图书情报专题研究

最新学科研究热点与前沿

（2019）

第 2 期

前　言

　　《图书情报专题研究》的宗旨是为我校师生开展学术研究提供有价值的参考信息，此项工作由图书馆信息咨询服务部承担。"最新学科研究热点与前沿"根据学校所购买的数字资源，通过分析其深层次的功能，从数据库中组织整理出了与我校学科领域相关的最新学科热点研究论文、最新研究前沿及最新国际会议信息等，以期能对我校师生开展学术研究、项目立项、开题等学术研究活动提供帮助。

　　本期收集整理了如下七个方面的热点文献和前沿信息：

　　1、Nature Latest Research，Nature Energy 最新研究进展；

　　2、IEL Top25，IEL 数据库下载最多的 25 篇论文；

　　3、ESI（Essential Science Indicators）HOT PAPERS，按照 ESI 某一学科热点论文被引频次排名选取前 25 篇；

　　4、ESI（Essential Science Indicators）HIGHLY CITED PAPERS，按照 ESI 某一学科高被引论文被引频次排名选取前 25 篇；

　　5、AIAA、IAF 最新会议，由 AIAA、IAF 主站提供的最新会议信息，可供相关研究者参考；

　　6、ACM 最新会议，根据 ACM 主页所提供的最新会议信息整理所得，可供相关研究者参考；

　　7、IQPC 最新会议，由国际质量与竞争力中心（IQPC：International Quality and Productivity Center）提供的最新国际会议，内容涉及国防、能源、工业、科技、电信等领域。IQPC 是国际顶级的会议展览策划公司，于 1973 年成立于美国，旨在为全球业务主管提供量身定制的会议、大型会展以及培训课程，积极为行业人士的相互交流创建平台，使业内人士能够随时掌握行业发展的最新趋势及技术创新。

　　如果您对我们的栏目设置、内容编排、出版方式等有好的意见和建议，欢迎与我们联系(电话：88492928)，我们将积极采纳，使这份电子刊物日臻完善，共同为把我校建成学科特色鲜明的世界一流大学而努力。

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目　录

NatureLatest Research(Energy)

来源：https://www.nature.com/nenergy/

1. **标题**：Performance of perovskite solar cells under simulated temperature-illumination real-world operating conditions

作者：Wolfgang Tress, Konrad Domanski, Brian Carlsen, Anand Agarwalla, Essa A. Alharbi, Michael Graetzel & Anders Hagfeldt

摘要：Since reaching 20% efficiency, research in perovskite photovoltaics has shifted from a race for efficiency to a race for stability. For efficiency, the standard test conditions set the rules for the race. However, the term 'stability' is used very broadly and assessed in various ways, meaning different groups are running different races. For the application, only energy yields that can be achieved under real-world, long-term operation matter. Here, we characterize and analyse the performance of an efficient perovskite solar cell (PSC) under simulated ambient conditions based on real temperature and irradiance data from selected days over one year at a location in central Europe. We find that the PSC shows only a low decrease of efficiency with elevated temperature and low light intensity, maintaining almost optimum values for ambient conditions, under which most of the solar energy is incident on the solar cell. The overall energy yield differs from what is expected from standard test condition measurements and is influenced by reversible degradation (delivering the highest performance in the morning) and by a slight permanent degradation that is observable during the year. With reference to tandem cells, we compare the PSC with a silicon device.

链接：https://www.nature.com/articles/s41560-019-0400-8

2. **标题**：Reduction of lead leakage from damaged lead halide perovskite solar modules using self-healing polymer-based encapsulation

作者：Yan Jiang, Longbin Qiu, Emilio J. Juarez-Perez, Luis K. Ono, Zhanhao Hu, Zonghao Liu, Zhifang Wu, Lingqiang Meng, Qijing Wang & Yabing Qi

摘要：In recent years, the major factors that determine commercialization of perovskite photovoltaic technology have been shifting from solar cell performance to stability, reproducibility, device upscaling and the prevention of lead (Pb) leakage from the module over the device service life. Here we simulate a realistic scenario in which perovskite modules with different encapsulation methods are mechanically damaged by a hail impact (modified FM 44787 standard) and quantitatively measure the Pb leakage rates under a variety of weather conditions. We demonstrate that the encapsulation method based on an epoxy resin reduces the Pb leakage rate by a factor of 375 compared with the encapsulation method based on a glass cover with an ultraviolet-cured resin at the module edges. The greater Pb leakage reduction of the epoxy resin encapsulation is associated with its optimal self-healing characteristics under the operating conditions and with its increased mechanical strength. These findings strongly suggest that perovskite photovoltaic products can be deployed with minimal Pb leakage if appropriate encapsulation is employed.

链接：https://www.nature.com/articles/s41560-019-0406-2

3.标题：High areal capacity battery electrodes enabled by segregated nanotube networks

作者：Sang-Hoon Park, Paul J. King, Ruiyuan Tian, Conor S. Boland, João Coelho, Chuanfang (John) Zhang, Patrick McBean, Niall McEvoy, Matthias P. Kremer, Dermot Daly, Jonathan N. Coleman & Valeria Nicolosi

摘要：Increasing the energy storage capability of lithium-ion batteries necessitates maximization of their areal capacity. This requires thick electrodes performing at near-theoretical specific capacity. However, achievable electrode thicknesses are restricted by mechanical instabilities, with high-thickness performance limited by the attainable electrode conductivity. Here we show that forming a segregated network composite of carbon nanotubes with a range of lithium storage materials (for example, silicon, graphite and metal oxide particles) suppresses mechanical instabilities by toughening the composite, allowing the fabrication of high-performance electrodes with thicknesses of up to 800 μm. Such composite electrodes display conductivities up to 1×10^4 S m^{-1} and low charge-transfer resistances, allowing fast charge-delivery and enabling near-theoretical specific capacities, even for thick electrodes. The combination of high thickness and specific capacity leads to areal capacities of up to 45 and 30 mAh cm^{-2} for anodes and cathodes, respectively. Combining optimized composite anodes and cathodes yields full cells with state-of-the-art areal capacities (29 mAh cm^{-2}) and specific/volumetric energies (480 Wh kg^{-1} and 1,600 Wh l^{-1}).

链接：https://www.nature.com/articles/s41560-019-0398-y

4.标题：Trace doping of multiple elements enables stable battery cycling of LiCoO2 at 4.6 V

作者：Jie-Nan Zhang, Qinghao Li, Chuying Ouyang, Xiqian Yu, Mingyuan Ge, Xiaojing Huang, Enyuan Hu, Chao Ma, Shaofeng Li, Ruijuan Xiao, Wanli Yang, Yong Chu, Yijin Liu, Huigen Yu, Xiao-Qing Yang, Xuejie Huang, Liquan Chen & Hong Li

摘要：LiCoO2 is a dominant cathode material for lithium-ion (Li-ion) batteries due to its high volumetric energy density, which could potentially be further improved by charging to high voltages. However, practical adoption of high-voltage charging is hindered by LiCoO2's structural instability at the deeply delithiated state and the associated safety concerns. Here, we achieve stable cycling of LiCoO2 at 4.6 V (versus Li/Li+) through trace Ti–Mg–Al co-doping. Using state-of-the-art synchrotron X-ray imaging and spectroscopic techniques, we report the incorporation of Mg and Al into the LiCoO2 lattice, which inhibits the undesired phase transition at voltages above 4.5 V. We also show that, even in trace amounts, Ti segregates significantly at grain boundaries and on the surface, modifying the microstructure of the particles while stabilizing the surface oxygen at high voltages. These dopants contribute through different mechanisms and synergistically promote the cycle stability of LiCoO2 at 4.6 V.

链接：https://www.nature.com/articles/s41560-019-0409-z

5. 标题：Visible-light-driven coproduction of diesel precursors and hydrogen from lignocellulose-derived methylfurans

作者：Nengchao Luo, Tiziano Montini, Jian Zhang, Paolo Fornasiero, Emiliano Fonda, Tingting Hou, Wei Nie, Jianmin Lu, Junxue Liu, Marc Heggen, Long Lin, Changtong Ma, Min Wang, Fengtao Fan, Shengye Jin & Feng Wang

摘要：Photocatalytic hydrogen production from biomass is a promising alternative to water splitting thanks to the oxidation half-reaction being more facile and its ability to simultaneously produce solar fuels and value-added chemicals. Here, we demonstrate the coproduction of H2 and diesel fuel precursors from lignocellulose-derived methylfurans via acceptorless dehydrogenative C−C coupling, using a Ru-doped ZnIn2S4 catalyst and driven by visible light. With this chemistry, up to 1.04 g gcatalyst−1 h−1 of diesel fuel precursors (~41% of which are precursors of branched-chain alkanes) are produced with selectivity higher than 96%, together with 6.0 mmol gcatalyst−1 h−1 of H2. Subsequent hydrodeoxygenation reactions yield the desired diesel fuels comprising straight- and branched-chain alkanes. We suggest that Ru dopants, substituted in the position of indium ions in the ZnIn2S4 matrix, improve charge separation efficiency, thereby accelerating C−H activation for the coproduction of H2 and diesel fuel precursors.

链接：https://www.nature.com/articles/s41557-019-0217-x

6.标题：Direct magnetic enhancement of electrocatalytic water oxidation in alkaline media

作者：Felipe A. Garcés-Pineda, Marta Blasco-Ahicart, David Nieto-Castro, Núria López & José Ramón Galán-Mascarós

摘要：Industrially profitable water splitting is one of the great challenges in the development of a viable and sustainable hydrogen economy. Alkaline electrolysers using Earth-abundant catalysts remain the most economically viable route to electrolytic hydrogen, but improved efficiency is desirable. Recently, electron spin polarization was described as a potential way to improve water-splitting catalysis. Here, we report the significant enhancement of alkaline water electrolysis when a moderate magnetic field (≤450 mT) is applied to the anode. Current density increments above 100% (over 100 mA cm−2) were found for highly magnetic electrocatalysts, such as the mixed oxide NiZnFe4Ox. Magnetic enhancement works even for decorated Ni–foam electrodes with very high current densities, improving their intrinsic activity by about 40% to reach over 1 A cm−2 at low overpotentials. Thanks to its simplicity, our discovery opens opportunities for implementing magnetic enhancement in water splitting.

链接：https://www.nature.com/articles/s41560-019-0404-4

7.标题：Atomically dispersed platinum supported on curved carbon supports for efficient electrocatalytic hydrogen evolution

作者：Daobin Liu, Xiyu Li, Shuangming Chen, Huan Yan, Changda Wang, Chuanqiang Wu, Yasir A. Haleem, Sai Duan, Junling Lu, Binghui Ge, Pulickel M. Ajayan, Yi Luo, Jun Jiang & Li Song

摘要：Dispersing catalytically active metals as single atoms on supports represents the ultimate in metal utilization efficiency and is increasingly being used as a strategy to design hydrogen evolution reaction (HER) electrocatalysts. Although platinum (Pt) is highly active for HER, given its high cost it is desirable to find ways to improve performance further while minimizing the Pt loading. Here, we use onion-like nanospheres of carbon (OLC) to anchor stable atomically dispersed Pt to act as a catalyst (Pt1/OLC) for the HER. In acidic media, the performance of the Pt1/OLC catalyst (0.27 wt% Pt) in terms of a low overpotential (38 mV at 10 mA cm−2) and high turnover frequencies (40.78 H2 s−1 at 100 mV) is better than that of a graphene-supported single-atom catalyst with a similar Pt loading, and comparable to a commercial Pt/C catalyst with 20 wt% Pt. First-principle calculations suggest that a tip-enhanced local electric field at the Pt site on the curved support promotes the reaction kinetics for hydrogen evolution.

链接：https://www.nature.com/articles/s41560-019-0402-6

8.标题：Challenges and opportunities towards fast-charging battery materials

作者：Yayuan Liu, Yangying Zhu & Yi Cui

摘要：Extreme fast charging, with a goal of 15 minutes recharge time, is poised to accelerate mass market adoption of electric vehicles, curb greenhouse gas emissions and, in turn, provide nations with greater energy security. However, the realization of such a goal requires research and development across multiple levels, with battery technology being a key technical barrier. The present-day high-energy lithium-ion batteries with graphite anodes and transition metal oxide cathodes in liquid electrolytes are unable to achieve the fast-charging goal without negatively affecting electrochemical performance and safety. Here we discuss the challenges and future research directions towards fast charging at the level of battery materials from mass transport, charge transfer and thermal management perspectives. Moreover, we highlight advanced characterization techniques to fundamentally understand the failure mechanisms of batteries during fast charging, which in turn would inform more rational battery designs.

链接：https://www.nature.com/articles/s41560-019-0405-3

9.标题：Public perceptions of and responses to new energy technologies

作者：Hilary S. Boudet

摘要：Energy's central place in economic, political and social systems—and the broad impacts that energy choices have on the natural world and public health—mean that new technologies often spur public reactions. Understanding these public responses and their drivers is important, as public support can influence new technology adoption and deployment. Here I review the literature on public perceptions of and responses to a wide range of new energy technologies. Unlike previous reviews that tend to focus on particular technologies or types of technologies, this Review covers both large-scale energy infrastructure projects, such as utility-scale wind and solar, fossil fuel extraction and marine renewables, as well as small-scale, 'consumer-facing' technologies such as electric vehicles, rooftop solar and smart meters. This approach reveals broad trends that may facilitate communication between policymakers, technologists and the public, and support the transition to a more sustainable energy system.

链接：https://www.nature.com/articles/s41560-019-0399-x

10.标题：A low ride on processing temperature for fast lithium conduction in garnet solid-state battery films

作者：Reto Pfenninger, Michal Struzik, Iñigo Garbayo, Evelyn Stilp & Jennifer L. M. Rupp

摘要：A critical parameter for the large-scale integration of solid-state batteries is to establish processing strategies to assemble battery materials at the lowest processing temperature possible while keeping lithium conduction up. Despite extensive research efforts, integrating ceramic film electrolytes while keeping a high lithium concentration and conduction at a low processing temperature remains challenging. Here, we report an alternative ceramic processing strategy through the evolution of multilayers establishing lithium reservoirs directly in lithium–garnet films that allow for lithiated and fast-conducting cubic solid-state battery electrolytes at unusually low processing temperatures. A lithium–garnet film processed via the multilayer processing approach exhibited the fastest ionic conductivity of $2.9 \pm 0.05 \times 10^{-5}\,\mathrm{S\,cm^{-1}}$ (at room temperature) and the desired cubic

phase, but was stabilized at a processing temperature lowered by 400 ℃. This method enables future solid-state battery architectures with more room for cathode volumes by design, and reduces the processing temperature.

链接：https://www.nature.com/articles/s41560-019-0384-4

11.标题：Building aqueous K-ion batteries for energy storage

作者：Liwei Jiang, Yaxiang Lu, Chenglong Zhao, Lilu Liu, Jienan Zhang, Qiangqiang Zhang, Xing Shen, Junmei Zhao, Xiqian Yu, Hong Li, Xuejie Huang, Liquan Chen & Yong-Sheng Hu

摘要：Aqueous K-ion batteries (AKIBs) are promising candidates for grid-scale energy storage due to their inherent safety and low cost. However, full AKIBs have not yet been reported due to the limited availability of suitable electrodes and electrolytes. Here we propose an AKIB system consisting of an Fe-substituted Mn-rich Prussian blue $KxFeyMn1−y[Fe(CN)6]w·zH2O$ cathode，an organic 3,4,9,10-perylenetetracarboxylic diimide anode and a 22 M $KCF3SO3$ water-in-salt electrolyte. The cathode achieves 70% capacity retention at 100 C and a lifespan of over 10,000 cycles due to the mitigation of phase transitions by Fe substitution. Meanwhile, the electrolyte can help decrease the dissolution of both electrodes owing to the lack of free water. The AKIB exhibits a high energy density of 80 Wh kg−1 and can operate well at rates of 0.1–20 C and over a wide temperature range (−20 to 60 ℃). We believe that our demonstration could pave the way for practical applications of AKIBs for grid-scale energy storage.

链接：https://www.nature.com/articles/s41560-019-0388-0

12.标题：High-energy lithium metal pouch cells with limited anode swelling and long stable cycles

作者：Chaojiang Niu, Hongkyung Lee, Shuru Chen, Qiuyan Li, Jason Du, Wu Xu, Ji-Guang Zhang, M. Stanley Whittingham, Jie Xiao & Jun Liu

摘要：Lithium metal anodes have attracted much attention as candidates for high-energy batteries, but there have been few reports of long cycling behaviour, and the degradation mechanism of realistic high-energy Li metal cells remains unclear. Here，we develop a prototypical 300 Wh kg−1 (1.0 Ah) pouch cell by integrating a Li metal anode, a $LiNi0.6Mn0.2Co0.2O2$ cathode and a compatible electrolyte. Under small uniform external pressure, the cell undergoes 200 cycles with 86% capacity retention and 83% energy retention. In the initial 50 cycles, flat Li foil converts into large Li particles that are entangled in the solid-electrolyte interphase, which leads to rapid volume expansion of the anode (cell thickening of 48%). As cycling continues, the external pressure helps the Li anode maintain good contact between the Li particles, which ensures a conducting percolation pathway for both ions and electrons, and thus the electrochemical reactions continue to occur. Accordingly, the solid Li particles evolve into a porous structure, which manifests in substantially reduced cell swelling by 19% in the subsequent 150 cycles.

链接：https://www.nature.com/articles/s41560-019-0390-6

13.标题：An evaluation of air quality, home heating and well-being under Beijing's programme to eliminate household coal use

作者：Christopher Barrington-Leigh, Jill Baumgartner, Ellison Carter, Brian E. Robinson, Shu Tao & Yuanxun Zhang

摘要：To mitigate health and environmental effects from coal-based home heating, the Beijing Municipality has implemented a programme in 3,700 villages that subsidizes electric heat pumps and

electricity, and bans coal. Here, we estimate this programme's impact on household energy use and expenditure, well-being and indoor environmental quality by comparing treated and untreated villages in three districts that vary in socioeconomic conditions. We find that, under this programme, households in high- and middle-income districts eliminated coal use with benefits to indoor temperature, indoor air pollution and life satisfaction. In a low-income district, the policy had partial effectiveness: coal use was contingent on household wealth, and there were fewer benefits to the indoor environment and negative impacts on well-being. These results suggest that a rapid household energy transition can be effective, but it is essential to appropriately control subsidies and fine-tune supports to limit transitional hardships for the less affluent.

链接：https://www.nature.com/articles/s41560-019-0386-2

14. 标题：Understanding the role of selenium in defect passivation for highly efficient selenium-alloyed cadmium telluride solar cells

作者：Thomas A. M. Fiducia, Budhika G. Mendis, Kexue Li, Chris R. M. Grovenor, Amit H. Munshi, Kurt Barth, Walajabad S. Sampath, Lewis D. Wright, Ali Abbas, Jake W. Bowers & John M. Walls

摘要：Electricity produced by cadmium telluride (CdTe) photovoltaic modules is the lowest-cost electricity in the solar industry, and now undercuts fossil fuel-based sources in many regions of the world. This is due to recent efficiency gains brought about by alloying selenium into the CdTe absorber, which has taken cell efficiency from 19.5% to its current record of 22.1%. Although the addition of selenium is known to reduce the bandgap of the absorber material, and hence increase the cell short-circuit current, this effect alone does not explain the performance improvement. Here, by means of cathodoluminescence and secondary ion mass spectrometry, we show that selenium enables higher luminescence efficiency and longer diffusion lengths in the alloyed material, indicating that selenium passivates critical defects in the bulk of the absorber layer. This passivation effect explains the record-breaking performance of selenium-alloyed CdTe devices, and provides a route for further efficiency improvement that can result in even lower costs for solar-generated electricity.

链接：https://www.nature.com/articles/s41560-019-0389-z

15. 标题：Building ultraconformal protective layers on both secondary and primary particles of layered lithium transition metal oxide cathodes

作者：Gui-Liang Xu, Qiang Liu, Kenneth K. S. Lau, Yuzi Liu, Xiang Liu, Han Gao, Xinwei Zhou, Minghao Zhuang, Yang Ren, Jiadong Li, Minhua Shao, Minggao Ouyang, Feng Pan, Zonghai Chen, Khalil Amine & Guohua Chen

摘要：Despite their relatively high capacity, layered lithium transition metal oxides suffer from crystal and interfacial structural instability under aggressive electrochemical and thermal driving forces, leading to rapid performance degradation and severe safety concerns. Here we report a transformative approach using an oxidative chemical vapour deposition technique to build a protective conductive polymer (poly(3,4-ethylenedioxythiophene)) skin on layered oxide cathode materials. The ultraconformal poly(3,4-ethylenedioxythiophene) skin facilitates the transport of lithium ions and electrons, significantly suppresses the undesired layered to spinel/rock-salt phase transformation and the associated oxygen loss, mitigates intergranular and intragranular mechanical cracking, and effectively stabilizes the cathode–electrolyte interface. This approach remarkably enhances the capacity and thermal stability under high-voltage operation. Building a protective skin at both secondary and primary particle levels of layered oxides offers a promising design strategy for

Ni-rich cathodes towards high-energy, long-life and safe lithium-ion batteries.

