

《人工智能在医药健康领域战略研究（2035）》参考

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中国工程科技知识中心医药卫生专业分中心
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[动态信息]

1. 人工智能教育联盟大会在青岛市级机关会议中心召开

【电子发烧友】8月12日，由青岛市教育局主办，以“AI聚智、共创未来”为主题的人工智能教育联盟大会在市级机关会议中心召开。

链接：<http://m.elecfans.com/article/1288523.html>

2. 为什么人工智能落不了地？人工智能的深水区问题待解！

【腾讯网】深度学习技术在移动端的应用越来越多，视频主体检测技术在App中的应用也在加速。目前，手机使用视频主体检测技术进行身份认证已经是非常普遍的事。视频主体检测技术主要根据物体的特征来进行判别，整个流程（如识别和监测这样的操作）包含大量的神经网络计算。下图是我们团队在2017年做的一个Demo，它通过实时识别视频中的图像主体，再通过该区域进行图像搜索，就可以得到商品、明星等多种垂直分类相关图片的信息。

链接：<https://new.qq.com/omn/20200904/20200904A04IKB00.html>

3. 三亚市卫健委与商汤科技开展“智慧医疗”建设交流座谈会

【三亚市卫生健康委员会】为落实市委、市政府与商汤科技有限公司战略合作内容,9月3日上午,市卫健委牵头组织公立医院与商汤科技召开座谈会,双方就深化“智慧医疗”建设合作进行探讨和交流。

链接: <http://www.sanya.gov.cn/wjwsite/gzdt/202009/902ff3fa5569406eaf8b52b5f02d89e1.shtml>

4. 人工智能与高性能计算结合带来的机遇与挑战

【腾讯网】随着人工智能的快速发展,其涉及的领域越来越广,交叉的学科越来越多,尤其与大数据、物联网和云计算等新兴技术的结合越来越成为研究的热点。随着其处理的对象和任务的不断增多,其计算速度问题日益成为制约其发展的重点。如今,高性能计算已经得到了长足的发展,并且已经成熟地运用在大型科学计算、复杂数据处理等各个方面,但其主要面向一个巨大而复杂的科学整体问题,对多用户和多任务的处理能力还有待提升。如果将人工智能的优化能力和高性能技术的计算能力相结合,将大大提高人工智能的处理数量和高性能计算的拓展能力,这将是未来具有机遇和挑战的新兴技术发展契合点。本文就两种技术的相互结合优势以及结合中的难点进行分析,并进行未来展望,希望能提供一个解决问题的新思路。

链接: <https://new.qq.com/omn/20200904/20200904A081VI00.html?pc>

5. 医疗人工智能公司 Deep Longevity Inc 研发衰老时钟计算你的寿命

【电子发烧友】早在 2018 年,加州大学洛杉矶分校的史蒂夫·霍瓦斯(Steve Horvath)教授开发出了基于表观遗传学的霍瓦斯老化时钟并由此闻名,“衰老时钟”对于医疗保健和高龄化社会的重要性日渐凸显。“‘我们是如何变老的?’我们正在接近这个问题答案的边缘。”亚历克斯·扎沃龙科夫(Alex Zhavoronkov)的《跨越衰老——生物科技的进步将如何改变全球经济》一书这样写道。

链接: <http://m.elecfans.com/article/1288493.html>

6. Artificial Intelligence Tool Diagnoses Alzheimer's with 95% Accuracy

【healthitanalytics】A team from Stevens Institute of Technology has developed an artificial intelligence tool that can diagnose Alzheimer's disease with more than 95 percent accuracy, eliminating the need for expensive scans or in-person testing.

链接:

<https://healthitanalytics.com/news/artificial-intelligence-tool-diagnoses-alzheimers-with-95-accura>

[cy](#)

7. Using deep learning to study how mental disorders affect the brain

【news-medical】 Georgia State University researchers are working to harness deep learning and artificial intelligence to learn more about how mental illness and other disorders affect the brain.

链接:

<https://www.news-medical.net/news/20200828/Using-deep-learning-to-study-how-mental-disorders-affect-the-brain.aspx>

8. DoD Using Artificial Intelligence to Detect Cancer in Medical Images

【hitinfrastructure】 The Department of Defense's (DoD) Defense Innovation Unit (DIU) is leveraging artificial intelligence tools and the department's vast amount of medical data to identify cancers and other conditions.