链接：https://www.nature.com/articles/s41560-019-0387-1

16.标题：Cation and anion immobilization through chemical bonding enhancement with fluorides for stable halide perovskite solar cells

作者：Nengxu Li, Shuxia Tao, Yihua Chen, Xiuxiu Niu, Chidozie K. Onwudinanti, Chen Hu, Zhiwen Qiu, Ziqi Xu, Guanhaojie Zheng, Ligang Wang, Yu Zhang, Liang Li, Huifen Liu, Yingzhuo Lun, Jiawang Hong, Xueyun Wang, Yuquan Liu, Haipeng Xie, Yongli Gao, Yang Bai, Shihe Yang, Geert Brocks, Qi Chen & Huanping Zhou

摘要：Defects play an important role in the degradation processes of hybrid halide perovskite absorbers, impeding their application for solar cells. Among all defects, halide anion and organic cation vacancies are ubiquitous, promoting ion diffusion and leading to thin-film decomposition at surfaces and grain boundaries. Here, we employ fluoride to simultaneously passivate both anion and cation vacancies, by taking advantage of the extremely high electronegativity of fluoride. We obtain a power conversion efficiency of 21.46% (and a certified 21.3%-efficient cell) in a device based on the caesium, methylammonium (MA) and formamidinium (FA) triple-cation perovskite $(Cs_{0.05}FA_{0.54}MA_{0.41})Pb(I_{0.98}Br_{0.02})_3$ treated with sodium fluoride. The device retains 90% of its original power conversion efficiency after 1,000 h of operation at the maximum power point. With the help of first-principles density functional theory calculations, we argue that the fluoride ions suppress the formation of halide anion and organic cation vacancies, through a unique strengthening of the chemical bonds with the surrounding lead and organic cations.

链接：https://www.nature.com/articles/s41560-019-0382-6

17.标题：A thermally synergistic photo-electrochemical hydrogen generator operating under concentrated solar irradiation

作者：Saurabh Tembhurne, Fredy Nandjou & Sophia Haussener

摘要：Achieving high current densities while maintaining high energy conversion efficiency is one of the main challenges for enhancing the competitiveness of photo-electrochemical devices. We describe a concept that allows this challenge to be overcome by operating under concentrated solar irradiation (up to 474 kW m−2), using thermal integration, mass transport optimization and a close electronic integration between the photoabsorber and electrocatalyst. We quantify the increase in the theoretical maximum efficiencies resulting from thermal integration, and experimentally validate the concept using a III–V-based photoabsorber and IrRuOx–Pt-based electrocatalysts. We reach current densities higher than 0.88 A cm−2 at calculated solar-to-hydrogen conversion efficiencies above 15%. Device performance, dynamic response and stability are investigated, demonstrating the ability to produce hydrogen stably under varying conditions for more than two hours. The current density and output power (27 W) achieved provide a pathway for device scalability aimed towards the large-scale deployment of photo-electrochemical hydrogen production.

链接：https://www.nature.com/articles/s41560-019-0373-7

18.标题：Path dependency in provision of domestic heating

作者：Robert Gross & Richard Hanna

摘要：In the United Kingdom, natural gas dominates the provision of heating in buildings. In Sweden, oil heating has been largely replaced by district heating and heat pumps. The origins and outcomes of

path dependence and lock-in in heat-system evolution can be country specific. Here, we compare case studies of heat transitions in the United Kingdom and Sweden, addressing the question: can path dependency help to understand why these countries have followed different paths in terms of change to their heating infrastructure? In both countries, the development of heating infrastructures can be understood as path-dependent processes, entailing increasing returns to adoption as fuel sources, infrastructures and end-use technologies coevolve such that the overall performance of the system increases. The challenge for policymakers seeking to achieve carbon targets is to consider how to create the conditions to encourage increasing returns to adoption of low-carbon heating solutions.

链接：https://www.nature.com/articles/s41560-019-0383-5

19.标题：Co-electrolysis of CO2 and glycerol as a pathway to carbon chemicals with improved technoeconomics due to low electricity consumption

作者：Sumit Verma, Shawn Lu & Paul J. A. Kenis

摘要：The renewable electricity-driven electroreduction of carbon dioxide (CO2) offers an alternative pathway to producing carbon chemicals that are traditionally manufactured using fossil fuels. Typical CO2 electroreduction approaches couple cathodic CO2 reduction with the anodic oxygen evolution reaction (OER), resulting in approximately 90% of the electricity input being consumed by the OER. Here, we explore alternatives to the OER and show that the anodic electro-oxidation of glycerol (a byproduct of industrial biodiesel and soap production) can lower electricity consumption by up to 53%. This reduces the process's operating costs and carbon footprint, thus opening avenues for a carbon-neutral cradle-to-gate process even when driven by grid electricity (~13% renewables today), as well as economical production of the 12-electron products ethylene and ethanol. This study may thus serve as a framework for the design of CO2 electroreduction processes with low electricity requirements, enhancing their CO2 utilization potential and economic viability.

链接：https://www.nature.com/articles/s41560-019-0374-6

20.标题：Comparative net energy analysis of renewable electricity and carbon capture and storage

作者：Sgouris Sgouridis, Michael Carbajales-Dale, Denes Csala, Matteo Chiesa & Ugo Bardi

摘要：Carbon capture and storage (CCS) for fossil-fuel power plants is perceived as a critical technology for climate mitigation. Nevertheless, limited installed capacity to date raises concerns about the ability of CCS to scale sufficiently. Conversely, scalable renewable electricity installations—solar and wind—are already deployed at scale and have demonstrated a rapid expansion potential. Here we show that power-sector CO2 emission reductions accomplished by investing in renewable technologies generally provide a better energetic return than CCS. We estimate the electrical energy return on energy invested ratio of CCS projects, accounting for their operational and infrastructural energy penalties, to range between 6.6:1 and 21.3:1 for 90% capture ratio and 85% capacity factor. These values compare unfavourably with dispatchable scalable renewable electricity with storage, which ranges from 9:1 to 30+:1 under realistic configurations. Therefore, renewables plus storage provide a more energetically effective approach to climate mitigation than constructing CCS fossil-fuel power stations.

链接：https://www.nature.com/articles/s41560-019-0365-7

21. **标题**：Poly(aryl piperidinium) membranes and ionomers for hydroxide exchange membrane fuel cells

作者：Junhua Wang, Yun Zhao, Brian P. Setzler, Santiago Rojas-Carbonell, Chaya Ben Yehuda, Alina Amel, Miles Page, Lan Wang, Keda Hu, Lin Shi, Shimshon Gottesfeld, Bingjun Xu & Yushan Yan

摘要：One promising approach to reduce the cost of fuel cell systems is to develop hydroxide exchange membrane fuel cells (HEMFCs), which open up the possibility of platinum-group-metal-free catalysts and low-cost bipolar plates. However, scalable alkaline polyelectrolytes (hydroxide exchange membranes and hydroxide exchange ionomers), a key component of HEMFCs, with desired properties are currently unavailable, which presents a major barrier to the development of HEMFCs. Here we show hydroxide exchange membranes and hydroxide exchange ionomers based on poly(aryl piperidinium) (PAP) that simultaneously possess adequate ionic conductivity, chemical stability, mechanical robustness, gas separation and selective solubility. These properties originate from the combination of the piperidinium cation and the rigid ether-bond-free aryl backbone. A low-Pt membrane electrode assembly with a Ag-based cathode using PAP materials showed an excellent peak power density of 920 mW cm−2 and operated stably at a constant current density of 500 mA cm−2 for 300 h with H2/CO2-free air at 95 °C.

链接：https://www.nature.com/articles/s41560-019-0372-8

22. **标题**：Deep eutectic solvents for cathode recycling of Li-ion batteries

作者：Mai K. Tran, Marco-Tulio F. Rodrigues, Keiko Kato, Ganguli Babu & Pulickel M. Ajayan

摘要：As the consumption of lithium-ion batteries (LIBs) for the transportation and consumer electronic sectors continues to grow, so does the pile of battery waste, with no successful recycling model, as exists for the lead–acid battery. Here, we exhibit a method to recycle LIBs using deep eutectic solvents to extract valuable metals from various chemistries, including lithium cobalt (III) oxide and lithium nickel manganese cobalt oxide. For the metal extraction from lithium cobalt (III) oxide, leaching efficiencies of ≥90% were obtained for both cobalt and lithium. It was also found that other battery components, such as aluminium foil and polyvinylidene fluoride binder, can be recovered separately. Deep eutectic solvents could provide a green alternative to conventional methods of LIB recycling and reclaiming strategically important metals, which remain crucial to meet the demand of the exponentially increasing LIB production.

链接：https://www.nature.com/articles/s41560-019-0368-4

23. **标题**：Intercalation-conversion hybrid cathodes enabling Li–S full-cell architectures with jointly superior gravimetric and volumetric energy densities

作者：Weijiang Xue, Zhe Shi, Liumin Suo, Chao Wang, Ziqiang Wang, Haozhe Wang, Kang Pyo So, Andrea Maurano, Daiwei Yu, Yuming Chen, Long Qie, Zhi Zhu, Guiyin Xu, Jing Kong & Ju Li

摘要：A common practise in the research of Li–S batteries is to use high electrode porosity and excessive electrolytes to boost sulfur-specific capacity. Here we propose a class of dense intercalation-conversion hybrid cathodes by combining intercalation-type Mo6S8 with conversion-type sulfur to realize a Li–S full cell. The mechanically hard Mo6S8 with fast Li-ion transport ability, high electronic conductivity, active capacity contribution and high affinity for lithium polysulfides is shown to be an ideal backbone to immobilize the sulfur species and unlock their high gravimetric capacity. Cycling stability and rate capability are reported under realistic conditions of low carbon content (~10 wt%), low electrolyte/active material ratio (~1.2 µl mg−1), low

cathode porosity (~55 vol%) and high mass loading (>10 mg cm−2). A pouch cell assembled based on the hybrid cathode and a 2× excess Li metal anode is able to simultaneously deliver a gravimetric energy density of 366 Wh kg−1 and a volumetric energy density of 581 Wh l−1.

链接：https://www.nature.com/articles/s41560-019-0351-0

24. **标题**：Chemical and structural origin of lattice oxygen oxidation in Co–Zn oxyhydroxide oxygen evolution electrocatalysts

作者：Zhen-Feng Huang, Jiajia Song, Yonghua Du, Shibo Xi, Shuo Dou, Jean Marie Vianney Nsanzimana, Cheng Wang, Zhichuan J. Xu & Xin Wang

摘要：The oxygen evolution reaction (OER) is a key process in electrochemical energy conversion devices. Understanding the origins of the lattice oxygen oxidation mechanism is crucial because OER catalysts operating via this mechanism could bypass certain limitations associated with those operating by the conventional adsorbate evolution mechanism. Transition metal oxyhydroxides are often considered to be the real catalytic species in a variety of OER catalysts and their low-dimensional layered structures readily allow direct formation of the O–O bond. Here, we incorporate catalytically inactive Zn^{2+} into CoOOH and suggest that the OER mechanism is dependent on the amount of Zn^{2+} in the catalyst. The inclusion of the Zn^{2+} ions gives rise to oxygen non-bonding states with different local configurations that depend on the quantity of Zn^{2+}. We propose that the OER proceeds via the lattice oxygen oxidation mechanism pathway on the metal oxyhydroxides only if two neighbouring oxidized oxygens can hybridize their oxygen holes without sacrificing metal–oxygen hybridization significantly, finding that $Zn_{0.2}Co_{0.8}OOH$ has the optimum activity.

链接：https://www.nature.com/articles/s41560-019-0355-9

25. **标题**：Data-driven prediction of battery cycle life before capacity degradation

作者：Kristen A. Severson, Peter M. Attia, Norman Jin, Nicholas Perkins, Benben Jiang, Zi Yang, Michael H. Chen, Muratahan Aykol, Patrick K. Herring, Dimitrios Fraggedakis, Martin Z. Bazant, Stephen J. Harris, William C. Chueh & Richard D. Braatz

摘要：Accurately predicting the lifetime of complex, nonlinear systems such as lithium-ion batteries is critical for accelerating technology development. However, diverse aging mechanisms, significant device variability and dynamic operating conditions have remained major challenges. We generate a comprehensive dataset consisting of 124 commercial lithium iron phosphate/graphite cells cycled under fast-charging conditions, with widely varying cycle lives ranging from 150 to 2,300 cycles. Using discharge voltage curves from early cycles yet to exhibit capacity degradation, we apply machine-learning tools to both predict and classify cells by cycle life. Our best models achieve 9.1% test error for quantitatively predicting cycle life using the first 100 cycles (exhibiting a median increase of 0.2% from initial capacity) and 4.9% test error using the first 5 cycles for classifying cycle life into two groups. This work highlights the promise of combining deliberate data generation with data-driven modelling to predict the behaviour of complex dynamical systems.

链接：https://www.nature.com/articles/s41560-019-0356-8

IEL Top25

（来源：http://ieeexplore.ieee.org/）

1.标题：Millimeter Wave Mobile Communications for 5G Cellular: It Will Work!

作者：Theodore S. Rappaport ; Shu Sun ; Rimma Mayzus ; Hang Zhao ; Yaniv Azar ; Kevin Wang ; George N. Wong ; Jocelyn K. Schulz ; Mathew Samimi ; Felix Gutierrez

出处：IEEE Access

Volume: 1 Date : 2013

Page(s):   335 - 349

摘要: The global bandwidth shortage facing wireless carriers has motivated the exploration of the underutilized millimeter wave (mm-wave) frequency spectrum for future broadband cellular communication networks. There is, however, little knowledge about cellular mm-wave propagation in densely populated indoor and outdoor environments. Obtaining this information is vital for the design and operation of future fifth generation cellular networks that use the mm-wave spectrum. In this paper, we present the motivation for new mm-wave cellular systems, methodology, and hardware for measurements and offer a variety of measurement results that show 28 and 38 GHz frequencies can be used when employing steerable directional antennas at base stations and mobile devices.

链接: https://ieeexplore.ieee.org/document/6515173

2.标题：Application of Big Data and Machine Learning in Smart Grid, and Associated Security Concerns: A Review

作者：Eklas Hossain ; Imtiaj Khan ; Fuad Un-Noor ; Sarder Shazali Sikander ; Md. Samiul Haque Sunny

出处：IEEE Access

Volume: 7 Date : 2019

Page(s):   13960 - 13988

摘要: This paper conducts a comprehensive study on the application of big data and machine learning in the electrical power grid introduced through the emergence of the next-generation power system-the smart grid (SG). Connectivity lies at the core of this new grid infrastructure, which is provided by the Internet of Things (IoT). This connectivity, and constant communication required in this system, also introduced a massive data volume that demands techniques far superior to conventional methods for proper analysis and decision-making. The IoT-integrated SG system can provide efficient load forecasting and data acquisition technique along with cost-effectiveness. Big data analysis and machine learning techniques are essential to reaping these benefits. In the complex connected system of SG, cyber security becomes a critical issue; IoT devices and their data turning into major targets of attacks. Such security concerns and their solutions are also included in this paper. Key information obtained through literature review is tabulated in the corresponding sections to provide a clear synopsis; and the findings of this rigorous review are listed to give a concise picture of this area of study and promising future fields of academic and industrial research, with current limitations with viable solutions along with their effectiveness.

链接: https://ieeexplore.ieee.org/document/8625421

3.标题：Original Symbol Phase Rotated Secure Transmission Against Powerful Massive MIMO Eavesdropper

作者：Bin Chen ; Chunsheng Zhu ; Wei Li ; Jibo Wei ; Victor C. M. Leung ; Laurence T. Yang

摘要: Massive multiple-input multiple-output (MIMO) has been extensively studied and considered as a key enabling technology for the fifth generation (5G) wireless communication systems, due to its potential to achieve high energy efficiency and spectral efficiency. As the concept of massive MIMO becomes more popular, it is plausible that the eavesdroppers will also employ massive antennas, which may remarkably enhance their ability to intercept the information. In this paper, motivated by the need to protect against the eavesdroppers equipped with powerful large antenna arrays, which has received scarce attention in the literature, a physical layer security approach called original symbol phase rotated (OSPR) secure transmission scheme is proposed to defend against eavesdroppers armed with unlimited antennas. The basic idea of the proposed OSPR scheme is to randomly rotate the phase of original symbols at the base station (BS) before they are transmitted, so that the massive MIMO eavesdropper will be confused by the intercepted signals, which may not represent the true information symbols. However, the legitimate users are able to infer the correct phase rotations and take proper inverse operations to recover the original symbols. We show that when the BS has a large enough, but finite number of antennas, the proposed OSPR scheme can achieve a considerable security performance in that the eavesdropper is unable to recover most of the original symbols, even with unlimited antennas. The process and the security performance of the proposed OSPR scheme are presented in detail. Simulation results are provided to further corroborate that the proposed OSPR scheme is a potential green secure transmission candidate technique for the future wireless networks.
链接: https://ieeexplore.ieee.org/document/7491252

4.标题：A Hardware Accelerator for Tracing Garbage Collection

作者：Martin Maas ; Krste Asanovic ; John Kubiatowicz

摘要: Many workloads are written in garbage-collected languages and GC consumes a significant fraction of resources for these workloads. We propose to decrease this overhead by moving GC into a small hardware accelerator that is located close to the memory controller and performs GC more efficiently than a CPU. We first show a general design of such a GC accelerator and describe how it can be integrated into both stop-the-world and pause-free garbage collectors. We then demonstrate an end-to-end RTL prototype, integrated into a RocketChip RISC-V System-on-Chip (SoC) executing full Java benchmarks within JikesRVM running under Linux on FPGAs. Our prototype performs the mark phase of a tracing GC at $4.2\times$ the performance of an in-order CPU, at just 18.5% the area. By prototyping our design in a real system, we show that our accelerator can be adopted without invasive changes to the SoC, and estimate its performance, area, and energy.
链接: https://ieeexplore.ieee.org/document/8695831

5.标题：Internet of Things for Smart Cities

作者：Andrea Zanella ; Nicola Bui ; Angelo Castellani ; Lorenzo Vangelista ; Michele Zorzi

出处：IEEE Internet of Things Journal

Volume: 1 Issue: 1 Date : Feb. 2014

Page(s):   22 - 32

摘要：The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different and heterogeneous end systems, while providing open access to selected subsets of data for the development of a plethora of digital services. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system. In this paper, we focus specifically to an urban IoT system that, while still being quite a broad category, are characterized by their specific application domain. Urban IoTs, in fact, are designed to support the Smart City vision, which aims at exploiting the most advanced communication technologies to support added-value services for the administration of the city and for the citizens. This paper hence provides a comprehensive survey of the enabling technologies, protocols, and architecture for an urban IoT. Furthermore, the paper will present and discuss the technical solutions and best-practice guidelines adopted in the Padova Smart City project, a proof-of-concept deployment of an IoT island in the city of Padova, Italy, performed in collaboration with the city municipality.

链接：https://ieeexplore.ieee.org/document/6740844

6.标题：Big IoT Data Analytics: Architecture, Opportunities, and Open Research Challenges

作者：Mohsen Marjani ; Fariza Nasaruddin ; Abdullah Gani ; Ahmad Karim ; Ibrahim Abaker Targio Hashem ; Aisha Siddiqa ; Ibrar Yaqoob

出处：IEEE Access

Volume: 5 Date : 2017

Page(s):   5247 - 5261

摘要: Voluminous amounts of data have been produced, since the past decade as the miniaturization of Internet of things (IoT) devices increases. However, such data are not useful without analytic power. Numerous big data, IoT, and analytics solutions have enabled people to obtain valuable insight into large data generated by IoT devices. However, these solutions are still in their infancy, and the domain lacks a comprehensive survey. This paper investigates the state-of-the-art research efforts directed toward big IoT data analytics. The relationship between big data analytics and IoT is explained. Moreover, this paper adds value by proposing a new architecture for big IoT data analytics. Furthermore, big IoT data analytic types, methods, and technologies for big data mining are discussed. Numerous notable use cases are also presented. Several opportunities brought by data analytics in IoT paradigm are then discussed. Finally, open research challenges, such as privacy, big data mining, visualization, and integration, are presented as future research directions.

链接: https://ieeexplore.ieee.org/document/7888916

7.标题：Blockchains and Smart Contracts for the Internet of Things

作者：Konstantinos Christidis ; Michael Devetsikiotis

出处：IEEE Access

Volume: 4 Date : 2016

Page(s):   2292 - 2303

摘要: Motivated by the recent explosion of interest around blockchains, we examine whether they make a good fit for the Internet of Things (IoT) sector. Blockchains allow us to have a distributed peer-to-peer network where non-trusting members can interact with each other without a trusted intermediary, in a verifiable manner. We review how this mechanism works and also look into smart contracts-scripts that reside on the blockchain that allow for the automation of multi-step processes. We then move into the IoT domain, and describe how a blockchain-IoT combination: 1) facilitates the sharing of services and resources leading to the creation of a marketplace of services between devices and 2) allows us to automate in a cryptographically verifiable manner several existing, time-consuming workflows. We also point out certain issues that should be considered before the deployment of a blockchain network in an IoT setting: from transactional privacy to the expected value of the digitized assets traded on the network. Wherever applicable, we identify solutions and workarounds. Our conclusion is that the blockchain-IoT combination is powerful and can cause significant transformations across several industries, paving the way for new business models and novel, distributed applications.

链接: https://ieeexplore.ieee.org/document/7467408

8.标题：Securing Uplink Transmission for Lightweight Single-Antenna UEs in the Presence of a Massive MIMO Eavesdropper

作者：Bin Chen ; Chunsheng Zhu ; Lei Shu ; Man Su ; Jibo Wei ; Victor C. M. Leung ; Joel J. P. C. Rodrigues

出处：IEEE Access

Volume: 4 Date : 2016

Page(s): 5374 - 5384

摘要: With the coming of the Internet of Things (IoT) and the fifth generation (5G) wireless communication era, more and more lightweight user equipments (UEs) appear in our life. The private information they gather and transmit on the uplink will likely face security risks, since the lightweight UEs are probably with limited number of antennas, e.g., only one antenna, limited power and low signal processing and data computing capabilities, which may inherently weaken the corresponding secrecy performance. As a consequence, traditional cryptographic techniques and complex physical layer security techniques with favorable secrecy performance may not be suitable for lightweight UEs due to high implementation complexity. Moreover, it is highly plausible that the unauthorized nodes can utilize much more powerful large antenna array, i.e., massive multiple-input multiple-output (MIMO) technology, to intercept the uplink information sent by the lightweight UEs due to the maturity of massive MIMO technology by then. Considering the possibility of facing massive MIMO eavesdropper, we propose to adopt the uplink original symbol phase rotated (UOSPR) scheme to secure the uplink transmission for lightweight single-antenna UEs in this paper. By employing the UOSPR secure transmission scheme, the lightweight UEs will randomly rotate the original information bearing symbols before they are transmitted to the BS on the uplink. This can be viewed as a symbol encryption process. The BS is then assured to be able to infer the accurate phase rotation and recover the original symbols while the massive MIMO eavesdropper can learn little useful information about the randomly rotated phase. The corresponding secrecy analysis of the UOSPR scheme on the uplink transmission is presented in detail. Furthermore, we show that the UOSPR scheme is with low complexity from the perspective of the lightweight UEs, which potentially makes it a candidate uplink secure transmission scheme in IoT and 5G scena...

链接: https://ieeexplore.ieee.org/document/7565464

9.标题：SegNet: A Deep Convolutional Encoder-Decoder Architecture for Image Segmentation
作者：Vijay Badrinarayanan ; Alex Kendall ; Roberto Cipolla
出处：IEEE Transactions on Pattern Analysis and Machine Intelligence
Volume: 39 Issue: 12 Date : 1 Dec. 2017
Page(s): 2481 - 2495

摘要: We present a novel and practical deep fully convolutional neural network architecture for semantic pixel-wise segmentation termed SegNet. This core trainable segmentation engine consists of an encoder network, a corresponding decoder network followed by a pixel-wise classification layer. The architecture of the encoder network is topologically identical to the 13 convolutional layers in the VGG16 network [1] . The role of the decoder network is to map the low resolution encoder feature maps to full input resolution feature maps for pixel-wise classification. The novelty of SegNet lies is in the manner in which the decoder upsamples its lower resolution input feature map(s). Specifically, the decoder uses pooling indices computed in the max-pooling step of the corresponding encoder to perform non-linear upsampling. This eliminates the need for learning to upsample. The upsampled maps are sparse and are then convolved with trainable filters to produce dense feature maps. We compare our proposed architecture with the widely adopted FCN [2] and also with the well known DeepLab-LargeFOV [3] , DeconvNet [4] architectures. This comparison reveals the memory versus accuracy trade-off involved in achieving good segmentation performance. SegNet was primarily motivated by scene understanding applications. Hence, it is designed to be efficient both in terms of memory and computational time during inference. It is also significantly smaller in the number of trainable parameters than other competing architectures and can be trained end-to-end using stochastic gradient descent. We also performed a controlled benchmark of SegNet and other architectures on both road scenes and SUN RGB-D indoor scene segmentation tasks. These quantitative assessments show that SegNet provides good performance with competitive inference time and most efficient inference memory-wise as compared to other architectures. We also provide a Caffe implementation of SegNet and a web demo at http://mi.eng.cam....
链接: https://ieeexplore.ieee.org/document/7803544/

10.标题：Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications
作者：Ala Al-Fuqaha ; Mohsen Guizani ; Mehdi Mohammadi ; Mohammed Aledhari ; Moussa Ayyash
出处：IEEE Communications Surveys & Tutorials
Volume: 17 Issue: 4 Date : Fourthquarter 2015
Page(s): 2347 - 2376

摘要: This paper provides an overview of the Internet of Things (IoT) with emphasis on enabling technologies, protocols, and application issues. The IoT is enabled by the latest developments in RFID, smart sensors, communication technologies, and Internet protocols. The basic premise is to have smart sensors collaborate directly without human involvement to deliver a new class of applications. The current revolution in Internet, mobile, and machine-to-machine (M2M) technologies can be seen as the first phase of the IoT. In the coming years, the IoT is expected to bridge diverse technologies to enable new applications by connecting physical objects together in support of intelligent decision making. This paper starts by providing a horizontal overview of the

IoT. Then, we give an overview of some technical details that pertain to the IoT enabling technologies, protocols, and applications. Compared to other survey papers in the field, our objective is to provide a more thorough summary of the most relevant protocols and application issues to enable researchers and application developers to get up to speed quickly on how the different protocols fit together to deliver desired functionalities without having to go through RFCs and the standards specifications. We also provide an overview of some of the key IoT challenges presented in the recent literature and provide a summary of related research work. Moreover, we explore the relation between the IoT and other emerging technologies including big data analytics and cloud and fog computing. We also present the need for better horizontal integration among IoT services. Finally, we present detailed service use-cases to illustrate how the different protocols presented in the paper fit together to deliver desired IoT services.

链接: https://ieeexplore.ieee.org/document/7123563

11.标题：Decentralizing Privacy: Using Blockchain to Protect Personal Data

作者：Guy Zyskind ; Oz Nathan ; Alex 'Sandy' Pentland

出处：2015 IEEE Security and Privacy Workshops

Date : 21-22 May 2015

Page(s): 180 - 184

摘要: The recent increase in reported incidents of surveillance and security breaches compromising users' privacy call into question the current model, in which third-parties collect and control massive amounts of personal data. Bit coin has demonstrated in the financial space that trusted, auditable computing is possible using a decentralized network of peers accompanied by a public ledger. In this paper, we describe a decentralized personal data management system that ensures users own and control their data. We implement a protocol that turns a block chain into an automated access-control manager that does not require trust in a third party. Unlike Bit coin, transactions in our system are not strictly financial -- they are used to carry instructions, such as storing, querying and sharing data. Finally, we discuss possible future extensions to block chains that could harness them into a well-rounded solution for trusted computing problems in society.

链接: https://ieeexplore.ieee.org/document/7163223

12.标题：IEEE Standard for Ethernet

IEEE Std 802.3-2018 (Revision of IEEE Std 802.3-2015)

出处: IEEE

Date : 31 Aug. 2018

Page(s): 1 - 5600

摘要: Ethernet local area network operation is specified for selected speeds of operation from 1 Mb/s to 400 Gb/s using a common media access control (MAC) specification and management information base (MIB). The Carrier Sense Multiple Access with Collision Detection (CSMA/CD) MAC protocol specifies shared medium (half duplex) operation, as well as full duplex operation. Speed specific Media Independent Interfaces (MIIs) allow use of selected Physical Layer devices (PHY) for operation over coaxial, twisted pair or fiber optic cables, or electrical backplanes. System considerations for multisegment shared access networks describe the use of Repeaters that are defined for operational speeds up to 1000 Mb/s. Local Area Network (LAN) operation is supported at all speeds. Other specified capabilities include: various PHY types for access networks, PHYs

suitable for metropolitan area network applications, and the provision of power over selected twisted pair PHY types.

链接: https://ieeexplore.ieee.org/document/8457469

13.标题：A Survey of Data Mining and Machine Learning Methods for Cyber Security Intrusion Detection

作者：Anna L. Buczak ; Erhan Guven

出处：IEEE Communications Surveys & Tutorials

Volume: 18 Issue: 2 Date : Secondquarter 2016

Page(s)： 1153 - 1176

摘要: This survey paper describes a focused literature survey of machine learning (ML) and data mining (DM) methods for cyber analytics in support of intrusion detection. Short tutorial descriptions of each ML/DM method are provided. Based on the number of citations or the relevance of an emerging method, papers representing each method were identified, read, and summarized. Because data are so important in ML/DM approaches, some well-known cyber data sets used in ML/DM are described. The complexity of ML/DM algorithms is addressed, discussion of challenges for using ML/DM for cyber security is presented, and some recommendations on when to use a given method are provided.

链接: https://ieeexplore.ieee.org/document/7307098

14.标题：The Internet of Things for Health Care: A Comprehensive Survey

作者：S. M. Riazul Islam ; Daehan Kwak ; MD. Humaun Kabir ; Mahmud Hossain ; Kyung-Sup Kwak

出处：IEEE Access

Volume: 3 Date : 2015

Page(s)： 678 - 708

摘要: The Internet of Things (IoT) makes smart objects the ultimate building blocks in the development of cyber-physical smart pervasive frameworks. The IoT has a variety of application domains, including health care. The IoT revolution is redesigning modern health care with promising technological, economic, and social prospects. This paper surveys advances in IoT-based health care technologies and reviews the state-of-the-art network architectures/platforms, applications, and industrial trends in IoT-based health care solutions. In addition, this paper analyzes distinct IoT security and privacy features, including security requirements, threat models, and attack taxonomies from the health care perspective. Further, this paper proposes an intelligent collaborative security model to minimize security risk; discusses how different innovations such as big data, ambient intelligence, and wearables can be leveraged in a health care context; addresses various IoT and eHealth policies and regulations across the world to determine how they can facilitate economies and societies in terms of sustainable development; and provides some avenues for future research on IoT-based health care based on a set of open issues and challenges.

链接: https://ieeexplore.ieee.org/document/7113786

15.标题：A Survey on Transfer Learning

作者：Sinno Jialin Pan ; Qiang Yang

出处：IEEE Transactions on Knowledge and Data Engineering

摘要: A major assumption in many machine learning and data mining algorithms is that the training and future data must be in the same feature space and have the same distribution. However, in many real-world applications, this assumption may not hold. For example, we sometimes have a classification task in one domain of interest, but we only have sufficient training data in another domain of interest, where the latter data may be in a different feature space or follow a different data distribution. In such cases, knowledge transfer, if done successfully, would greatly improve the performance of learning by avoiding much expensive data-labeling efforts. In recent years, transfer learning has emerged as a new learning framework to address this problem. This survey focuses on categorizing and reviewing the current progress on transfer learning for classification, regression, and clustering problems. In this survey, we discuss the relationship between transfer learning and other related machine learning techniques such as domain adaptation, multitask learning and sample selection bias, as well as covariate shift. We also explore some potential future issues in transfer learning research.

链接: https://ieeexplore.ieee.org/document/5288526/

16.标题：A Survey of 5G Network: Architecture and Emerging Technologies

作者：A. Gupta ; R. K. Jha

出处：IEEE Access

摘要: In the near future, i.e., beyond 4G, some of the prime objectives or demands that need to be addressed are increased capacity, improved data rate, decreased latency, and better quality of service. To meet these demands, drastic improvements need to be made in cellular network architecture. This paper presents the results of a detailed survey on the fifth generation (5G) cellular network architecture and some of the key emerging technologies that are helpful in improving the architecture and meeting the demands of users. In this detailed survey, the prime focus is on the 5G cellular network architecture, massive multiple input multiple output technology, and device-to-device communication (D2D). Along with this, some of the emerging technologies that are addressed in this paper include interference management, spectrum sharing with cognitive radio, ultra-dense networks, multi-radio access technology association, full duplex radios, millimeter wave solutions for 5G cellular networks, and cloud technologies for 5G radio access networks and software defined networks. In this paper, a general probable 5G cellular network architecture is proposed, which shows that D2D, small cell access points, network cloud, and the Internet of Things can be a part of 5G cellular network architecture. A detailed survey is included regarding current research projects being conducted in different countries by research groups and institutions that are working on 5G technologies.

链接: https://ieeexplore.ieee.org/document/7169508

17.标题：Salient Object Detection and Segmentation via Ultra-Contrast

作者：Liangzhi Tang ; Fanman Meng ; Qingbo Wu ; Nii Longdon Sowah ; Kai Tan ; Hongliang Li

出处：IEEE Access

Volume: 6 Date : 2018

Page(s): 14870 - 14883

摘要: Salient object detection aims at finding the most conspicuous objects in an image that highly catches the user's attention. The traditional contrast based salient object detection algorithms focus on highlighting the most dissimilar regions and generally fail to detect complex salient objects. In this paper, we propose a salient object detection principle from existing contrast based methods: dissimilarity produces contrast, while contrast leads to saliency . Guided by this principle, we propose a generalized framework to detect complex salient objects. First, we propose a set of region dissimilarity definitions inspired by diverse saliency cues. Then, multiple contrast contexts are encoded to derive dissimilarity matrices. Afterwards, multiple contrast transformations are designed to convert dissimilarity matrices into unified ultra-contrast features. Finally, these ultra-contrast features are mapped to saliency values through logistic regression. The proposed framework is capable of flexibly integrating different kinds of region dissimilarity definitions, region contexts, and contrast transformations. The experimental results demonstrate that our ultra-contrast based saliency detection method outperforms existing contrast based algorithms in terms of three metrics on four datasets.

链接: https://ieeexplore.ieee.org/document/8290763/

18.标题：Deep Convolutional Neural Network for Inverse Problems in Imaging

作者：Kyong Hwan Jin ; Michael T. McCann ; Emmanuel Froustey ; Michael Unser

出处：IEEE Transactions on Image Processing

Volume: 26 Issue: 9 Date : Sept. 2017

Page(s):   4509 - 4522

摘要: In this paper, we propose a novel deep convolutional neural network (CNN)-based algorithm for solving ill-posed inverse problems. Regularized iterative algorithms have emerged as the standard approach to ill-posed inverse problems in the past few decades. These methods produce excellent results, but can be challenging to deploy in practice due to factors including the high computational cost of the forward and adjoint operators and the difficulty of hyperparameter selection. The starting point of this paper is the observation that unrolled iterative methods have the form of a CNN (filtering followed by pointwise nonlinearity) when the normal operator (H^*H, where H^* is the adjoint of the forward imaging operator, H) of the forward model is a convolution. Based on this observation, we propose using direct inversion followed by a CNN to solve normal-convolutional inverse problems. The direct inversion encapsulates the physical model of the system, but leads to artifacts when the problem is ill posed; the CNN combines multiresolution decomposition and residual learning in order to learn to remove these artifacts while preserving image structure. We demonstrate the performance of the proposed network in sparse-view reconstruction (down to 50 views) on parallel beam X-ray computed tomography in synthetic phantoms as well as in real experimental sinograms. The proposed network outperforms total variation-regularized iterative reconstruction for the more realistic phantoms and requires less than a second to reconstruct a 512×512 image on the GPU.

链接: https://ieeexplore.ieee.org/document/7949028

19.标题：Security for 5G Mobile Wireless Networks

作者：Dongfeng Fang ; Yi Qian ; Rose Qingyang Hu

出处：IEEE Access

Volume: 6 Date : 2018

Page(s): 4850 - 4874

摘要: The advanced features of 5G mobile wireless network systems yield new security requirements and challenges. This paper presents a comprehensive study on the security of 5G wireless network systems compared with the traditional cellular networks. The paper starts with a review on 5G wireless networks particularities as well as on the new requirements and motivations of 5G wireless security. The potential attacks and security services are summarized with the consideration of new service requirements and new use cases in 5G wireless networks. The recent development and the existing schemes for the 5G wireless security are presented based on the corresponding security services, including authentication, availability, data confidentiality, key management, and privacy. This paper further discusses the new security features involving different technologies applied to 5G, such as heterogeneous networks, device-to-device communications, massive multiple-input multiple-output, software-defined networks, and Internet of Things. Motivated by these security research and development activities, we propose a new 5G wireless security architecture, based on which the analysis of identity management and flexible authentication is provided. As a case study, we explore a handover procedure as well as a signaling load scheme to show the advantages of the proposed security architecture. The challenges and future directions of 5G wireless security are finally summarized.

链接: https://ieeexplore.ieee.org/document/8125684

20.标题：Hawk: The Blockchain Model of Cryptography and Privacy-Preserving Smart Contracts

作者：Ahmed Kosba ; Andrew Miller ; Elaine Shi ; Zikai Wen ; Charalampos Papamanthou

出处：2016 IEEE Symposium on Security and Privacy (SP)

Date : 22-26 May 2016

Page(s): 839 - 858

摘要: Emerging smart contract systems over decentralized cryptocurrencies allow mutually distrustful parties to transact safely without trusted third parties. In the event of contractual breaches or aborts, the decentralized blockchain ensures that honest parties obtain commensurate compensation. Existing systems, however, lack transactional privacy. All transactions, including flow of money between pseudonyms and amount transacted, are exposed on the blockchain. We present Hawk, a decentralized smart contract system that does not store financial transactions in the clear on the blockchain, thus retaining transactional privacy from the public's view. A Hawk programmer can write a private smart contract in an intuitive manner without having to implement cryptography, and our compiler automatically generates an efficient cryptographic protocol where contractual parties interact with the blockchain, using cryptographic primitives such as zero-knowledge proofs. To formally define and reason about the security of our protocols, we are the first to formalize the blockchain model of cryptography. The formal modeling is of independent interest. We advocate the community to adopt such a formal model when designing applications atop decentralized blockchains.

链接: https://ieeexplore.ieee.org/document/7546538

21.标题：Disease Prediction by Machine Learning Over Big Data From Healthcare Communities

作者：Min Chen ; Yixue Hao ; Kai Hwang ; Lu Wang ; Lin Wang

出处：IEEE Access

Volume: 5 Date : 2017

Page(s):　8869 - 8879

摘要: With big data growth in biomedical and healthcare communities, accurate analysis of medical data benefits early disease detection, patient care, and community services. However, the analysis accuracy is reduced when the quality of medical data is incomplete. Moreover, different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease outbreaks. In this paper, we streamline machine learning algorithms for effective prediction of chronic disease outbreak in disease-frequent communities. We experiment the modified prediction models over real-life hospital data collected from central China in 2013-2015. To overcome the difficulty of incomplete data, we use a latent factor model to reconstruct the missing data. We experiment on a regional chronic disease of cerebral infarction. We propose a new convolutional neural network (CNN)-based multimodal disease risk prediction algorithm using structured and unstructured data from hospital. To the best of our knowledge, none of the existing work focused on both data types in the area of medical big data analytics. Compared with several typical prediction algorithms, the prediction accuracy of our proposed algorithm reaches 94.8% with a convergence speed, which is faster than that of the CNN-based unimodal disease risk prediction algorithm.
链接: https://ieeexplore.ieee.org/document/7912315/

22.标题：ORB-SLAM: A Versatile and Accurate Monocular SLAM System

作者：Raúl Mur-Artal ; J. M. M. Montiel ; Juan D. Tardós

出处：IEEE Transactions on Robotics

Volume: 31 Issue: 5 Date : Oct. 2015

Page(s):　1147 - 1163

摘要: This paper presents ORB-SLAM, a feature-based monocular simultaneous localization and mapping (SLAM) system that operates in real time, in small and large indoor and outdoor environments. The system is robust to severe motion clutter, allows wide baseline loop closing and relocalization, and includes full automatic initialization. Building on excellent algorithms of recent years, we designed from scratch a novel system that uses the same features for all SLAM tasks: tracking, mapping, relocalization, and loop closing. A survival of the fittest strategy that selects the points and keyframes of the reconstruction leads to excellent robustness and generates a compact and trackable map that only grows if the scene content changes, allowing lifelong operation. We present an exhaustive evaluation in 27 sequences from the most popular datasets. ORB-SLAM achieves unprecedented performance with respect to other state-of-the-art monocular SLAM approaches. For the benefit of the community, we make the source code public.
链接: https://ieeexplore.ieee.org/document/7219438

23.标题：Deep Residual Learning for Image Recognition

作者：Kaiming He ; Xiangyu Zhang ; Shaoqing Ren ; Jian Sun

出处：2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)

Date : 27-30 June 2016

Page(s):　770 - 778

摘要: Deeper neural networks are more difficult to train. We present a residual learning framework to ease the training of networks that are substantially deeper than those used previously. We explicitly reformulate the layers as learning residual functions with reference to the layer inputs, instead of

learning unreferenced functions. We provide comprehensive empirical evidence showing that these residual networks are easier to optimize, and can gain accuracy from considerably increased depth. On the ImageNet dataset we evaluate residual nets with a depth of up to 152 layers - 8× deeper than VGG nets [40] but still having lower complexity. An ensemble of these residual nets achieves 3.57% error on the ImageNet test set. This result won the 1st place on the ILSVRC 2015 classification task. We also present analysis on CIFAR-10 with 100 and 1000 layers. The depth of representations is of central importance for many visual recognition tasks. Solely due to our extremely deep representations, we obtain a 28% relative improvement on the COCO object detection dataset. Deep residual nets are foundations of our submissions to ILSVRC & COCO 2015 competitions1, where we also won the 1st places on the tasks of ImageNet detection, ImageNet localization, COCO detection, and COCO segmentation.