链接:

<https://healthitanalytics.com/news/dod-using-artificial-intelligence-to-detect-cancer-in-medical-images>

9. Machine learning approach can indicate health risks in future pregnancies

【news-medical】 After a baby is born, doctors sometimes examine the placenta--the organ that links the mother to the baby--for features that indicate health risks in any future pregnancies.

链接:

<https://www.news-medical.net/news/20200903/Machine-learning-approach-can-indicate-health-risks-in-future-pregnancies.aspx>

10. Researchers to create integrated global platform for longevity biotechnology, aging research

【news-medical】 Deep Longevity, Inc (DLI), a leader in artificial intelligence for aging and longevity research announced that it had entered into the agreement to be

acquired by Regent Pacific to create the integrated global platform for longevity biotechnology and aging research.

链接:

<https://www.news-medical.net/news/20200904/Researchers-to-create-an-integrated-global-platform-for-longevity-biotechnology-aging-research.aspx>

[文献速递]

1. 基于便携式计算设备的传统光学显微镜的 AI 赋能升级

作者: 尚尚

文献来源: *中国医疗设备*

摘要: 光学显微镜在生物医学研究和临床医疗中有着广泛的应用.近年来深度学习技术为显微影像的自动分析提供了先进算法支持.然而,目前我国医院和科研单位已安装的显微镜大多没有自带深度神经网络图像分析功能,而设备和软件的升级又需要高额成本.本研究借助便携式计算设备对传统的数字光学显微镜进行人工智能升级,采用 Jetson TX2 便携式设备运行 Faster R-CNN 网络对斑马鱼卵显微图像实现了 3 帧频的分类检测效率,对各类鱼卵的检测敏感度大于 0.88,特异性大于 0.94,并且所用的便携式设备尺寸小,可以方便地放置在显微镜旁侧.本研究为人工智能赋能传统显微镜提供了一种方便、低廉且具有良好推广性的技术解决方案.

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63749

2. 人工智能与人工阅片不同联合方法在肺结节 CT 筛查中的比较

作者: 马宁强

文献来源: *实用放射学杂志*

摘要: 目的 探讨人工智能(AI)与人工阅片不同联合方法对胸部 CT 阅片时间及肺结节检出效能的影响.方法 纳入肺结节 CT 筛查患者 200 例,共包含 1836 个肺结节,分别使用共同阅片(CR)(阅片时 AI 结果同时显示)、第 2 阅片(SR)(不知道 AI 结果的情况下先阅片)及人工双阅(DR)(住院医师阅片,主治医师审核)3 种方法阅片,记录每例阅片时间、检出肺结节及其特征.以 2 名副主任医

师一致意见为参考标准,分别计算出 3 种方法阅片时间、肺结节检出的敏感性、阳性预测值及假阳性率,阅片时间两两比较采用 q 检验,肺结节检出敏感性、阳性预测值及特征两两比较采用 χ^2 检验,假阳性率采用配对 t 检验.结果 CR 法平均每例阅片时间($184.45 \text{ s} \pm 91.21 \text{ s}$)明显短于 SR 法($345.72 \text{ s} \pm 130.71 \text{ s}$)($P < 0.05$)和 DR 法($522.88 \text{ s} \pm 130.08 \text{ s}$)($P < 0.05$).CR 法的肺结节检出敏感性(95.48%)明显高于 DR 法(82.41%)($P < 0.05$),与 SR 法(96.57%)之间差异无统计学意义($P > 0.05$).CR 法的肺结节阳性预测值和假阳性率(97.61%,0.22/CT)与 SR 法(97.74%,0.21/CT)、DR 法(97.68%,0.18/CT),之间差异无统计学意义($P > 0.05$).结论 在肺结节 CT 筛查中,使用 AI 共同阅片法,节省了人力和时间成本,相对于 DR 法又提高了肺结节检出的敏感性,便于临床推广使用.