链接: https://ieeexplore.ieee.org/document/7780459/

24.标题：LSTM Fully Convolutional Networks for Time Series Classification
作者：Fazle Karim ; Somshubra Majumdar ; Houshang Darabi ; Shun Chen
IEEE Access
Volume: 6 Date : 2018
Page(s): 1662 - 1669
摘要: Fully convolutional neural networks (FCNs) have been shown to achieve the state-of-the-art performance on the task of classifying time series sequences. We propose the augmentation of fully convolutional networks with long short term memory recurrent neural network (LSTM RNN) sub-modules for time series classification. Our proposed models significantly enhance the performance of fully convolutional networks with a nominal increase in model size and require minimal preprocessing of the data set. The proposed long short term memory fully convolutional network (LSTM-FCN) achieves the state-of-the-art performance compared with others. We also explore the usage of attention mechanism to improve time series classification with the attention long short term memory fully convolutional network (ALSTM-FCN). The attention mechanism allows one to visualize the decision process of the LSTM cell. Furthermore, we propose refinement as a method to enhance the performance of trained models. An overall analysis of the performance of our model is provided and compared with other techniques.

链接: https://ieeexplore.ieee.org/document/8141873

25.标题：Power of Deep Learning for Channel Estimation and Signal Detection in OFDM Systems
作者：Hao Ye ; Geoffrey Ye Li ; Biing-Hwang Juang
出处：IEEE Wireless Communications Letters
Volume: 7 Issue: 1 Date : Feb. 2018
Page(s): 114 - 117
摘要: This letter presents our initial results in deep learning for channel estimation and signal detection in orthogonal frequency-division multiplexing (OFDM) systems. In this letter, we exploit deep learning to handle wireless OFDM channels in an end-to-end manner. Different from existing OFDM receivers that first estimate channel state information (CSI) explicitly and then detect/recover the transmitted symbols using the estimated CSI, the proposed deep learning-based approach estimates CSI implicitly and recovers the transmitted symbols directly. To address channel distortion, a deep learning model is first trained offline using the data generated from simulation based on

channel statistics and then used for recovering the online transmitted data directly. From our simulation results, the deep learning based approach can address channel distortion and detect the transmitted symbols with performance comparable to the minimum mean-square error estimator. Furthermore, the deep learning-based approach is more robust than conventional methods when fewer training pilots are used, the cyclic prefix is omitted, and nonlinear clipping noise exists. In summary, deep learning is a promising tool for channel estimation and signal detection in wireless communications with complicated channel distortion and interference.

链接: https://ieeexplore.ieee.org/document/8052521

ESI HOT PAPERS

(Computer Science)

（来源：http://esi.incites.thomsonreuters.com）

1、被引频次：319

题目：LMERTEST PACKAGE: TESTS IN LINEAR MIXED EFFECTS MODELS

作者：KUZNETSOVA, A;BROCKHOFF, PB;CHRISTENSEN, RHB

出处：J STAT SOFTW 82 (13): 1-26 DEC 2017

地址：TECH UNIV DENMARK, LYNGBY, DENMARK;TECH UNIV DENMARK, CHRISTENSEN STAT, LYNGBY, DENMARK;DTU COMPUTE, STAT & DATA ANAL SECT, DEPT APPL MATH & COMP SCI, RICHARD PETERSENS PLADS,BLDG 324, DK-2800 LYNGBY, DENMARK

摘要：One of the frequent questions by users of the mixed model function lmer of the lme4 package has been: How can I get p values for the F and t tests for objects returned by lmer? The lmerTest package extends the 'lmerMod' class of the lme4 package, by overloading the anova and summary functions by providing p values for tests for fixed effects. We have implemented the Satterthwaite's method for approximating degrees of freedom for the t and F tests. We have also implemented the construction of Type I-II ANOVA tables. Furthermore, one may also obtain the summary as well as the anova table using the Kenward-Roger approximation for denominator degrees of freedom (based on the KRmodcomp function from the pbkrtest package). Some other convenient mixed model analysis tools such as a step method, that performs backward elimination of nonsignificant effects both random and fixed, calculation of population means and multiple comparison tests together with plot facilities are provided by the package as well.

电子邮件地址：alku@dtu.dk

2、被引频次：242

题目：A SURVEY ON DEEP LEARNING IN MEDICAL IMAGE ANALYSIS

作者：LITJENS, G;KOOI, T;BEJNORDI, BE;SETIO, AAA;CIOMPI, F;GHAFOORIAN, M;VAN DER LAAK, JAWM;VAN GINNEKEN, B;SANCHEZ, CI

出处：MED IMAGE ANAL 42: 60-88 DEC 2017

地址：RADBOUD UNIV NIJMEGEN, MED CTR, DIAGNOST IMAGE ANAL GRP, NIJMEGEN, NETHERLANDS

摘要：Deep learning algorithms, in particular convolutional networks, have rapidly become a methodology of choice for analyzing medical images. This paper reviews the major deep learning concepts pertinent to medical image analysis and summarizes over 300 contributions to the field, most of which appeared in the last year. We survey the use of deep learning for image classification, object detection, segmentation, registration, and other tasks. Concise overviews are provided of studies per application area: neuro, retinal, pulmonary, digital pathology, breast, cardiac, abdominal, musculoskeletal. We end with a summary of the current state-of-the-art, a critical discussion of open challenges and directions for future research. (C) 2017 Elsevier B.V. All rights reserved.

电子邮件地址：geert.litjens@radboudumc.nl

3、被引频次：194

题目：IMAGEJ2: IMAGEJ FOR THE NEXT GENERATION OF SCIENTIFIC IMAGE DATA

作者：RUEDEN, CT;SCHINDELIN, J;HINER, MC;DEZONIA, BE;WALTER, AE;ARENA, ET;ELICEIRI, KW

出处：BMC BIOINFORMATICS 18: - NOV 29 2017

地址：UNIV WISCONSIN, LAB OPT & COMPUTAT INSTRUMENTAT, MADISON, WI 53706 USA;MORGRIDGE INST RES, MADISON, WI 53715 USA

摘要：Background: ImageJ is an image analysis program extensively used in the biological sciences and beyond. Due to its ease of use, recordable macro language, and extensible plug-in architecture, ImageJ enjoys contributions from non-programmers, amateur programmers, and professional developers alike. Enabling such a diversity of contributors has resulted in a large community that spans the biological and physical sciences. However, a rapidly growing user base, diverging plugin suites, and technical limitations have revealed a clear need for a concerted software engineering effort to support emerging imaging paradigms, to ensure the software's ability to handle the requirements of modern science. Results: We rewrote the entire ImageJ codebase, engineering a redesigned plugin mechanism intended to facilitate extensibility at every level, with the goal of creating a more powerful tool that continues to serve the existing community while addressing a wider range of scientific requirements. This next-generation ImageJ, called "ImageJ2" in places where the distinction matters, provides a host of new functionality. It separates concerns, fully decoupling the data model from the user interface. It emphasizes integration with external applications to maximize interoperability. Its robust new plugin framework allows everything from image formats, to scripting languages, to visualization to be extended by the community. The redesigned data model supports arbitrarily large, N-dimensional datasets, which are increasingly common in modern image acquisition. Despite the scope of these changes, backwards compatibility is maintained such that this new functionality can be seamlessly integrated with the classic ImageJ interface, allowing users and developers to migrate to these new methods at their own pace. Conclusions: Scientific imaging benefits from open-source programs that advance new method

development and deployment to a diverse audience. ImageJ has continuously evolved with this idea in mind; however, new and emerging scientific requirements have posed corresponding challenges for ImageJ's development. The described improvements provide a framework engineered for flexibility, intended to support these requirements as well as accommodate future needs. Future efforts will focus on implementing new algorithms in this framework and expanding collaborations with other popular scientific software suites.

电子邮件地址：eliceiri@wisc.edu

4、被引频次：180

题目：MASTERING THE GAME OF GO WITHOUT HUMAN KNOWLEDGE

作者：SILVER, D;SCHRITTWIESER, J;SIMONYAN, K;ANTONOGLOU, I;HUANG, A;GUEZ, A;HUBERT, T;BAKER, L;LAI, M;BOLTON, A;CHEN, YT;LILLICRAP, T;HUI, F;SIFRE, L;VAN DEN DRIESSCHE, G;GRAEPEL, T;HASSABIS, D

出处：NATURE 550 (7676): 354-+ OCT 19 2017

地址：DEEPMIND, 5 NEW ST SQ, LONDON EC4A 3TW, ENGLAND

摘要：A long-standing goal of artificial intelligence is an algorithm that learns, tabula rasa, superhuman proficiency in challenging domains. Recently, AlphaGo became the first program to defeat a world champion in the game of Go. The tree search in AlphaGo evaluated positions and selected moves using deep neural networks. These neural networks were trained by supervised learning from human expert moves, and by reinforcement learning from self-play. Here we introduce an algorithm based solely on reinforcement learning, without human data, guidance or domain knowledge beyond game rules. AlphaGo becomes its own teacher: a neural network is trained to predict AlphaGo's own move selections and also the winner of AlphaGo's games. This neural network improves the strength of the tree search, resulting in higher quality move selection and stronger self-play in the next iteration. Starting tabula rasa, our new program AlphaGo Zero achieved superhuman performance, winning 100-0 against the previously published, champion-defeating AlphaGo.

电子邮件地址：davidsilver@google.com

5、被引频次：141

题目：PRACTICAL BAYESIAN MODEL EVALUATION USING LEAVE-ONE-OUT CROSS-VALIDATION AND WAIC

作者：VEHTARI, A;GELMAN, A;GABRY, J

出处：STAT COMPUT 27 (5): 1413-1432 SEP 2017

地址：AALTO UNIV, DEPT COMP SCI, HIIT, ESPOO, FINLAND;COLUMBIA UNIV, DEPT STAT, NEW YORK, NY USA

摘要：Leave-one-out cross-validation (LOO) and the widely applicable information criterion (WAIC) are methods for estimating pointwise out-of-sample prediction accuracy from a fitted Bayesian model using the log-likelihood evaluated at the posterior simulations of the parameter values. LOO and WAIC have various advantages over simpler estimates of predictive error such as AIC and DIC but are less used in practice because they involve additional computational steps. Here we lay out fast and stable computations for LOO and WAIC that can be performed using existing simulation draws. We introduce an efficient computation of LOO using Pareto-smoothed importance sampling (PSIS), a new procedure for regularizing importance weights. Although WAIC is asymptotically equal to LOO,

we demonstrate that PSIS-LOO is more robust in the finite case with weak priors or influential observations. As a byproduct of our calculations, we also obtain approximate standard errors for estimated predictive errors and for comparison of predictive errors between two models. We implement the computations in an R package called loo and demonstrate using models fit with the Bayesian inference package Stan.

电子邮件地址：aki.vehtari@aalto.fi; gelman@stat.columbia.edu

6、被引频次：138
题目：IMAGENET CLASSIFICATION WITH DEEP CONVOLUTIONAL NEURAL NETWORKS
作者：KRIZHEVSKY, A;SUTSKEVER, I;HINTON, GE
出处：COMMUN ACM 60 (6): 84-90 JUN 2017
地址：GOOGLE INC, MOUNTAIN VIEW, CA 94043 USA;OPENAI, SAN FRANCISCO, CA USA
摘要：We trained a large, deep convolutional neural network to classify the 1.2 million high-resolution images in the ImageNet LSVRC-2010 contest into the 1000 different classes. On the test data, we achieved top-1 and top-5 error rates of 37.5% and 17.0%, respectively, which is considerably better than the previous state-of-the-art. The neural network, which has 60 million parameters and 650,000 neurons, consists of five convolutional layers, some of which are followed by max-pooling layers, and three fully connected layers with a final 1000-way softmax. To make training faster, we used non-saturating neurons and a very efficient GPU implementation of the convolution operation. To reduce overfitting in the fully connected layers we employed a recently developed regularization method called "dropout" that proved to be very effective. We also entered a variant of this model in the ILSVRC-2012 competition and achieved a winning top-5 test error rate of 15.3%, compared to 26.2% achieved by the second-best entry.

电子邮件地址：akrizhevsky@google.com; ilyasu@openai.com; geoffhinton@google.com

7、被引频次：132
题目：A SURVEY OF DEEP NEURAL NETWORK ARCHITECTURES AND THEIR APPLICATIONS
作者：LIU, WB;WANG, ZD;LIU, XH;ZENGB, NY;LIU, YR;ALSAADI, FE
出处：NEUROCOMPUTING 234: 11-26 APR 19 2017
地址：BRUNEL UNIV LONDON, DEPT COMP SCI, UXBRIDGE U138 3PH, MIDDX, ENGLAND;XIAMEN UNIV, DEPT INSTRUMENTAL & ELECT ENGN, XIAMEN 361005, FUJIAN, PEOPLES R CHINA;YANGZHOU UNIV, DEPT MATH, YANGZHOU 225002, JIANGSU, PEOPLES R CHINA;KING ABDULAZIZ UNIV, CSN RES GRP, FAC ENGN, JEDDAH 21589, SAUDI ARABIA
摘要：Since the proposal of a fast learning algorithm for deep belief networks in 2006, the deep learning techniques have drawn ever-increasing research interests because of their inherent capability of overcoming the drawback of traditional algorithms dependent on hand-designed features. Deep learning approaches have also been found to be suitable for big data analysis with successful applications to computer vision, pattern recognition, speech recognition, natural language processing, and recommendation systems. In this paper, we discuss some widely used deep learning architectures and their practical applications. An up-to-date overview is provided on four deep learning architectures, namely, autoencoder, convolutional neural network, deep belief network, and restricted Boltzmann machine. Different types of deep neural networks are surveyed and recent progresses are

summarized. Applications of deep learning techniques on some selected areas (speech recognition, pattern recognition and computer vision) are highlighted. A list of future research topics are finally given with clear justifications.

电子邮件地址：Zidong.Wang@brunel.ac.uk

8、被引频次：118

题目：LONG NON-CODING RNAS AND COMPLEX DISEASES: FROM EXPERIMENTAL RESULTS TO COMPUTATIONAL MODELS

作者：CHEN, X;YAN, CC;ZHANG, X;YOU, ZH

出处：BRIEF BIOINFORM 18 (4): 558-576 JUL 2017

地址：CHINA UNIV MIN & TECHNOL, SCH INFORMAT & ELECT ENGN, XUZHOU 221116, PEOPLES R CHINA;CHINA UNIV MIN & TECHNOL, SCH COMP SCI & TECHNOL, XUZHOU 221116, PEOPLES R CHINA;HANGZHOU DIANZI UNIV, INST INFORMAT & CONTROL, HANGZHOU, ZHEJIANG, PEOPLES R CHINA;SHANDONG UNIV, SCH MECH ELECT & INFORMAT ENGN, JINAN, PEOPLES R CHINA

摘要：LncRNAs have attracted lots of attentions from researchers worldwide in recent decades. With the rapid advances in both experimental technology and computational prediction algorithm, thousands of lncRNA have been identified in eukaryotic organisms ranging from nematodes to humans in the past few years. More and more research evidences have indicated that lncRNAs are involved in almost the whole life cycle of cells through different mechanisms and play important roles in many critical biological processes. Therefore, it is not surprising that the mutations and dysregulations of lncRNAs would contribute to the development of various human complex diseases. In this review, we first made a brief introduction about the functions of lncRNAs, five important lncRNA-related diseases, five critical disease-related lncRNAs and some important publicly available lncRNA-related databases about sequence, expression, function, etc. Nowadays, only a limited number of lncRNAs have been experimentally reported to be related to human diseases. Therefore, analyzing available lncRNA-disease associations and predicting potential human lncRNA-disease associations have become important tasks of bioinformatics, which would benefit human complex diseases mechanism understanding at lncRNA level, disease biomarker detection and disease diagnosis, treatment, prognosis and prevention. Furthermore, we introduced some state-of-the-art computational models, which could be effectively used to identify disease-related lncRNAs on a large scale and select the most promising disease-related lncRNAs for experimental validation. We also analyzed the limitations of these models and discussed the future directions of developing computational models for lncRNA research.

电子邮件地址：xingchen@amss.ac.cn; zhuhongyou@gmail.com

9、被引频次：113

题目：BRMS: AN R PACKAGE FOR BAYESIAN MULTILEVEL MODELS USING STAN

作者：BURKNER, PC

出处：J STAT SOFTW 80 (1): 1-28 AUG 2017

地址：UNIV MUNSTER, FAC PSYCHOL, D-48149 MUNSTER, GERMANY

摘要：The brms package implements Bayesian multilevel models in R using the probabilistic programming language Stan. A wide range of distributions and link functions are supported, allowing users to fit - among others - linear, robust linear, binomial, Poisson, survival, ordinal, zero-inflated,

hurdle, and even non-linear models all in a multilevel context. Further modeling options include autocorrelation of the response variable, user defined covariance structures, censored data, as well as meta-analytic standard errors. Prior specifications are flexible and explicitly encourage users to apply prior distributions that actually reflect their beliefs. In addition, model fit can easily be assessed and compared with the Watanabe-Akaike information criterion and leave-one-out cross-validation.

电子邮件地址：paul.buerkner@gmail.com

10、被引频次：107

题目：MULTI-SENSOR FUSION IN BODY SENSOR NETWORKS: STATE-OF-THE-ART AND RESEARCH CHALLENGES

作者：GRAVINA, R;ALINIA, P;GHASEMZADEH, H;FORTINO, G

出处：INF FUSION 35: 68-80 MAY 2017

地址：UNIV CALABRIA, DEPT INFORMAT MODELING ELECT & SYST, VIA P BUCCI, I-87036 ARCAVACATA DI RENDE, CS, ITALY;WASHINGTON STATE UNIV, SCH ELECT ENGN & COMP SCI, PULLMAN, WA 99164 USA

摘要：Body Sensor Networks (BSNs) have emerged as a revolutionary technology in many application domains in health-care, fitness, smart cities, and many other compelling Internet of Things (loT) applications. Most commercially available systems assume that a single device monitors a plethora of user information. In reality, BSN technology is transitioning to multi-device synchronous measurement environments; fusion of the data from multiple, potentially heterogeneous, sensor sources is therefore becoming a fundamental yet non-trivial task that directly impacts application performance. Nevertheless, only recently researchers have started developing technical solutions for effective fusion of BSN data. To the best of our knowledge, the community is currently lacking a comprehensive review of the state-of-the-art techniques on multi-sensor fusion in the area of BSN. This survey discusses clear motivations and advantages of multi-sensor data fusion and particularly focuses on physical activity recognition, aiming at providing a systematic categorization and common comparison framework of the literature, by identifying distinctive properties and parameters affecting data fusion design choices at different levels (data, feature, and decision). The survey also covers data fusion in the domains of emotion recognition and general-health and introduce relevant directions and challenges of future research on multi-sensor fusion in the BSN domain. (C) 2016 Elsevier B.V. All rights reserved.

电子邮件地址：rgravina@dimes.unical.it; paras2.alinia@gmail.com; hassan@eecs.wsu.edu; g.fortino@unical.it

11、被引频次：105

题目：BASICS OF META-ANALYSIS: I-2 IS NOT AN ABSOLUTE MEASURE OF HETEROGENEITY

作者：BORENSTEIN, M;HIGGINS, JPT;HEDGES, LV;ROTHSTEIN, HR

出处：RES SYNTH METHODS 8 (1): 5-18 MAR 2017

地址：BIOSTAT INC, ENGLEWOOD, NJ 07631 USA;UNIV BRISTOL, SCH SOCIAL & COMMUNITY MED, BRISTOL, AVON, ENGLAND;NORTHWESTERN UNIV, DEPT STAT, EVANSTON, IL 60208 USA;CUNY, BARUCH COLL, DEPT MANAGEMENT, NEW YORK, NY 10021 USA

摘要：When we speak about heterogeneity in a meta-analysis, our intent is usually to understand the

substantive implications of the heterogeneity. If an intervention yields a mean effect size of 50 points, we want to know if the effect size in different populations varies from 40 to 60, or from 10 to 90, because this speaks to the potential utility of the intervention. While there is a common belief that the I-2 statistic provides this information, it actually does not. In this example, if we are told that I-2 is 50%, we have no way of knowing if the effects range from 40 to 60, or from 10 to 90, or across some other range. Rather, if we want to communicate the predicted range of effects, then we should simply report this range. This gives readers the information they think is being captured by I-2 and does so in a way that is concise and unambiguous. Copyright (C) 2017 John Wiley & Sons, Ltd.

电子邮件地址：Biostat100@GMail.com

12、被引频次：103

题目：SECURE ATTRIBUTE-BASED DATA SHARING FOR RESOURCE-LIMITED USERS IN CLOUD COMPUTING

作者：LI, J;ZHANG, YH;CHEN, XF;XIANG, Y

出处：COMPUT SECURITY 72: 1-12 JAN 2018

地址：GUANGZHOU UNIV, SCH COMP SCI, GUANGZHOU, GUANGDONG, PEOPLES R CHINA;STATE KEY LAB CRYPTOL, POB 5159, BEIJING 100878, PEOPLES R CHINA;XIAN UNIV POSTS & TELECOMMUN, NATL ENGN LAB WIRELESS SECUR, XIAN 710121, SHAANXI, PEOPLES R CHINA;WESTONE CRYPTOL RES CTR, BEIJING 100070, PEOPLES R CHINA;XIDIAN UNIV, STATE KEY LAB INTEGRATED SERV NETWORKS ISN, XIAN 710071, SHAANXI, PEOPLES R CHINA;SWINBURNE UNIV TECHNOL, SCH SOFTWARE & ELECT ENGN, HAWTHORN, VIC, AUSTRALIA

摘要：Data sharing becomes an exceptionally attractive service supplied by cloud computing platforms because of its convenience and economy. As a potential technique for realizing finegrained data sharing, attribute-based encryption (ABE) has drawn wide attentions. However, most of the existing ABE solutions suffer from the disadvantages of high computation overhead and weak data security, which has severely impeded resource-constrained mobile devices to customize the service. The problem of simultaneously achieving fine-grainedness, high efficiency on the data owner's side, and standard data confidentiality of cloud data sharing actually still remains unresolved. This paper addresses this challenging issue by proposing a new attribute-based data sharing, scheme suitable for resource-limited mobile users in cloud computing. The proposed scheme eliminates a majority of the computation task by adding system public parameters besides moving partial encryption computation offline. In addition, a public ciphertext test phase is performed before the decryption phase, which eliminates most of computation overhead due to illegitimate ciphertexts. For the sake of data security, a Chameleon hash function is used to generate an immediate ciphertext, which will be blinded by the offline ciphertexts to obtain the final online ciphertexts. The proposed scheme is proven secure against adaptively chosen-ciphertext attacks, which is widely recognized as a standard security notion. Extensive performance analysis indicates that the proposed scheme is secure and efficient. (C) 2017 Elsevier Ltd. All rights reserved.

电 子 邮 件 地 址 ： lijin@gzhu.edu.cn; yhzhaang@163.com; xfchen@xidian.edu.cn; yxiang@swin.edu.au

13、被引频次：91

题目：A SURVEY ON INTERNET OF THINGS: ARCHITECTURE, ENABLING TECHNOLOGIES, SECURITY AND PRIVACY, AND APPLICATIONS

作者：LIN, J;YU, W;ZHANG, N;YANG, XY;ZHANG, HL;ZHAO, W

出处：IEEE INTERNET THINGS J 4 (5): 1125-1142 SP. ISS. SI OCT 2017

地址：XI AN JIAO TONG UNIV, DEPT COMP SCI & TECHNOL, XIAN 710049, SHAANXI, PEOPLES R CHINA;TOWSON UNIV, DEPT COMP & INFORMAT SCI, TOWSON, MD 21252 USA;GEORGE WASHINGTON UNIV, DEPT COMP SCI, WASHINGTON, DC 20052 USA;QINGDAO UNIV, DEPT COMP SCI & TECHNOL, QINGAO 266061, PEOPLES R CHINA;UNIV MACAU, DEPT COMP & INFORMAT SCI, MACAU, PEOPLES R CHINA

摘要：Fog/edge computing has been proposed to be integrated with Internet of Things (IoT) to enable computing services devices deployed at network edge, aiming to improve the user's experience and resilience of the services in case of failures. With the advantage of distributed architecture and close to end-users, fog/edge computing can provide faster response and greater quality of service for IoT applications. Thus, fog/edge computing-based IoT becomes future infrastructure on IoT development. To develop fog/edge computing-based IoT infrastructure, the architecture, enabling techniques, and issues related to IoT should be investigated first, and then the integration of fog/edge computing and IoT should be explored. To this end, this paper conducts a comprehensive overview of IoT with respect to system architecture, enabling technologies, security and privacy issues, and present the integration of fog/edge computing and IoT, and applications. Particularly, this paper first explores the relationship between cyber-physical systems and IoT, both of which play important roles in realizing an intelligent cyber-physical world. Then, existing architectures, enabling technologies, and security and privacy issues in IoT are presented to enhance the understanding of the state of the art IoT development. To investigate the fog/edge computing-based IoT, this paper also investigate the relationship between IoT and fog/edge computing, and discuss issues in fog/edge computing-based IoT. Finally, several applications, including the smart grid, smart transportation, and smart cities, are presented to demonstrate how fog/edge computing-based IoT to be implemented in real-world applications.

电子邮件地址：jielin@xjtu.edu.cn; wyu@towson.edu; nzhang10@gwu.edu; yxyphd@mail.xjtu.edu.cn; hanlin@qdu.edu.cn; weizhao@umac.mo

14、被引频次：87

题目：ENERGY-EFFICIENT UAV COMMUNICATION WITH TRAJECTORY OPTIMIZATION

作者：ZENG, Y;ZHANG, R

出处：IEEE TRANS WIREL COMMUN 16 (6): 3747-3760 JUN 2017

地址：NATL UNIV SINGAPORE, DEPT ELECT & COMP ENGN, SINGAPORE 117583, SINGAPORE;ASTAR, INST INFOCOMM RES, SINGAPORE 138632, SINGAPORE

摘要：Wireless communication with unmanned aerial vehicles (UAVs) is a promising technology for future communication systems. In this paper, assuming that the UAV flies horizontally with a fixed altitude, we study energy-efficient UAV communication with a ground terminal via optimizing the UAV's trajectory, a new design paradigm that jointly considers both the communication throughput and the UAV's energy consumption. To this end, we first derive a theoretical model on the propulsion energy consumption of fixed-wing UAVs as a function of the UAV's flying speed, direction, and acceleration. Based on the derived model and by ignoring the radiation and signal processing energy

consumption, the energy efficiency of UAV communication is defined as the total information bits communicated normalized by the UAV propulsion energy consumed for a finite time horizon. For the case of unconstrained trajectory optimization, we show that both the rate-maximization and energy-minimization designs lead to vanishing energy efficiency and thus are energy-inefficient in general. Next, we introduce a simple circular UAV trajectory, under which the UAV's flight radius and speed are jointly optimized to maximize the energy efficiency. Furthermore, an efficient design is proposed for maximizing the UAV's energy efficiency with general constraints on the trajectory, including its initial/final locations and velocities, as well as minimum/maximum speed and acceleration. Numerical results show that the proposed designs achieve significantly higher energy efficiency for UAV communication as compared with other benchmark schemes.

电子邮件地址：elezeng@nus.edu.sg; elezhang@nus.edu.sg

15、被引频次：85
题目：5G: A TUTORIAL OVERVIEW OF STANDARDS, TRIALS, CHALLENGES, DEPLOYMENT, AND PRACTICE
作者：SHAFI, M;MOLISCH, AF;SMITH, PJ;HAUSTEIN, T;ZHU, PY;DE SILVA, P;TUFVESSON, F;BENJEBBOUR, A;WUNDER, G
出处：IEEE J SEL AREA COMMUN 35 (6): 1201-1221 JUN 2017
地址：SPARK NZ, WELLINGTON 6011, NEW ZEALAND;UNIV SOUTHERN CALIF, VITERBI SCH ENGN, MING HSIEH DEPT ELECT ENGN, LOS ANGELES, CA 90089 USA;VICTORIA UNIV WELLINGTON, SCH MATH & STAT, WELLINGTON 6140, NEW ZEALAND;FRAUNHOFER HHI, DEPT WIRELESS COMMUN & NETWORKS, D-10587 BERLIN, GERMANY;HUAWEI TECHNOL CANADA, OTTAWA, ON K2K 3J1, CANADA;LUND UNIV, DEPT ELECT & INFORMAT TECHNOL, SE-22100 LUND, SWEDEN;NTT DOCOMO INC, LAB 5G, YOKOSUKA, KANAGAWA 2398536, JAPAN;FRAUNHOFER HEINRICH HERZ INST, D-10587 BERLIN, GERMANY

摘要：There is considerable pressure to define the key requirements of 5G, develop 5G standards, and perform technology trials as quickly as possible. Normally, these activities are best done in series but there is a desire to complete these tasks in parallel so that commercial deployments of 5G can begin by 2020. 5G will not be an incremental improvement over its predecessors; it aims to be a revolutionary leap forward in terms of data rates, latency, massive connectivity, network reliability, and energy efficiency. These capabilities are targeted at realizing highspeed connectivity, the Internet of Things, augmented virtual reality, the tactile internet, and so on. The requirements of 5G are expected to be met by new spectrum in the microwave bands (3.3-4.2 GHz), and utilizing large bandwidths available in mm-wave bands, increasing spatial degrees of freedom via large antenna arrays and 3-D MIMO, network densification, and new waveforms that provide scalability and flexibility to meet the varying demands of 5G services. Unlike the one size fits all 4G core networks, the 5G core network must be flexible and adaptable and is expected to simultaneously provide optimized support for the diverse 5G use case categories. In this paper, we provide an overview of 5G research, standardization trials, and deployment challenges. Due to the enormous scope of 5G systems, it is necessary to provide some direction in a tutorial article, and in this overview, the focus is largely user centric, rather than device centric. In addition to surveying the state of play in the area, we identify leading technologies, evaluating their strengths and weaknesses, and outline the key challenges ahead, with research test beds delivering promising performance but pre-commercial trials

lagging behind the desired 5G targets.

电子邮件地址： mansoor.shafi@spark.co.nz; molisch@usc.edu; peter.smith@vuw.ac.nz; thomas.haustein@hhi.fraunhofer.de; peiying.zhu@huawei.com; prasan.desilva@spark.co.nz; fredrik.turfvesson@eith.lth.se; benjebbour@nttdocomo.com; gerhard.wunder@hhi.fraunhofer.de

16、被引频次：75

题 目 ： COMMUNICATIONS AND SIGNALS DESIGN FOR WIRELESS POWER TRANSMISSION

作者：ZENG, Y;CLERCKX, B;ZHANG, R

出处：IEEE TRANS COMMUN 65 (5): 2264-2290 MAY 2017

地址：NATL UNIV SINGAPORE, DEPT ELECT & COMP ENGN, SINGAPORE 117583, SINGAPORE;IMPERIAL COLL LONDON, ELECT & ELECT ENGN DEPT, LONDON SW7 2AZ, ENGLAND;ASTAR, INST INFOCOMM RES, SINGAPORE 138632, SINGAPORE

摘要：Radiative wireless power transfer (WPT) is a promising technology to provide cost-effective and real-time power supplies to wireless devices. Although radiative WPT shares many similar characteristics with the extensively studied wireless information transfer or communication, they also differ significantly in terms of design objectives, transmitter/receiver architectures and hardware constraints, and so on. In this paper, we first give an overview on the various WPT technologies, the historical development of the radiative WPT technology and the main challenges in designing contemporary radiative WPT systems. Then, we focus on the state-of-the-art communication and signal processing techniques that can be applied to tackle these challenges. Topics discussed include energy harvester modeling, energy beamforming for WPT, channel acquisition, power region characterization in multi-user WPT, waveform design with linear and non-linear energy receiver model, safety and health issues of WPT, massive multiple-input multiple-output and millimeter wave enabled WPT, wireless charging control, and wireless power and communication systems co-design. We also point out directions that are promising for future research.

电子邮件地址：elezeng@nus.edu.sg; b.clerckx@imperial.ac.uk; elezhang@nus.edu.sg

17、被引频次：71

题目：LSTM: A SEARCH SPACE ODYSSEY

作者：GREFF, K;SRIVASTAVA, RK;KOUTNIK, J;STEUNEBRINK, BR;SCHMIDHUBER, J

出处：IEEE TRANS NEURAL NETW LEARN 28 (10): 2222-2232 OCT 2017

地址：SCUOLA UNIV PROFESS SVIZZERA ITALIANA, IST DALLE MOLLE STUDI INTELLIGENZA ARTIFICIALE, CH-6928 MANNO, SWITZERLAND;UNIV SVIZZERA ITALIANA, CH-6904 LUGANO, SWITZERLAND

摘要：Several variants of the long short-term memory (LSTM) architecture for recurrent neural networks have been proposed since its inception in 1995. In recent years, these networks have become the state-of-the-art models for a variety of machine learning problems. This has led to a renewed interest in understanding the role and utility of various computational components of typical LSTM variants. In this paper, we present the first large-scale analysis of eight LSTM variants on three representative tasks: speech recognition, handwriting recognition, and polyphonic music modeling. The hyperparameters of all LSTM variants for each task were optimized separately using random search, and their importance was assessed using the powerful functional ANalysis Of VAriance framework. In total, we summarize the results of 5400 experimental runs (approximate to

15 years of CPU time), which makes our study the largest of its kind on LSTM networks. Our results show that none of the variants can improve upon the standard LSTM architecture significantly, and demonstrate the forget gate and the output activation function to be its most critical components. We further observe that the studied hyperparameters are virtually independent and derive guidelines for their efficient adjustment.

电子邮件地址：klaus@idsia.ch; rupesh@idsia.ch; hkou@idsia.ch; bas@idsia.ch; juergen@idsia.ch

18、被引频次：70

题目：STACKED CONVOLUTIONAL DENOISING AUTO-ENCODERS FOR FEATURE REPRESENTATION

作者：DU, B;XIONG, W;WU, J;ZHANG, LF;ZHANG, LP;TAO, DC

出处：IEE TRANS CYBERN 47 (4): 1017-1027 APR 2017

地址：WUHAN UNIV, COLLABORAT INNOVAT CTR GEOSPATIAL INFORMAT TECHNO, KEY LAB AEROSP INFORMAT SECUR & TRUSTED COMP, STATE KEY LAB SOFTWARE ENGN,MINIST EDUC,SCH COMP, WUHAN 430072, PEOPLES R CHINA;UNIV TECHNOL SYDNEY, CTR QUANTUM COMPUTAT & INTELLIGENT SYST, SYDNEY, NSW 2007, AUSTRALIA;UNIV TECHNOL SYDNEY, DEPT ENGN & INFORMAT TECHNOL, SYDNEY, NSW 2007, AUSTRALIA;WUHAN UNIV, COLLABORAT INNOVAT CTR GEOSPATIAL TECHNOL, STATE KEY LAB INFORMAT ENGN SURVEYING MAPPING & R, WUHAN 430072, PEOPLES R CHINA

摘要：Deep networks have achieved excellent performance in learning representation from visual data. However, the supervised deep models like convolutional neural network require large quantities of labeled data, which are very expensive to obtain. To solve this problem, this paper proposes an unsupervised deep network, called the stacked convolutional denoising auto-encoders, which can map images to hierarchical representations without any label information. The network, optimized by layer-wise training, is constructed by stacking layers of denoising autoencoders in a convolutional way. In each layer, high dimensional feature maps are generated by convolving features of the lower layer with kernels learned by a denoising auto-encoder. The autoencoder is trained on patches extracted from feature maps in the lower layer to learn robust feature detectors. To better train the large network, a layer-wise whitening technique is introduced into the model. Before each convolutional layer, a whitening layer is embedded to sphere the input data. By layers of mapping, raw images are transformed into high-level feature representations which would boost the performance of the subsequent support vector machine classifier. The proposed algorithm is evaluated by extensive experimentations and demonstrates superior classification performance to state-of-the-art unsupervised networks.

电子邮件地址：gunspace@163.com; wxiong@whu.edu.cn; jia.wu@uts.edu.au; zhanglefei@whu.edu.cn; zlp62@whu.edu.cn; dacheng.tao@gmail.com

19、被引频次：70

题目：AUTOMATED DETECTION OF ARRHYTHMIAS USING DIFFERENT INTERVALS OF TACHYCARDIA ECG SEGMENTS WITH CONVOLUTIONAL NEURAL NETWORK

作者：ACHARYA, UR;FUJITA, H;LIH, OS;HAGIWARA, Y;TAN, JH;ADAM, M

出处：INFORM SCIENCES 405: 81-90 SEP 2017

地址：NGEE ANN POLYTECH, DEPT ELECT & COMP ENGN, SINGAPORE, SINGAPORE;SIM

UNIV, SCH SCI & TECHNOL, DEPT BIOMED ENGN, SINGAPORE, SINGAPORE;UNIV MALAYA, DEPT BIOMED ENGN, FAC ENGN, KUALA LUMPUR, MALAYSIA;IWATE PREFECTURAL UNIV, FAC SOFTWARE & INFORMAT SCI, TAKIZAWA, IWATE 0200693, JAPAN

摘要：Our cardiovascular system weakens and is more prone to arrhythmia as we age. An arrhythmia is an abnormal heartbeat rhythm which can be life-threatening. Atrial fibrillation (A(fib)), atrial flutter (A(fl)), and ventricular fibrillation (V-fib) are the recurring life-threatening arrhythmias that affect the elderly population. An electrocardiogram (ECG) is the principal diagnostic tool employed to record and interpret ECG signals. These signals contain information about the different types of arrhythmias. However, due to the complexity and non-linearity of ECG signals, it is difficult to manually analyze these signals. Moreover, the interpretation of ECG signals is subjective and might vary between the experts. Hence, a computer-aided diagnosis (CAD) system is proposed. The CAD system will ensure that the assessment of ECG signals is objective and accurate. In this work, we present a convolutional neural network (CNN) technique to automatically detect the different ECG segments. Our algorithm consists of an eleven-layer deep CNN with the output layer of four neurons, each representing the normal (N-sr), A(fib), A(fl), and V-fib ECG class. In this work, we have used ECG signals of two seconds and five seconds' durations without QRS detection. We achieved an accuracy, sensitivity, and specificity of 92.50%, 98.09%, and 93.13% respectively for two seconds of ECG segments. We obtained an accuracy of 94.90%, the sensitivity of 99.13%, and specificity of 81.44% for five seconds of ECG duration. This proposed algorithm can serve as an adjunct tool to assist clinicians in confirming their diagnosis. (C) 2017 Elsevier Inc. All rights reserved.
电子邮件地址：HFujita-799@acm.org

20、被引频次：65
题目：A PRIMER ON 3GPP NARROWBAND INTERNET OF THINGS
作者：WAN, YPE;LIN, XQ;ADHIKARY, A;GROVLEN, A;SUI, YT;BLANKENSHIP, Y;BERGMAN, J;RAZAGHI, HS
出处：IEEE COMMUN MAG 55 (3): 117-123 MAR 2017
地址：ERICSSON RES, SANTA CLARA, CA USA;ERICSSON RES, RADIO ACCESS TECHNOL, SANTA CLARA, CA USA;ERICSSON AB, STOCKHOLM, SWEDEN
摘要：Narrowband Internet of Things (NB-IoT) is a new cellular technology introduced in 3GPP Release 13 for providing wide-area coverage for IoT. This article provides an overview of the air interface of NB-IoT. We describe how NB-IoT addresses key IoT requirements such as deployment flexibility, low device complexity, long battery lifetime, support of massive numbers of devices in a cell, and significant coverage extension beyond existing cellular technologies. We also share the various design rationales during the standardization of NB-IoT in Release 13 and point out several open areas for future evolution of NB-IoT.
电子邮件地址：eric.yp.wang@ericsson.com; xingqin.lin@ericsson.com; ansuman.adhikary@ericsson.com; asbjorn.grovlen@ericsson.com; yutao.sui@ericsson.com; yufei.blankenship@ericsson.com; johan.bergman@ericsson.com; hazhir.shokri.razaghi@ericsson.com

21、被引频次：62

题目：CLOUD-AIDED LIGHTWEIGHT CERTIFICATELESS AUTHENTICATION PROTOCOL WITH ANONYMITY FOR WIRELESS BODY AREA NETWORKS

作者：SHEN, J;GUI, ZY;JI, S;SHEN, J;TAN, HW;TANG, Y

出处：J NETW COMPUT APPL 106: 117-123 MAR 15 2018

地址：NANJING UNIV INFORMAT SCI & TECHNOL, JIANGSU ENGN CTR NETWORK MONITORING, NANJING, JIANGSU, PEOPLES R CHINA;CHINESE ACAD SCI, INST INFORMAT ENGN, STATE KEY LAB INFORMAT SECUR, BEIJING, PEOPLES R CHINA;CHOSUN UNIV, DEPT COMP SCI, GWANGJU, SOUTH KOREA;GUANGZHOU UNIV, SCH MATH & INFORMAT SCI, GUANGZHOU, GUANGDONG, PEOPLES R CHINA

摘要：With the development of cloud computing and wireless body area networks (WBANs), wearable equipments are able to become new intelligent terminals to provide services for users, which plays an important role to improve the human health-care service. However, The traditional WBANs devices have limited computing and storage capabilities. These restrictions limit the services that WBANs can provide to users. Thus the concept of Cloud-aided WBANs has been proposed to enhance the capabilities of WBANs. In addition, due to the openness of the cloud computing environment, the protection of the user's physiological information and privacy remains a major concern. In previous authentication protocols, few of them can protect the user's private information in insecure channel. In this paper, we propose a cloud-aided lightweight certificateless authentication protocol with anonymity for wireless body area networks. Our protocol ensures that no one can obtain user's real identity except for the network manager in the registration phase. Moreover, in the authentication phase, the network manager cannot know the user's real identity. Note that, through the security analysis, we can conclude that our protocol can provide stronger security protection of private information than most of existing schemes in insecure channel.

电子邮件地址：s_shenjian@126.com; guizy_nuist@126.com; jisai@nuist.edu.cn; demon_sj@126.com; tanhaowen@chosun.kr; ytang@gzhu.edu.cn

22、被引频次：59

题目：GRASSHOPPER OPTIMISATION ALGORITHM: THEORY AND APPLICATION

作者：SAREMI, S;MIRJALILI, S;LEWIS, A

出处：ADV ENG SOFTW 105: 30-47 MAR 2017

地址：GRIFFITH UNIV, SCH INFORMAT & COMMUN TECHNOL, BRISBANE, QLD 4111, AUSTRALIA;GRIFFITH COLL, BRISBANE, QLD 4122, AUSTRALIA

摘要：This paper proposes an optimisation algorithm called Grasshopper Optimisation Algorithm (GOA) and applies it to challenging problems in structural optimisation. The proposed algorithm mathematically models and mimics the behaviour of grasshopper swarms in nature for solving optimisation problems. The GOA algorithm is first benchmarked on a set of test problems including CEC2005 to test and verify its performance qualitatively and quantitatively. It is then employed to find the optimal shape for a 52-bar truss, 3-bar truss, and cantilever beam to demonstrate its applicability. The results show that the proposed algorithm is able to provide superior results compared to well-knowri and recent algorithms in the literature. The results of the real applications also prove the merits of GOA in solving real problems with unknown search spaces. (C) 2017 Elsevier Ltd. All rights reserved.