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63739

3. 鼻咽癌调强放疗标准流程的同质化与优化策略

作者: 杨光荣

文献来源: *中华放射肿瘤学杂志*

摘要: 放疗是鼻咽癌最主要的治疗手段,放疗技术与水平对鼻咽癌预后至关重要。由于调强放疗设备结构的复杂性以及放疗临床要求的精确性,必然对调强放疗流程提出了更高的要求。目前我国各放疗单位在设备配置、人员结构组成等方面存在差距,放疗同质化有待加强。且随着放疗信息管理系统、数字医学及人工智能技术在放疗领域的应用,原有流程已经满足不了新型精确放疗技术的应用需要。本流程旨在依据现有鼻咽癌放疗流程的基础上,结合目前放疗领域的最新进展,建立新的标准流程推荐,有力保证放疗的规范化、同质化,并实现鼻咽癌调强放疗的个体化。

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63738

4. 人工智能时代创新型中医药数据分析人才的培养模式研究

作者: 刘钰涵

文献来源: *学校党建与思想教育*

摘要: 传承创新发展中医药是新时代中国特色社会主义事业的重要内容.人工

智能时代对中医药数据分析人才培养提出了新的需求和挑战.文章通过分析中医药信息相关专业人才培养存在的问题,提出新型的人才培养模式.通过构建全新的教学理念、课程知识体系、校内外实训方法,旨在培养出具有较强的中医药数据分析能力的创新型人才,提升中医药院校的创新型人才培养水平,促进创新教育的科学发展.

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63740

5. 基于健康大数据的军队老干部全维保健模式研究

作者: 曹清心

文献来源: *医学研究生学报*

摘要: 伴随物联网、云计算、区块链和人工智能等现代信息技术的广泛应用,健康大数据融合多学科关键技术,将有力推动健康事业和健康产业的发展.文章针对军队离退休老干部的现实需求,构建全员、全域、全程、全时服务的综合保健新模式,融合物联网、云计算、区块链和人工智能等信息科技,加强大数据技术在全维保健模式上的采集挖掘和分析利用.文章构建四种保健模式和相应的运行机制,具有较好的实用性和推广价值,能有效提升基层卫生机构预防、医疗和保健质量水平.

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63741

6. Machine learning reveals that prolonged exposure to air pollution is associated with SARS-CoV-2 mortality and infectivity in Italy

作者: Cazzolla, Gatti R

文献来源: *Environ Pollut*

摘要: Air pollution can increase the risk of respiratory diseases, enhancing the susceptibility to viral and bacterial infections. Some studies suggest that small air particles facilitate the spread of viruses and also of the new coronavirus, besides the direct person-to-person contagion. However, the effects of the exposure to particulate matter and other contaminants on SARS-CoV-2 has been poorly explored. Here we examined the possible reasons why the new coronavirus differently impacted on Italian regional and provincial populations.

With the help of artificial intelligence, we studied the importance of air pollution for mortality and positivity rates of the SARS-CoV-2 outbreak in Italy. We discovered that among several environmental, health, and socio-economic factors, air pollution and fine particulate matter (PM2.5), as its main component, resulted as the most important predictors of SARS-CoV-2 effects. We also found that the emissions from industries, farms, and road traffic - in order of importance - might be responsible for more than 70% of the deaths associated with SARS-CoV-2 nationwide. Given the major contribution played by air pollution (much more important than other health and socio-economic factors, as we discovered), we projected that, with an increase of 5-10% in air pollution, similar future pathogens may inflate the epidemic toll of Italy by 21-32% additional cases, whose 19-28% more positives and 4-14% more deaths. Our findings, demonstrating that fine-particulate (PM2.5) pollutant level is the most important factor to predict SARS-CoV-2 effects that would worsen even with a slight decrease of air quality, highlight that the imperative of productivity before health and environmental protection is, indeed, a short-term/small-minded resolution.

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63742

7. New technologies and Amyotrophic Lateral Sclerosis - Which step forward rushed by the COVID-19 pandemic?

作者: Pinto, S

文献来源: *J Neurol Sci*

摘要: Amyotrophic Lateral Sclerosis (ALS) is a fast-progressive neurodegenerative disease leading to progressive physical immobility with usually normal or mild cognitive and/or behavioural involvement. Many patients are relatively young, instructed, sensitive to new technologies, and professionally active when developing the first symptoms. Older patients usually require more time, encouragement, reinforcement and a closer support but, nevertheless, selecting user-friendly devices, provided earlier in the course

of the disease, and engaging motivated carers may overcome many technological barriers. ALS may be considered a model for neurodegenerative diseases to further develop and test new technologies. From multidisciplinary teleconsults to telemonitoring of the respiratory function, telemedicine has the potentiality to embrace other fields, including nutrition, physical mobility, and the interaction with the environment. Brain-computer interfaces and eye tracking expanded the field of augmentative and alternative communication in ALS but their potentialities go beyond communication, to cognition and robotics. Virtual reality and different forms of artificial intelligence present further interesting possibilities that deserve to be investigated. COVID-19 pandemic is an unprecedented opportunity to speed up the development and implementation of new technologies in clinical practice, improving the daily living of both ALS patients and carers. The present work reviews the current technologies for ALS patients already in place or being under evaluation with published publications, prompted by the COVID-19 pandemic.