电子邮件地址：seyedali.mirjalili@griffithuni.edu.au

23、被引频次：59

题目：MILLIMETER WAVE COMMUNICATIONS FOR FUTURE MOBILE NETWORKS

作者：XIAO, M;MUMTAZ, S;HUANG, YM;DAI, LL;LI, YH;MATTHAIOU, M;KARAGIANNIDIS, GK;BJORNSON, E;YANG, K;CHIH-LIN, I;GHOSH, A

出处：IEEE J SEL AREA COMMUN 35 (9): 1909-1935 SEP 2017

地址：KTH ROYAL INST TECHNOL, SCH ELECT ENGN, DEPT INFORMAT SCI & ENGN, S-10044 STOCKHOLM, SWEDEN;INST TELECOMUNICACOES, AVEIRO, PORTUGAL;SOUTHEAST UNIV, NATL MOBILE COMMUN RES LAB, NANJING 210096, JIANGSU, PEOPLES R CHINA;TSINGHUA UNIV, BEIJING 100084, PEOPLES R CHINA;UNIV SYDNEY, CTR EXCELLENCE TELECOMMUN, SYDNEY, NSW, AUSTRALIA;UNIV SYDNEY, SCH ELECT & INFORMAT ENGN, SYDNEY, NSW, AUSTRALIA;QUEENS UNIV BELFAST, BELFAST BT3 9DT, ANTRIM, NORTH IRELAND;ARISTOTLE UNIV THESSALONIKI, ELECT & COMP ENGN DEPT, THESSALONIKI, GREECE;ARISTOTLE UNIV THESSALONIKI, DIGITAL TELECOMMUN SYST & NETWORKS LAB, THESSALONIKI, GREECE;LINKOPING UNIV, S-58183 LINKOPING, SWEDEN;TONGJI UNIV, SHANGHAI, PEOPLES R CHINA;CHINA MOBILE, BEIJING 100053, PEOPLES R CHINA;NOKIA BELL LABS, SMALL CELL RES, MURRAY HILL, NJ USA

摘要：Millimeter wave (mmWave) communications have recently attracted large research interest, since the huge available bandwidth can potentially lead to the rates of multiple gigabit per second per user. Though mmWave can be readily used in stationary scenarios, such as indoor hotspots or backhaul, it is challenging to use mmWave in mobile networks, where the transmitting/receiving nodes may be moving, channels may have a complicated structure, and the coordination among multiple nodes is difficult. To fully exploit the high potential rates of mmWave in mobile networks, lots of technical problems must be addressed. This paper presents a comprehensive survey of mmWave communications for future mobile networks (5G and beyond). We first summarize the recent channel measurement campaigns and modeling results. Then, we discuss in detail recent progresses in multiple input multiple output transceiver design for mmWave communications. After that, we provide an overview of the solution for multiple access and backhauling, followed by the analysis of coverage and connectivity. Finally, the progresses in the standardization and deployment of mmWave for mobile networks are discussed.

电子邮件地址：mingx@kth.se; smumtaz@av.it.pt; huangym@seu.edu.cn; daill@tsinghua.edu.cn; yonghui.li@sydney.edu.au; m.matthaiou@qub.ac.uk; geokarag@auth.gr; emil.bjornson@liu.se; kaiyang@tongji.edu.cn; icl@chinamobile.com; amitava.ghosh@nokia.com

24、被引频次：58

题目：APPLICATION OF DEEP CONVOLUTIONAL NEURAL NETWORK FOR AUTOMATED DETECTION OF MYOCARDIAL INFARCTION USING ECG SIGNALS

作者：ACHARYA, UR;FUJITA, H;OH, SL;HAGIWARA, Y;TAN, JH;ADAM, M

出处：INFORM SCIENCES 415: 190-198 NOV 2017

地址：NGEE ANN POLYTECH, DEPT ELECT & COMP ENGN, SINGAPORE, SINGAPORE;SINGAPORE UNIV SOCIAL SCI, SCH SCI & TECHNOL, DEPT BIOMED ENGN, SINGAPORE, SINGAPORE;UNIV MALAYA, FAC ENGN, DEPT BIOMED ENGN, KUALA LUMPUR, MALAYSIA;IPU, FAC SOFTWARE & INFORMAT SCI, TAKIZAWA, IWATE 0200693, JAPAN

摘要：The electrocardiogram (ECG) is a useful diagnostic tool to diagnose various cardiovascular diseases (CVDs) such as myocardial infarction (MI). The ECG records the heart's electrical activity and these signals are able to reflect the abnormal activity of the heart. However, it is challenging to visually interpret the ECG signals due to its small amplitude and duration. Therefore, we propose a novel approach to automatically detect the MI using ECG signals. In this study, we implemented a convolutional neural network (CNN) algorithm for the automated detection of a normal and MI ECG beats (with noise and without noise). We achieved an average accuracy of 93.53% and 95.22% using ECG beats with noise and without noise removal respectively. Further, no feature extraction or selection is performed in this work. Hence, our proposed algorithm can accurately detect the unknown ECG signals even with noise. So, this system can be introduced in clinical settings to aid the clinicians in the diagnosis of MI. (C) 2017 Elsevier Inc. All rights reserved.
电子邮件地址：HFujita-799@acm.org

25、被引频次：52
题目：SALP SWARM ALGORITHM: A BIO-INSPIRED OPTIMIZER FOR ENGINEERING DESIGN PROBLEMS
作者：MIRJALILI, S;GANDOMI, AH;MIRJALILI, SZ;SAREMI, S;FARIS, H;MIRJALILI, SM
出处：ADV ENG SOFTW 114: 163-191 DEC 2017
地址：GRIFFITH UNIV, INST INTEGRATED & INTELLIGENT SYST, NATHAN, QLD 4111, AUSTRALIA;STEVENS INST TECHNOL, SCH BUSINESS, HOBOKEN, NJ 07030 USA;UNIV NEWCASTLE, SCH ELECT ENGN & COMP, CALLAGHAN, NSW 2308, AUSTRALIA;UNIV JORDAN, KING ABDULLAH II SCH INFORMAT TECHNOL, BUSINESS INFORMAT TECHNOL DEPT, AMMAN, JORDAN;CONCORDIA UNIV, DEPT ELECT & COMP ENGN, MONTREAL, PQ H3G 1M8, CANADA;MICHIGAN STATE UNIV, BEACON CTR STUDY EVOLUT ACT, E LANSING, MI USA

摘要：This work proposes two novel optimization algorithms called Salp Swarm Algorithm (SSA) and Multiobjective Salp Swarm Algorithm (MSSA) for solving optimization problems with single and multiple objectives. The main inspiration of SSA and MSSA is the swarming behaviour of salps when navigating and foraging in oceans. These two algorithms are tested on several mathematical optimization functions to observe and confirm their effective behaviours in finding the optimal solutions for optimization problems. The results on the mathematical functions show that the SSA algorithm is able to improve the initial random solutions effectively and converge towards the optimum. The results of MSSA show that this algorithm can approximate Pareto optimal solutions with high convergence and coverage. The paper also considers solving several challenging and computationally expensive engineering design problems (e.g. airfoil design and marine propeller design) using SSA and MSSA. The results of the real case studies demonstrate the merits of the algorithms proposed in solving real-world problems with difficult and unknown search spaces. (C) 2017 Elsevier Ltd. All rights reserved.
电子邮件地址：seyedali.mirjalili@griffithuni.edu.au

ESI HIGHLY CITED PAPERS

(Computer Science)

（来源：http://esi.incites.thomsonreuters.com）

1、被引频次：13947
题目：LIBSVM: A Library for Support Vector Machines
作者：CHANG, CC;LIN, CJ
出处：ACM TRANS INTELL SYST TECHNOL 2 (3): - SP. ISS. SI 2011
地址：NATL TAIWAN UNIV, DEPT COMP SCI, TAIPEI 106, TAIWAN
摘要：LIBSVM is a library for Support Vector Machines (SVMs). We have been actively developing this package since the year 2000. The goal is to help users to easily apply SVM to their applications. LIBSVM has gained wide popularity in machine learning and many other areas. In this article, we present all implementation details of LIBSVM. Issues such as solving SVM optimization problems theoretical convergence multiclass classification probability estimates and parameter selection are discussed in detail.
电子邮箱地址：cjlin@csie.ntu.edu.tw

2、被引频次：10542
题目：Fitting Linear Mixed-Effects Models Using lme4
作者：BATES, D;MACHLER, M;BOLKER, BM;WALKER, SC
出处：J STAT SOFTW 67 (1): 1-48 OCT 2015
地址：UNIV WISCONSIN, DEPT STAT, MADISON, WI 53706 USA;ETH, SEMINAR STAT, CH-8092 ZURICH, SWITZERLAND;MCMASTER UNIV, DEPT MATH & STAT, HAMILTON, ON L8S 4K1, CANADA;MCMASTER UNIV, DEPT BIOL, HAMILTON, ON L8S 4K1, CANADA
摘要：Maximum likelihood or restricted maximum likelihood (REML) estimates of the parameters in linear mixed-effects models can be determined using the lmer function in the lme4 package for R. As for most model-fitting functions in R, the model is described in an lmer call by a formula, in this case including both fixed- and random-effects terms. The formula and data together determine a numerical representation of the model from which the profiled deviance or the profiled REML criterion can be evaluated as a function of some of the model parameters. The appropriate criterion is optimized, using one of the constrained optimization functions in R, to provide the parameter estimates. We describe the structure of the model, the steps in evaluating the profiled deviance or REML criterion, and the structure of classes or types that represents such a model. Sufficient detail is included to allow specialization of these structures by users who wish to write functions to fit specialized linear mixed models, such as models incorporating pedigrees or smoothing splines, that are not easily expressible in the formula language used by lmer.
电子邮箱地址：bates@stat.wisc.edu; maechler@stat.math.ethz.ch; bolker@mcmaster.ca; scwalker@math.mcmaster.ca

3、被引频次：7442

题目：Research electronic data capture (REDCap)-A metadata-driven methodology and workflow process for providing translational research informatics support

作者：HARRIS, PA;TAYLOR, R;THIELKE, R;PAYNE, J;GONZALEZ, N;CONDE, JG

出处：J BIOMED INFORM 42 (2): 377-381 APR 2009

地址：VANDERBILT UNIV, DEPT BIOMED INFORMAT, NASHVILLE, TN 37212 USA;VANDERBILT UNIV, OFF RES INFORMAT, NASHVILLE, TN 37212 USA;VANDERBILT UNIV, NASHVILLE, TN 37232 USA;MED COLL WISCONSIN, GEN CLIN RES CTR, MILWAUKEE, WI 53226 USA;UNIV PUERTO RICO, CTR INFORMAT ARCHITECTURE RES, SAN JUAN, PR 00936 USA

摘要：Research electronic data capture (REDCap) is a novel workflow methodology and software solution designed for rapid development and deployment of electronic data capture tools to support clinical and translational research. We present: (1) a brief description of the REDCap metadata-driven software toolset; (2) detail concerning the capture and use of study-related metadata from scientific research teams; (3) measures of impact for REDCap; (4) details concerning a consortium network of domestic and international institutions collaborating on. the project; and (5) strengths and limitations of the REDCap system. REDCap is currently supporting 286 translational research projects in a growing collaborative network including 27 active partner institutions. (C) 2008 Elsevier Inc. All rights reserved.

电子邮箱地址：paul.harris@vanderbilt.edu

4、被引频次：7025

题目：Scikit-learn: Machine Learning in Python

作者：PEDREGOSA, F;VAROQUAUX, G;GRAMFORT, A;MICHEL, V;THIRION, B;GRISEL, O;BLONDEL, M;PRETTENHOFER, P;WEISS, R;DUBOURG, V;VANDERPLAS, J;PASSOS, A;COURNAPEAU, D;BRUCHER, M;PERROT, M;DUCHESNAY, E

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地址：CEA SACLAY, INRIA SACLAY, F-91191 GIF SUR YVETTE, FRANCE;NUXEO, F-75020 PARIS, FRANCE;KOBE UNIV, KOBE, HYOGO 6578501, JAPAN;UNIV WEIMAR, D-99421 WEIMAR, GERMANY;GOOGLE INC, NEW YORK, NY 10011 USA;CLERMONT UNIV, IFMA, EA 3867, LAMI, F-63000 CLERMONT FERRAND, FRANCE;UNIV WASHINGTON, DEPT ASTRON, SEATTLE, WA 98195 USA;UMASS AMHERST, IESL LAB, AMHERST, MA 01002 USA;ENTHOUGHT, CAMBRIDGE CB3 0FA, ENGLAND;TOTAL SA, CSTJF, F-64000 PAU, FRANCE;CEA SACLAY, LNAO, F-91191 GIF SUR YVETTE, FRANCE

摘要：Scikit-learn is a Python module integrating a wide range of state-of-the-art machine learning algorithms for medium-scale supervised and unsupervised problems. This package focuses on bringing machine learning to non-specialists using a general-purpose high-level language. Emphasis is put on ease of use, performance, documentation, and API consistency. It has minimal dependencies and is distributed under the simplified BSD license, encouraging its use in both academic and commercial settings. Source code, binaries, and documentation can be downloaded from http://scikit-learn.sourceforge.net.

电子邮箱地址：FABIAN.PEDREGOSA@INRIA.FR;

GAEL.VAROQUAUX@NORMALESUP.ORG; ALEXANDRE.GRAMFORT@INRIA.FR;

VINCENT.MICHEL@LOGILAB.FR; BERTRAND.THIRION@INRIA.FR;

OLIVIER.GRISEL@ENSTA.FR; MBLONDEL@AI.CS.KOBE-U.AC.JP;
PETER.PRETTENHOFER@GMAIL.COM; RONWEISS@GMAIL.COM;
VINCENT.DUBOURG@GMAIL.COM; VANDERPLAS@ASTRO.WASHINGTON.EDU;
ALEXANDRE.TP@GMAIL.COM; COURNAPE@GMAIL.COM;
MATTHIEU.BRUCHER@GMAIL.COM; MATTHIEU.PERROT@CEA.FR;
EDOUARD.DUCHESNAY@CEA.FR

5、被引频次：4386
题目：The Internet of Things: A survey
作者：ATZORI, L;IERA, A;MORABITO, G
出处：COMPUT NETW 54 (15): 2787-2805 OCT 28 2010
地址：UNIV CATANIA, I-95124 CATANIA, ITALY;UNIV CAGLIARI, DIEE, I-09124 CAGLIARI, ITALY;UNIV MEDITERRANEA REGGIO CALABRIA, REGGIO DI CALABRIA, ITALY

摘要：This paper addresses the Internet of Things. Main enabling factor of this promising paradigm is the integration of several technologies and communications solutions. Identification and tracking technologies, wired and wireless sensor and actuator networks, enhanced communication protocols (shared with the Next Generation Internet), and distributed intelligence for smart objects are just the most relevant. As one can easily imagine. any serious contribution to the advance of the Internet of Things must necessarily be the result of synergetic activities conducted in different fields of knowledge, such as telecommunications, informatics, electronics and social science. In such a complex scenario, this survey is directed to those who want to approach this complex discipline and contribute to its development. Different visions of this Internet of Things paradigm are reported and enabling technologies reviewed. What emerges is that still major issues shall be faced by the research community. The most relevant among them are addressed in details. (C) 2010 Elsevier B.V. All rights reserved.

电子邮箱地址：l.atzori@diee.unica.it; antonio.iera@unirc.it; giacomo.morabito@diit.unict.it

6、被引频次：4314
题目：Dropout: A Simple Way to Prevent Neural Networks from Overfitting
作者：SRIVASTAVA, N;HINTON, G;KRIZHEVSKY, A;SUTSKEVER, I;SALAKHUTDINOV, R
出处：J MACH LEARN RES 15: 1929-1958 JUN 2014
地址：UNIV TORONTO, DEPT COMP SCI, TORONTO, ON M5G 3G4, CANADA

摘要：Deep neural nets with a large number of parameters are very powerful machine learning systems. However, overfitting is a serious problem in such networks. Large networks are also slow to use, making it difficult to deal with overfitting by combining the predictions of many different large neural nets at test time. Dropout is a technique for addressing this problem. The key idea is to randomly drop units (along with their connections) from the neural network during training. This prevents units from co-adapting too much. During training, dropout samples from an exponential number of different "thinned" networks. At test time, it is easy to approximate the effect of averaging the predictions of all these thinned networks by simply using a single unthinned network that has smaller weights. This significantly reduces overfitting and gives major improvements over other regularization methods. We show that dropout improves the performance of neural networks on supervised learning tasks in vision, speech recognition, document classification and computational biology, obtaining state-of-the-art results on many benchmark data sets.

电子邮箱地址： nitish@cs.toronto.edu; hinton@cs.toronto.edu; kriz@cs.toronto.edu; ilya@cs.toronto.edu; rsalakhu@cs.toronto.edu

7、被引频次：3927

题目：RSEM: accurate transcript quantification from RNA-Seq data with or without a reference genome

作者：LI, B;DEWEY, CN

出处：BMC BIOINFORMATICS 12: - AUG 4 2011

地址：UNIV WISCONSIN, DEPT COMP SCI, MADISON, WI 53706 USA;UNIV WISCONSIN, DEPT BIOSTAT & MED INFORMAT, MADISON, WI USA

摘要：Background: RNA-Seq is revolutionizing the way transcript abundances are measured. A key challenge in transcript quantification from RNA-Seq data is the handling of reads that map to multiple genes or isoforms. This issue is particularly important for quantification with de novo transcriptome assemblies in the absence of sequenced genomes, as it is difficult to determine which transcripts are isoforms of the same gene. A second significant issue is the design of RNA-Seq experiments, in terms of the number of reads, read length, and whether reads come from one or both ends of cDNA fragments. Results: We present RSEM, an user-friendly software package for quantifying gene and isoform abundances from single-end or paired-end RNA-Seq data. RSEM outputs abundance estimates, 95% credibility intervals, and visualization files and can also simulate RNA-Seq data. In contrast to other existing tools, the software does not require a reference genome. Thus, in combination with a de novo transcriptome assembler, RSEM enables accurate transcript quantification for species without sequenced genomes. On simulated and real data sets, RSEM has superior or comparable performance to quantification methods that rely on a reference genome. Taking advantage of RSEM's ability to effectively use ambiguously-mapping reads, we show that accurate gene-level abundance estimates are best obtained with large numbers of short single-end reads. On the other hand, estimates of the relative frequencies of isoforms within single genes may be improved through the use of paired-end reads, depending on the number of possible splice forms for each gene. Conclusions: RSEM is an accurate and user-friendly software tool for quantifying transcript abundances from RNA-Seq data. As it does not rely on the existence of a reference genome, it is particularly useful for quantification with de novo transcriptome assemblies. In addition, RSEM has enabled valuable guidance for cost-efficient design of quantification experiments with RNA-Seq, which is currently relatively expensive.

电子邮箱地址：cdewey@biostat.wisc.edu

8、被引频次：3690

题目：BLAST plus : architecture and applications

作者：CAMACHO, C;COULOURIS, G;AVAGYAN, V;MA, N;PAPADOPOULOS, J;BEALER, K;MADDEN, TL

出处：BMC BIOINFORMATICS 10: - DEC 15 2009

地址：NATL LIB MED, NATL CTR BIOTECHNOL INFORMAT, NIH, BETHESDA, MD 20894 USA

摘要：Background: Sequence similarity searching is a very important bioinformatics task. While Basic Local Alignment Search Tool (BLAST) outperforms exact methods through its use of heuristics, the speed of the current BLAST software is suboptimal for very long queries or database

sequences. There are also some shortcomings in the user-interface of the current command-line applications. Results: We describe features and improvements of rewritten BLAST software and introduce new command-line applications. Long query sequences are broken into chunks for processing, in some cases leading to dramatically shorter run times. For long database sequences, it is possible to retrieve only the relevant parts of the sequence, reducing CPU time and memory usage for searches of short queries against databases of contigs or chromosomes. The program can now retrieve masking information for database sequences from the BLAST databases. A new modular software library can now access subject sequence data from arbitrary data sources. We introduce several new features, including strategy files that allow a user to save and reuse their favorite set of options. The strategy files can be uploaded to and downloaded from the NCBI BLAST web site. Conclusion: The new BLAST command-line applications, compared to the current BLAST tools, demonstrate substantial speed improvements for long queries as well as chromosome length database sequences. We have also improved the user interface of the command-line applications.

电 子 邮 箱 地 址 ： camacho@ncbi.nlm.nih.gov; coulouri@ncbi.nlm.nih.gov; avagyanv@ncbi.nlm.nih.gov; maning@ncbi.nlm.nih.gov; jasonp@boo.net; kevinbealer@gmail.com; madden@ncbi.nlm.nih.gov

9、被引频次：3662
题目：A Fast Iterative Shrinkage-Thresholding Algorithm for Linear Inverse Problems
作者：BECK, A;TEBOULLE, M
出处：SIAM J IMAGING SCI 2 (1): 183-202 2009
地址：TECHNION ISRAEL INST TECHNOL, DEPT IND ENGN & MANAGEMENT, IL-32000 HAIFA, ISRAEL;TEL AVIV UNIV, SCH MATH SCI, IL-69978 TEL AVIV, ISRAEL
摘要：We consider the class of iterative shrinkage-thresholding algorithms (ISTA) for solving linear inverse problems arising in signal/image processing. This class of methods, which can be viewed as an extension of the classical gradient algorithm, is attractive due to its simplicity and thus is adequate for solving large-scale problems even with dense matrix data. However, such methods are also known to converge quite slowly. In this paper we present a new fast iterative shrinkage-thresholding algorithm (FISTA) which preserves the computational simplicity of ISTA but with a global rate of convergence which is proven to be significantly better, both theoretically and practically. Initial promising numerical results for wavelet-based image deblurring demonstrate the capabilities of FISTA which is shown to be faster than ISTA by several orders of magnitude.
电子邮箱地址：becka@ie.technion.ac.il; teboulle@post.tau.ac.il

10、被引频次：3447
题目：A View of Cloud Computing
作者：ARMBRUST, M;FOX, A;GRIFFITH, R;JOSEPH, AD;KATZ, R;KONWINSKI, A;LEE, G;PATTERSON, D;RABKIN, A;STOICA, I;ZAHARIA, M
出处：COMMUN ACM 53 (4): 50-58 APR 2010
地址：UNIV CALIF BERKELEY, RELIABLE ADAPT DISTRIBUTED SYST LAB RAD LAB, BERKELEY, CA 94720 USA

11、被引频次：3194

题目：Regularization Paths for Generalized Linear Models via Coordinate Descent

作者：FRIEDMAN, J;HASTIE, T;TIBSHIRANI, R

出处：J STAT SOFTW 33 (1): 1-22 FEB 2010

地址：STANFORD UNIV, STANFORD, CA 94305 USA

摘要：We develop fast algorithms for estimation of generalized linear models with convex penalties. The models include linear regression, two-class logistic regression, and multinomial regression problems while the penalties include l(1) (the lasso), l(2) (ridge regression) and mixtures of the two (the elastic net). The algorithms use cyclical coordinate descent, computed along a regularization path. The methods can handle large problems and can also deal efficiently with sparse features. In comparative timings we find that the new algorithms are considerably faster than competing methods.

电子邮箱地址：hastie@stanford.edu

12、被引频次：3112

题目：Conducting Meta-Analyses in R with the metafor Package

作者：VIECHTBAUER, W

出处：J STAT SOFTW 36 (3): 1-48 AUG 2010

地址：MAASTRICHT UNIV, SCH PUBL HLTH & PRIMARY CARE, DEPT METHODOL & STAT, NL-6200 MD MAASTRICHT, NETHERLANDS

摘要：The metafor package provides functions for conducting meta-analyses in R. The package includes functions for fitting the meta-analytic fixed- and random-effects models and allows for the inclusion of moderators variables (study-level covariates) in these models. Meta-regression analyses with continuous and categorical moderators can be conducted in this way. Functions for the Mantel-Haenszel and Peto's one-step method for meta-analyses of 2 x 2 table data are also available. Finally, the package provides various plot functions (for example, for forest, funnel, and radial plots) and functions for assessing the model fit, for obtaining case diagnostics, and for tests of publication bias.

电子邮箱地址：wvb@wvbauer.com

13、被引频次：2869

题目：lavaan: An R Package for Structural Equation Modeling

作者：ROSSEEL, Y

出处：J STAT SOFTW 48 (2): 1-36 MAY 2012

地址：UNIV GHENT, DEPT DATA ANAL, B-9000 GHENT, BELGIUM

摘要：Structural equation modeling (SEM) is a vast field and widely used by many applied researchers in the social and behavioral sciences. Over the years, many software packages for structural equation modeling have been developed, both free and commercial. However, perhaps the best state-of-the-art software packages in this field are still closed-source and/or commercial. The R package lavaan has been developed to provide applied researchers, teachers, and statisticians, a free, fully open-source, but commercial-quality package for latent variable modeling. This paper explains the aims behind the development of the package, gives an overview of its most important features, and provides some examples to illustrate how lavaan works in practice.

电子邮箱地址：Yves.Rosseel@UGent.be

14、被引频次：2843

题目：What Will 5G Be?

作者：ANDREWS, JG;BUZZI, S;CHOI, W;HANLY, SV;LOZANO, A;SOONG, ACK;ZHANG, JC

出处：IEEE J SEL AREA COMMUN 32 (6): 1065-1082 JUN 2014

地址：UNIV TEXAS AUSTIN, AUSTIN, TX 78712 USA;UNIV CASSINO & SOUTHERN LATIUM, I-03043 CASSINO, FR, ITALY;CONSORZIO NAZL INTERUNIV TELECOMUNICAZ, I-03043 CASSINO FROSIONE, ITALY;KOREA ADV INST SCI & TECHNOL, DEPT ELECT ENGN, TAEJON 305701, SOUTH KOREA;MACQUARIE UNIV, N RYDE, NSW 2109, AUSTRALIA;UNIV POMPEU FABRA, BARCELONA 08002, SPAIN;HUAWEI TECHNOL, PLANO, TX 75024 USA;SAMSUNG ELECT, RICHARDSON, TX 75082 USA

摘要：What will 5G be? What it will not be is an incremental advance on 4G. The previous four generations of cellular technology have each been a major paradigm shift that has broken backward compatibility. Indeed, 5G will need to be a paradigm shift that includes very high carrier frequencies with massive bandwidths, extreme base station and device densities, and unprecedented numbers of antennas. However, unlike the previous four generations, it will also be highly integrative: tying any new 5G air interface and spectrum together with LTE and WiFi to provide universal high-rate coverage and a seamless user experience. To support this, the core network will also have to reach unprecedented levels of flexibility and intelligence, spectrum regulation will need to be rethought and improved, and energy and cost efficiencies will become even more critical considerations. This paper discusses all of these topics, identifying key challenges for future research and preliminary 5G standardization activities, while providing a comprehensive overview of the current literature, and in particular of the papers appearing in this special issue.

电子邮箱地址：jandrews@ece.utexas.edu; buzzi@unicas.it; wchoi@kaist.edu; stephen.hanly@mq.edu.au; angel.lozano@upf.edu; anthony.soong@huawei.com; jianzhong.z@samsung.com

15、被引频次：2712

题目：Noncooperative Cellular Wireless with Unlimited Numbers of Base Station Antennas

作者：MARZETTA, TL

出处：IEEE TRANS WIREL COMMUN 9 (11): 3590-3600 NOV 2010

地址：ALCATEL LUCENT, BELL LABS, MURRAY HILL, NJ 07974 USA

摘要：A cellular base station serves a multiplicity of single-antenna terminals over the same time-frequency interval. Time-division duplex operation combined with reverse-link pilots enables the base station to estimate the reciprocal forward-and reverse-link channels. The conjugate-transpose of the channel estimates are used as a linear precoder and combiner respectively on the forward and reverse links. Propagation, unknown to both terminals and base station, comprises fast fading, log-normal shadow fading, and geometric attenuation. In the limit of an infinite number of antennas a complete multi-cellular analysis, which accounts for inter-cellular interference and the overhead and errors associated with channel-state information, yields a number of mathematically exact conclusions and points to a desirable direction towards which cellular wireless could evolve. In particular the effects of uncorrelated noise and fast fading vanish, throughput and the number of terminals are independent of the size of the cells, spectral efficiency is independent of bandwidth, and the required transmitted energy per bit vanishes. The only remaining impairment is inter-cellular interference caused by re-use of the pilot sequences in other cells (pilot contamination) which does

not vanish with unlimited number of antennas.

电子邮箱地址：tom.marzetta@alcatel-lucent.com

16、被引频次：2421

题目：Integrative Genomics Viewer (IGV): high-performance genomics data visualization and exploration

作者：THORVALDSDOTTIR, H;ROBINSON, JT;MESIROV, JP

出处：BRIEF BIOINFORM 14 (2): 178-192 SP. ISS. SI MAR 2013

地址：0

摘要：Data visualization is an essential component of genomic data analysis. However, the size and diversity of the data sets produced by today's sequencing and array-based profiling methods present major challenges to visualization tools. The Integrative Genomics Viewer (IGV) is a high-performance viewer that efficiently handles large heterogeneous data sets, while providing a smooth and intuitive user experience at all levels of genome resolution. A key characteristic of IGV is its focus on the integrative nature of genomic studies, with support for both array-based and next-generation sequencing data, and the integration of clinical and phenotypic data. Although IGV is often used to view genomic data from public sources, its primary emphasis is to support researchers who wish to visualize and explore their own data sets or those from colleagues. To that end, IGV supports flexible loading of local and remote data sets, and is optimized to provide high-performance data visualization and exploration on standard desktop systems. IGV is freely available for download from http://www.broadinstitute.org/igv, under a GNU LGPL open-source license.

电子邮箱地址：jrobinso@broadinstitute.org

17、被引频次：2267

题目：pROC: an open-source package for R and S plus to analyze and compare ROC curves

作者：ROBIN, X;TURCK, N;HAINARD, A;TIBERTI, N;LISACEK, F;SANCHEZ, JC;MULLER, M

出处：BMC BIOINFORMATICS 12: - MAR 17 2011

地址：MED UNIV CTR, DEPT STRUCT BIOL & BIOINFORMAT, BIOMED PROTE RES GRP, GENEVA, SWITZERLAND;MED UNIV CTR, SWISS INST BIOINFORMAT, GENEVA, SWITZERLAND

摘要：Background: Receiver operating characteristic (ROC) curves are useful tools to evaluate classifiers in biomedical and bioinformatics applications. However, conclusions are often reached through inconsistent use or insufficient statistical analysis. To support researchers in their ROC curves analysis we developed pROC, a package for R and S+ that contains a set of tools displaying, analyzing, smoothing and comparing ROC curves in a user-friendly, object-oriented and flexible interface. Results: With data previously imported into the R or S+ environment, the pROC package builds ROC curves and includes functions for computing confidence intervals, statistical tests for comparing total or partial area under the curve or the operating points of different classifiers, and methods for smoothing ROC curves. Intermediary and final results are visualised in user-friendly interfaces. A case study based on published clinical and biomarker data shows how to perform a typical ROC analysis with pROC. Conclusions: pROC is a package for R and S+ specifically dedicated to ROC analysis. It proposes multiple statistical tests to compare ROC curves, and in particular partial areas under the curve, allowing proper ROC interpretation. pROC is available in

two versions: in the R programming language or with a graphical user interface in the S+ statistical software. It is accessible at http://expasy.org/tools/pROC/under the GNU General Public License. It is also distributed through the CRAN and CSAN public repositories, facilitating its installation.

电子邮箱地址：Xavier.Robin@unige.ch; markus.mueller@isb-sib.ch

18、被引频次：2190

题目：Prodigal: prokaryotic gene recognition and translation initiation site identification

作者：HYATT, D;CHEN, GL;LOCASCIO, PF;LAND, ML;LARIMER, FW;HAUSER, LJ

出处：BMC BIOINFORMATICS 11: - MAR 8 2010

地址：OAK RIDGE NATL LAB, COMPUTAT BIOL & BIOINFORMAT GRP, OAK RIDGE, TN 37831 USA;UNIV TENNESSEE, GENOME SCI & TECHNOL GRAD SCH, KNOXVILLE, TN 37996 USA;OAK RIDGE NATL LAB, DOE JOINT GENOME INST, OAK RIDGE, TN 37831 USA

摘要：Background: The quality of automated gene prediction in microbial organisms has improved steadily over the past decade, but there is still room for improvement. Increasing the number of correct identifications, both of genes and of the translation initiation sites for each gene, and reducing the overall number of false positives, are all desirable goals. Results: With our years of experience in manually curating genomes for the Joint Genome Institute, we developed a new gene prediction algorithm called Prodigal (PROkaryotic DYnamic programming Gene-finding ALgorithm). With Prodigal, we focused specifically on the three goals of improved gene structure prediction, improved translation initiation site recognition, and reduced false positives. We compared the results of Prodigal to existing gene-finding methods to demonstrate that it met each of these objectives. Conclusion: We built a fast, lightweight, open source gene prediction program called Prodigal http://compbio.ornl.gov/prodigal/. Prodigal achieved good results compared to existing methods, and we believe it will be a valuable asset to automated microbial annotation pipelines.

电子邮箱地址：hyattpd@ornl.gov

19、被引频次：2129

题目：The Split Bregman Method for L1-Regularized Problems

作者：GOLDSTEIN, T;OSHER, S

出处：SIAM J IMAGING SCI 2 (2): 323-343 2009

地址：UNIV CALIF LOS ANGELES, DEPT MATH, LOS ANGELES, CA 90095 USA

摘要：The class of L1-regularized optimization problems has received much attention recently because of the introduction of "compressed sensing," which allows images and signals to be reconstructed from small amounts of data. Despite this recent attention, many L1-regularized problems still remain difficult to solve, or require techniques that are very problem-specific. In this paper, we show that Bregman iteration can be used to solve a wide variety of constrained optimization problems. Using this technique, we propose a "split Bregman" method, which can solve a very broad class of L1-regularized problems. We apply this technique to the Rudin-Osher-Fatemi functional for image denoising and to a compressed sensing problem that arises in magnetic resonance imaging.

电子邮箱地址：tomgoldstein1@gmail.com; sjo@math.ucla.edu

20、被引频次：1989

题目：The NumPy Array: A Structure for Efficient Numerical Computation

作者：VAN DER WALT, S;COLBERT, SC;VAROQUAUX, G

出处：COMPUT SCI ENG 13 (2): 22-30 MAR-APR 2011

地址：UNIV STELLENBOSCH, ZA-7600 STELLENBOSCH, SOUTH AFRICA;ENTHOUGHT INC, AUSTIN, TX USA;INRIA, LE CHESNAY, FRANCE

摘要：In the Python world, NumPy arrays are the standard representation for numerical data and enable efficient implementation of numerical computations in a high-level language. As this effort shows, NumPy performance can be improved through three techniques: vectorizing calculations, avoiding copying data in memory, and minimizing operation counts.

电子邮箱地址：stefan@sun.ac.za; chris.colbert@enthought.com; gael.varoquaux@normalesup.org

21、被引频次：1788

题目：mice: Multivariate Imputation by Chained Equations in R

作者：VAN BUUREN, S;GROOTHUIS-OUDSHOORN, K

出处：J STAT SOFTW 45 (3): 1-67 DEC 2011

地址：TNO, NL-2301 CE LEIDEN, NETHERLANDS;FSS UNIV UTRECHT, DEPT METHODOL & STAT, UTRECHT, NETHERLANDS;UNIV TWENTE, MB HTSR, NL-7500 AE ENSCHEDE, NETHERLANDS

摘要：The R package mice imputes incomplete multivariate data by chained equations. The software mice 1.0 appeared in the year 2000 as an S-PLUS library, and in 2001 as an R package. mice 1.0 introduced predictor selection, passive imputation and automatic pooling. This article documents mice 2.9, which extends the functionality of mice 1.0 in several ways. In mice 2.9, the analysis of imputed data is made completely general, whereas the range of models under which pooling works is substantially extended. mice 2.9 adds new functionality for imputing multilevel data, automatic predictor selection, data handling, post-processing imputed values, specialized pooling routines, model selection tools, and diagnostic graphs. Imputation of categorical data is improved in order to bypass problems caused by perfect prediction. Special attention is paid to transformations, sum scores, indices and interactions using passive imputation, and to the proper setup of the predictor matrix. mice 2.9 can be downloaded from the Comprehensive R Archive Network. This article provides a hands-on, stepwise approach to solve applied incomplete data problems.

电子邮箱地址：stef.vanbuuren@tno.nl; c.g.m.oudshoorn@utwente.nl

22、被引频次：1773

题目：MCMC Methods for Multi-Response Generalized Linear Mixed Models: The MCMCglmm R Package

作者：HADFIELD, JD

出处：J STAT SOFTW 33 (2): 1-22 FEB 2010

地址：UNIV EDINBURGH, INST EVOLUTIONARY BIOL, EDINBURGH EH9 3JT, MIDLOTHIAN, SCOTLAND

摘要：Generalized linear mixed models provide a flexible framework for modeling a range of data, although with non-Gaussian response variables the likelihood cannot be obtained in closed form. Markov chain Monte Carlo methods solve this problem by sampling from a series of simpler conditional distributions that can be evaluated. The R package M C M C g l m m implements such an

algorithm for a range of model fitting problems. More than one response variable can be analyzed simultaneously, and these variables are allowed to follow Gaussian, Poisson, multi(bi) nominal, exponential, zero-inflated and censored distributions. A range of variance structures are permitted for the random effects, including interactions with categorical or continuous variables (i.e., random regression), and more complicated variance structures that arise through shared ancestry, either through a pedigree or through a phylogeny. Missing values are permitted in the response variable(s) and data can be known up to some level of measurement error as in meta-analysis. All simulation is done in C/C++ using the CSparse library for sparse linear systems.

电子邮箱地址：j.hadfield@ed.ac.uk

23、被引频次：1698

题目：Avogadro: an advanced semantic chemical editor, visualization, and analysis platform

作者：HANWELL, MD;CURTIS, DE;LONIE, DC;VANDERMEERSCH, T;ZUREK, E;HUTCHISON, GR

出处：J CHEMINFORMATICS 4: - AUG 13 2012

地址：UNIV PITTSBURGH, DEPT CHEM, PITTSBURGH, PA 15260 USA;KITWARE INC, DEPT COMP SCI, CLIFTON PK, NY 12065 USA;COE COLL, DEPT COMP SCI, CEDAR RAPIDS, IA 52402 USA;SUNY BUFFALO, DEPT CHEM, BUFFALO, NY 14260 USA

摘要：Background: The Avogadro project has developed an advanced molecule editor and visualizer designed for cross-platform use in computational chemistry, molecular modeling, bioinformatics, materials science, and related areas. It offers flexible, high quality rendering, and a powerful plugin architecture. Typical uses include building molecular structures, formatting input files, and analyzing output of a wide variety of computational chemistry packages. By using the CML file format as its native document type, Avogadro seeks to enhance the semantic accessibility of chemical data types. Results: The work presented here details the Avogadro library, which is a framework providing a code library and application programming interface (API) with three-dimensional visualization capabilities; and has direct applications to research and education in the fields of chemistry, physics, materials science, and biology. The Avogadro application provides a rich graphical interface using dynamically loaded plugins through the library itself. The application and library can each be extended by implementing a plugin module in C++ or Python to explore different visualization techniques, build/manipulate molecular structures, and interact with other programs. We describe some example extensions, one which uses a genetic algorithm to find stable crystal structures, and one which interfaces with the PackMol program to create packed, solvated structures for molecular dynamics simulations. The 1.0 release series of Avogadro is the main focus of the results discussed here. Conclusions: Avogadro offers a semantic chemical builder and platform for visualization and analysis. For users, it offers an easy-to-use builder, integrated support for downloading from common databases such as PubChem and the Protein Data Bank, extracting chemical data from a wide variety of formats, including computational chemistry output, and native, semantic support for the CML file format. For developers, it can be easily extended via a powerful plugin mechanism to support new features in organic chemistry, inorganic complexes, drug design, materials, biomolecules, and simulations. Avogadro is freely available under an open-source license from http://avogadro.openmolecules.net.

电子邮箱地址：marcus.hanwell@kitware.com

24、被引频次：1626

题目：Open Babel: An open chemical toolbox

作者：OBOYLE, NM;BANCK, M;JAMES, CA;MORLEY, C;VANDERMEERSCH, T;HUTCHISON, GR

出处：J CHEMINFORMATICS 3: - OCT 7 2011

地址：UNIV PITTSBURGH, DEPT CHEM, PITTSBURGH, PA 15217 USA;UNIV COLL CORK, ANALYT & BIOL CHEM RES FACIL, CORK, IRELAND;TECH UNIV MUNICH, DEPT CHEM, D-85747 GARCHING, GERMANY;EMOLECULES INC, SOLANA BEACH, CA 92075 USA

摘要：Background: A frequent problem in computational modeling is the interconversion of chemical structures between different formats. While standard interchange formats exist (for example, Chemical Markup Language) and de facto standards have arisen (for example, SMILES format), the need to interconvert formats is a continuing problem due to the multitude of different application areas for chemistry data, differences in the data stored by different formats (0D versus 3D, for example), and competition between software along with a lack of vendor-neutral formats. Results: We discuss, for the first time, Open Babel, an open-source chemical toolbox that speaks the many languages of chemical data. Open Babel version 2.3 interconverts over 110 formats. The need to represent such a wide variety of chemical and molecular data requires a library that implements a wide range of cheminformatics algorithms, from partial charge assignment and aromaticity detection, to bond order perception and canonicalization. We detail the implementation of Open Babel, describe key advances in the 2.3 release, and outline a variety of uses both in terms of software products and scientific research, including applications far beyond simple format interconversion. Conclusions: Open Babel presents a solution to the proliferation of multiple chemical file formats. In addition, it provides a variety of useful utilities from conformer searching and 2D depiction, to filtering, batch conversion, and substructure and similarity searching. For developers, it can be used as a programming library to handle chemical data in areas such as organic chemistry, drug design, materials science, and computational chemistry. It is freely available under an open-source license from http://openbabel.org.

电子邮箱地址：geoffh@pitt.edu

25、被引频次：1468

题目：Primer-BLAST: A tool to design target-specific primers for polymerase chain reaction

作者：YE, J;COULOURIS, G;ZARETSKAYA, I;CUTCUTACHE, I;ROZEN, S;MADDEN, TL

出处：BMC BIOINFORMATICS 13: - JUN 18 2012

地址：NIH, NATL CTR BIOTECHNOL INFORMAT, NATL LIB MED, BETHESDA, MD 20894 USA;DUKE NUS GRAD MED SCH, NEUROSCI & BEHAV DISORDERS PROGRAM, SINGAPORE 169857, SINGAPORE

摘要：Background: Choosing appropriate primers is probably the single most important factor affecting the polymerase chain reaction (PCR). Specific amplification of the intended target requires that primers do not have matches to other targets in certain orientations and within certain distances that allow undesired amplification. The process of designing specific primers typically involves two stages. First, the primers flanking regions of interest are generated either manually or using software tools; then they are searched against an appropriate nucleotide sequence database using tools such as BLAST to examine the potential targets. However, the latter is not an easy process as one needs to examine many details between primers and targets, such as the number and the positions of matched

bases, the primer orientations and distance between forward and reverse primers. The complexity of such analysis usually makes this a time-consuming and very difficult task for users, especially when the primers have a large number of hits. Furthermore, although the BLAST program has been widely used for primer target detection, it is in fact not an ideal tool for this purpose as BLAST is a local alignment algorithm and does not necessarily return complete match information over the entire primer range. Results: We present a new software tool called Primer-BLAST to alleviate the difficulty in designing target-specific primers. This tool combines BLAST with a global alignment algorithm to ensure a full primer-target alignment and is sensitive enough to detect targets that have a significant number of mismatches to primers. Primer-BLAST allows users to design new target-specific primers in one step as well as to check the specificity of pre-existing primers. Primer-BLAST also supports placing primers based on exon/intron locations and excluding single nucleotide polymorphism (SNP) sites in primers. Conclusions: We describe a robust and fully implemented general purpose primer design tool that designs target-specific PCR primers. Primer-BLAST offers flexible options to adjust the specificity threshold and other primer properties. This tool is publicly available at http://www.ncbi.nlm.nih.gov/tools/primer-blast.

电子邮箱地址：jianye@ncbi.nlm.nih.gov

AIAA、IAF 最新会议

AIAA

（AIAA 来源：http://www.aiaa.org/）

1.**会议名称**：AIAA Science and Technology Forum and Exposition (AIAA SciTech Forum)
会议时间：6 January - 10 January 2020
会议地点：Hyatt Regency Orlando, Orlando, Florida
会议简介：The AIAA SciTech Forum is the world's largest event for aerospace research, development, and technology. The 2020 forum will bring together experts to share ideas on Fluid Dynamics; Applied Aerodynamics; Guidance, Navigation, and Control; Structures; and much more.
链接：https://www.aiaa.org/home/events-learning/event/2020/01/06/default-calendar/SciTech2020

2.**会议名称**：2020 IEEE Aerospace Conference
会议时间：7 March - 14 March 2020
会议地点：Yellowstone Conference Center, Big Sky, Montana
会议简介：The international IEEE Aerospace Conference, with AIAA and PHM Society as technical cosponsors, is organized to promote interdisciplinary understanding of aerospace systems, their underlying science and technology, and their applications to government and commercial endeavors.
链接：

https://www.aiaa.org/home/events-learning/event/2020/03/07/default-calendar/2020-ieee-aerospace-conference

3.会议名称：23rd AIAA International Space Planes and Hypersonic Systems and Technologies Conference
会议时间：24 March - 26 March 2020
会议地点：Montréal, Québec, Canada
会议简介：The 23rd AIAA International Space Planes and Hypersonics Systems and Technologies Conference, will take place 24-26 March in Montréal, Canada. Sponsored by the Canadian Aeronautics and Space Institute (CASI), this conference provides a forum for the discussion and exchange of information for attendees from across the globe about leading-edge research and development activities associated with space planes and hypersonic atmospheric flight vehicles and the technologies underpinning these capabilities. Presentations will be provided on national programs from North America, South America, Australia, Europe, and Asia and multiple opportunities for international collaboration will be discussed. Special panel sessions will be organized around relevant topics of strong global interest.
链接：
https://www.aiaa.org/home/events-learning/event/2020/03/24/default-calendar/23rd-aiaa-international-space-planes-and-hypersonic-systems-and-technologies-conference

IAF

（IAF 来源：http://www.iafastro.org/）

1.会议名称：SpaceOps 2020
会议时间：18 – 22 May 2020
会议地点：Cape Town, South Africa
会议简介：SpaceOps 2020, hosted by SANSA, will provide the opportunity for you to share experiences, challenges, and innovative solutions with colleagues from around the world. This conference aims to bring together the global space operations community to address state-of-the-art operations principles, methods and tools. Held biennially since 1990, the conference attracts technologists, scientists, and managers from space agencies, industry, and academia, and fosters managerial and technical interchange on all aspects of space mission operations, including robotic and human spaceflight, Earth orbit and deep space missions, lunar and planetary missions, and orbital and surface operations.

SpaceOps 2020 will be held for the first time on the African continent, in the multicultural melting pot with a rich history, Cape Town, South Africa. South Africa is rapidly taking its place amongst the scientific destinations of choice with the science and technology innovations & research it undertakes on a global scale. Our country, South Africa, also offers the discerning tourist an exciting mix of tourist and entertainment possibilities. Visitors will find Cape Town a vibrant, trendy, sophisticated, well connected and stunningly attractive modern city to visit. South Africa's top 6 tourist attractions are within an hour from the City Centre with SpaceOps 2020 right in the centre of it all.
链接： https://aerospace-europe2020.eu/

ACM 最新会议

来源：http://www.acm.org/

1. **会议名称**：MoMM2019
会议时间：2-4 December, 2019
会议地点：Munich, Gemany
会议简介：The 17th International Conference on Advances in Mobile Computing & Multimedia (MoMM2019) is a leading international conference for researchers and industry practitioners to share their new ideas, original research results and practical development experiences from all mobile computing and multimedia related areas.

MoMM2019 is endorsed by the International Organization for Information Integration and Web-based Applications & Services (@WAS), and will be held from 2-4 December 2019, in Munich, Germany, the city of innovation, technology, art and culture, in conjunction with the 21st International Conference on Information Integration and Web-based Applications & Services (iiWAS2019).

链接：http://www.iiwas.org/conferences/momm2019/

2. **会议名称**：6th IEEE/ACM International Conference on Big Data Computing, Applications and Technologies
会议时间：December 2 - 5, 2019
会议地点：Auckland University of Technology, New Zealand
会议简介：The 6th IEEE/ACM International Conference on Big Data Computing, Applications and Technologies (BDCAT 2019) aims to provide a platform for researchers from both academia and industry to present new discoveries in the broad area of big data computing and applications. The conference topics are big data science, infrastructure and platforms, applications, trends and challenges as well as visualisation of big data.

BDCAT 2019 will have a co-located 11th International Conference on Utility and Cloud Computing (UCC 2019) and a subsequent Serverless Symposium. Do not miss the opportunity for discussing a full week of cloud and big data advances in New Zealand at the end of the year!

This will be the 6th BDCAT along with the 12th UCC in a successful conference series of community-driven events. For more information, consult the conference history and the listing of previous awards given to top papers presented at the conference.

链接：https://www.bdcat-conference.org/

3. **会议名称**：OzCHI 2019
会议时间：Tuesday, 3rd December – Thursday, 5th December 2019
会议地点：Western Australia
会议简介：OzCHI is Australia's leading forum for the latest in Human-Computer Interaction research and practice. OzCHI attracts a broad international community of researchers, industry practitioners, academics and students. Participants come from a range of backgrounds, including interface designers, user experience experts, information architects, software engineers, human factors

specialists, information systems analysts, and social scientists.

After 18 years, OzCHI finally come back to Western Australia. Time has passed and things have changed a lot since OzCHI 2001. More HCI and UX works have been done in Western Australia as well as its neighbouring countries. Having the privilege to convene the 2nd OzCHI conference in Western Australia, one of our objectives is to be inclusive towards attendees across overall Asia-Pacific.

The conference theme is Experience Design in Asia Pacific, which highlights the challenges we all face in the endeavour to tame the environment without destroying it to ensure our continuing existence. Our vision is to make OzCHI 2019 as an inclusive event for academic, industry, research, start-ups, maker communities to learn and exchange knowledge in the recent and emerging HCI and UX areas – practical, technical, empirical and theoretical aspects regardless their level of maturity in the fields.

We invite contributions on all topics related to Human-Computer Interaction, Interaction Design, Architecture, Engineering, Planning, Social Science, Creative Industries, and other related disciplines. Therefore we seek contributions in the "space" of Creating, Designing, Experiencing, Innovating, Intelligence, and Community.

链接：http://ozchi2019.visemex.org/wp/

4.会议名称：Winter Simulation Conference 2019 Simulation for Risk Management
会议时间：December 8-11, 2019
会议地点：National Harbor, Maryland
会议简介：From its very beginnings over 70 years ago, simulation has been a powerful tool for assessing potential risks and guiding us in making decisions under uncertainty. The 2019 conference seeks to highlight the latest simulation technologies for more accurately anticipating risks and for making more robust decisions in the face of uncertainty, ambiguity, and variability. These include methods for robust and accurate simulation modeling, analysis, and optimization. We also invite papers describing applications of simulation to risk management in a broad variety of domains, including healthcare, disaster response, power grids, construction, transportation, finance, cybersecurity, and more.

链接：http://meetings2.informs.org/wordpress/wsc2019/

5.会议名称：CVMP 2019
会议时间：17-18 December 2019
会议地点：BFI Southbank, London, UK
会议简介：Welcome to the ACM SIGGRAPH European Conference on Visual Media Production (CVMP). For the years, CVMP has built a reputation as the prime venue for researchers to meet with practitioners in the Creative Industries.

CVMP brings together production and post-production specialists from the worlds of film, broadcast and games with imaging and graphics researchers; it brings together expertise in video processing, computer vision, computer graphics, animation and physical simulation.

CVMP provides a European forum for presentation of the latest research and application advances, combined with keynote and invited talks on state-of-the-art industry practice.

In this 16th edition of the conference, we are proud to be officially affiliated to and sponsored by ACM SIGGRAPH.

链接：https://www.cvmp-conference.org/2019/

6.**会议名称**：ACM-SIAM Symposium on Discrete Algorithms(SODA20)

会议时间：January 5-8, 2020

会议地点：Salt Lake City,Utah,U.S.

会议简介：This symposium focuses on research topics related to efficient algorithms and data structures for discrete problems. In addition to the design of such methods and structures, the scope also includes their use, performance analysis, and the mathematical problems related to their development or limitations. Performance analyses may be analytical or experimental and may address worst-case or expected-case performance. Studies can be theoretical or based on data sets that have arisen in practice and may address methodological issues involved in performance analysis. Algorithm Engineering and Experiments (ALENEX20), Symposium on Simplicity in Algorithms (SOSA20), and Symposium on Algorithmic Principles of Computer Systems (APOCS20) will take place at the same location.

SODA is jointly sponsored by the SIAM Activity Group on Discrete Mathematics and the ACM Special Interest Group on Algorithms and Computation Theory.

链接：https://www.siam.org/Conferences/CM/Conference/soda20

7.**会议名称**：COMSNETS 2020

会议时间：January 7 – 11, 2020

会议地点：Bengaluru, India

会议简介：COMSNETS is a premier international conference dedicated to advances in Networking and Communications Systems. The conference is a yearly event for a world-class gathering of researchers from academia and industry, practitioners, and business leaders, providing a forum for discussing cutting edge research, and directions for new innovative business and technology.

The conference will include a highly selective technical program consisting of submitted papers, a small set of invited papers on important and timely topics from well-known leaders in the field, and poster session of work in progress. Focused workshops and panel discussions will be held on emerging topics to allow for a lively exchange of ideas. International business and government leaders will be invited to share their perspectives, and will complement the technical program.

The conference will recognize one or more papers, demos, posters, and Graduate Student forum presentations with awards.

链接：https://www.comsnets.org/

8.**会议名称**：HPC Asia 2020

会议时间：15-17 Jan. 2020

会议地点：Fukuoka, Japan

会议简介：High performance computing is a key technology to solve large problems in science, engineering, and business by utilizing computing power which has been evolving to the future. HPC Asia is an international conference series on HPC technologies in Asia Pacific region to exchange ideas, research results and case studies related to all issues of high performance computing and related technologies. Recently, it was held in Tokyo, Japan (2018) and in Guangzhou, China (2019). Then, the next conference, HPC Asia 2020, will be held in Fukuoka, Japan.

链接：http://sighpc.ipsj.or.jp/HPCAsia2020/

9.会议名称：ACM Conference on Fairness, Accountability, and Transparency (ACM FAT*)

会议时间：January 27th to January 30th, 2020.

会议地点：Barcelona.

会议简介：Algorithmic systems are being adopted in a growing number of contexts, fueled by big data. These systems filter, sort, score, recommend, personalize, and otherwise shape human experience. increasingly making or informing decisions with major impact on access to, e.g. credit, insurance, healthcare, parole, social security, and immigration. Although these systems may bring myriad benefits, they also contain inherent risks, such as codifying and entrenching biases; reducing accountability, and hindering due process; they also increase the information asymmetry between individuals whose data feed into these systems and big players capable of inferring potentially relevant information.

ACM FAT* is an interdisciplinary conference dedicated to bringing together a diverse community of scholars from computer science, law, social sciences, and humanities to investigate and tackle issues in this emerging area. Research challenges are not limited to technological solutions regarding potential bias, but include the question of whether decisions should be outsourced to data- and code-driven computing systems. We particularly seek to evaluate technical solutions with respect to existing problems, reflecting upon their benefits and risks; to address pivotal questions about economic incentive structures, perverse implications, distribution of power, and redistribution of welfare; and to ground research on fairness, accountability, and transparency in existing legal requirements.

The conference in 2020 will have five tracks (see Call for Papers):

Computer Science

Law

Social Sciences and Humanities

Practice and Experience

Education

ACM FAT* builds upon two previous successful conference editions and years of workshops on the topics of fairness, accountability, transparency, ethics, and interpretability in machine learning, recommender systems, the web, and other technical disciplines.

链接：https://fatconference.org/

10.会议名称：17th USENIX Symposium on Networked Systems Design and Implementation

会议时间：FEBRUARY 25–27, 2020

会议地点：SANTA CLARA, CA, USA

会议简介：Join us in Santa Clara, CA, USA on February 25–27, 2020, for the 17th USENIX Symposium on Networked Systems Design and Implementation. NSDI focuses on the design principles, implementation, and practical evaluation of networked and distributed systems. Our goal is to bring together researchers from across the networking and systems community to foster a broad approach to addressing overlapping research challenges.

NSDI provides a high-quality, single-track forum for presenting results and discussing ideas that further the knowledge and understanding of the networked systems community as a whole, continue a significant research dialog, or push the architectural boundaries of network services.View the Call for Papers. The Fall deadline to submit paper titles and abstracts is Thursday, September 12, 2019.

链接：https://www.usenix.org/conference/nsdi20

IQPC 最新国防会议(Defence)

IQPC 来源：http://www.iqpc.com/

1. **会议名称**：16th Maritime Security and Coastal Surveillance Asia 2019

会议时间：03 - 04 December, 2019

会议地点：Grand Copthorne Waterfront Hotel, Singapore

会议简介：Today's maritime security needs have become highly sophisticated and multi-dimensional with the exponential rise in maritime terrorism, drug trafficking, piracy and other non-traditional seaborne attacks. Technological advancements and modernization are also shaping governments' spending in the maritime defence and security sector.

Following 15 years of continuous success, the Maritime Security & Coastal Surveillance series has established itself as the preferred annual gathering point for Navies, Coast Guards, Air Forces, Marine Police, Government Agencies and leading technology players.

Global market for new procurement of military platforms will be worth US$838 billion by 2029

Out of this, spending in the Asia-Pacific region is forecast to total US$274.9 billion, with major programmes including Australia's Project Sea 5000 Future Frigate estimated at US$10.1 billion, China's Type 003 aircraft carrier estimated at US$10.6 billion and India's Arihant-class submarine estimated at US$8.2 billion.

Annual global spending across all classes of vessels is expected to increase from US$77 billion in 2019 to US$82 billion in 2024

Asia-Pacific is witnessing a surge in naval procurement as it reacts to growing capabilities among neighbouring countries. Excluding China and India, nations in the region are expected to spend in excess of US$95 billion by the end of 2029

链接：

https://www.defenceiq.com/events-coastalsurveillancemda?utm_medium=portal&mac=IQPCCORP

2. **会议名称**：Air Power Eastern Europe

会议时间：10 - 12 December, 2019

会议地点：Salzburg, Austria

会议简介：The annexation of Crimea redoubled military planners' efforts to leave behind last decade's focus on asymmetric warfare and concentrate on the very real possibility of having to defend against aggression on the European continent. The nations of Eastern Europe responded by increasing defence spending faster than any other region in the world in 2018. Poland already meets NATO's 2% GDP target, and plans to increase defence spending by 46 billion euros over 15 years. Romania's defence budget exceeded 3 billion USD for the first time in 2016, and Lithuania should meet the NATO 2% target for the first time this year.

As the modernisation of regional armed forces continues and readiness levels increase, NATO members on the eastern flank recognise that the decisive deployment of air power will be critical to deterring and responding to aggression and ensuring collective security. Against this backdrop, Defence IQ has launched this regional summit, in order to ensure that air power – rotary and fixed-wing – can be leveraged as a critical enabler for the joint force, up to and beyond 2025.

链接：https://www.defenceiq.com/events-airpoweree?utm_medium=portal&mac=IQPCCORP

3.**会议名称**：International Armoured Vehicles
会议时间：20 - 23 January, 2020
会议地点：Twickenham, London, UK
会议简介：Over 650 armoured vehicles professionals – including over 250 industry experts and 400 military leaders - gathered at The World's Largest Dedicated Armoured Vehicles Conference, in Twickenham earlier this year.

Reflecting on the eighteen years since our first amoured vehicles event in 2001, we've seen the rapid evolution of land power doctrine. 2001 was the start of an extended period of counter-insurgency and counter-terror fighting, leading to the rapid acquisition of armoured vehicles, innovation in counter-IED technology and the proliferation of unmanned aerial systems. Now in 2018, we see the emergence of multi-domain concepts of operation, a reorientation towards high-end peer conflict and the aggressive pursuit of disruptive technologies in AI and Robotics, which are sure to revolutionise and re-energise debate within the land forces community – not least, the armoured vehicles market.

International Armoured Vehicles is the foremost annual meeting that drives this debate – providing a comprehensive dialogue on everything armoured vehicle related from the geostrategic issues shaping doctrine, to the challenges of MRO, lifecycle management and active procurement programmes, through to the next generation of 'optionally manned' combat vehicles. Put simply, over four days, military practitioners, research & development leaders, acquistion specialists and partners from industry will meet to discuss the full range of emerging technologies and changing CONOPS impacting the sector, and how to prepare for challenges to 2035 and beyond.

A truly unique experience for the armour community, welcome to the world's Premier Armoured Vehicles Forum.
链接：
https://www.defenceiq.com/events-internationalarmouredvehicles?utm_medium=portal&mac=IQPCCORP

4.**会议名称**：Surface Warships
会议时间：28 - 30 January, 2020
会议地点：London, UK
会议简介：The Surface Warships conference has become established as the premier meeting ground for the higher naval commands of the nato alliance and partner states, attracting over 150 senior officials including navy commanders, directors of materiel, heads of strategic programs, capability planners, shipyard directors, as well as leading solution providers.

Over the course of 3 days, the event will address the themes now, tomorrow, and the future, focusing on operational requirements for current operations, anticipated platform modernisation, and integration of disruptive technologies for future surface warships.

The conference will allow the exchange of knowledge in the field of ship design, construction, and operations across the entire spectrum of surface warships – identifying solutions for modernising capabilities and enhancing interoperability to maintain maritime superiority against near-peer opponents and asymmetric threats.
链接：https://www.defenceiq.com/events-surfacewarships?utm_medium=portal&mac=IQPCCORP

5.会议名称：Additive Manufacturing for Aerospace & Space

会议时间：25 - 27 February, 2020

会议地点：Birmingham, UK

会议简介：Now entering its 5th year, IQPC's Additive Manufacturing for Aerospace & Space conference has fast established itself as the premium forum for AM users, R&D experts and industry partners within the aerospace and space industry. Returning to London after hosting the forum in Munich earlier this year, and following a valuable visit to the EOS facilities, we are delighted to announce AM for Aerospace & Space will return home. This year, Airbus will take the lead from an AM user perspective and will kindly host a visit to their world renowned Space Systems facility just north of London.

Not just academic in focus and not solution provider heavy, the event has achieved its reputation by providing content that can tangibly help the AM user exploit the performance gains and economic returns that AM offers – this is achieved through predominantly case study led presentations from both users and solution providers.

Aligned to support the UK's national AM strategy, the conference is a platform to tackle the roadblocks of industrial digitisation and ensure opportunities in high value manufacturing are not squandered – both internationally and in the UK.

链接：

https://www.defenceiq.com/events-additivemanufacturing?utm_medium=portal&mac=IQPCCORP