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63744

8. Low-Shot Deep Learning of Diabetic Retinopathy With Potential Applications to Address Artificial Intelligence Bias in Retinal Diagnostics and Rare Ophthalmic Diseases

作者: Burlina, P

文献来源: *JAMA Ophthalmol*

摘要: IMPORTANCE: Recent studies have demonstrated the successful application of artificial intelligence (AI) for automated retinal disease diagnostics but have not addressed a fundamental challenge for deep learning systems: the current need for large, criterion standard-annotated retinal data sets for training. Low-shot learning algorithms, aiming to learn from a relatively low number of training data, may be beneficial for clinical situations involving rare retinal diseases or when addressing potential bias resulting from data that may not adequately represent certain groups for training, such as individuals

older than 85 years. **OBJECTIVE:** To evaluate whether low-shot deep learning methods are beneficial when using small training data sets for automated retinal diagnostics. **DESIGN, SETTING, AND PARTICIPANTS:** This cross-sectional study, conducted from July 1, 2019, to June 21, 2020, compared different diabetic retinopathy classification algorithms, traditional and low-shot, for 2-class designations (diabetic retinopathy warranting referral vs not warranting referral). The public domain EyePACS data set was used, which originally included 88 692 fundi from 44 346 individuals. Statistical analysis was performed from February 1 to June 21, 2020. **MAIN OUTCOMES AND MEASURES:** The performance (95% CIs) of the various AI algorithms was measured via receiver operating curves and their area under the curve (AUC), precision recall curves, accuracy, and F1 score, evaluated for different training data sizes, ranging from 5120 to 10 samples per class. **RESULTS:** Deep learning algorithms, when trained with sufficiently large data sets (5120 samples per class), yielded comparable performance, with an AUC of 0.8330 (95% CI, 0.8140-0.8520) for a traditional approach (eg, fined-tuned ResNet), compared with low-shot methods (AUC, 0.8348 [95% CI, 0.8159-0.8537]) (using self-supervised Deep InfoMax [our method denoted as DIM]). However, when far fewer training images were available (n=160), the traditional deep learning approach had an AUC decreasing to 0.6585 (95% CI, 0.6332-0.6838) and was outperformed by a low-shot method using self-supervision with an AUC of 0.7467 (95% CI, 0.7239-0.7695). At very low shots (n = 10), the traditional approach had performance close to chance, with an AUC of 0.5178 (95% CI, 0.4909-0.5447) compared with the best low-shot method (AUC, 0.5778 [95% CI, 0.5512-0.6044]). **CONCLUSIONS AND RELEVANCE:** These findings suggest the potential benefits of using low-shot methods for AI retinal diagnostics when a limited number of annotated training retinal images are available (eg, with rare ophthalmic diseases or when addressing potential AI bias).

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63743

9. Human- Versus Machine Learning-Based Triage Using Digitalized Patient Histories in Primary Care: Comparative Study

作者: Entezarjou, A

文献来源: *JMIR Med Inform*

摘要: BACKGROUND: Smartphones have made it possible for patients to digitally report symptoms before physical primary care visits. Using machine learning (ML), these data offer an opportunity to support decisions about the appropriate level of care (triage). OBJECTIVE: The purpose of this study was to explore the interrater reliability between human physicians and an automated ML-based triage method. METHODS: After testing several models, a naïve Bayes triage model was created using data from digital medical histories, capable of classifying digital medical history reports as either in need of urgent physical examination or not in need of urgent physical examination. The model was tested on 300 digital medical history reports and classification was compared with the majority vote of an expert panel of 5 primary care physicians (PCPs). Reliability between raters was measured using both Cohen κ (adjusted for chance agreement) and percentage agreement (not adjusted for chance agreement). RESULTS: Interrater reliability as measured by Cohen κ was 0.17 when comparing the majority vote of the reference group with the model. Agreement was 74% (138/186) for cases judged not in need of urgent physical examination and 42% (38/90) for cases judged to be in need of urgent physical examination. No specific features linked to the model's triage decision could be identified. Between physicians within the panel, Cohen κ was 0.2. Intrarater reliability when 1 physician retriaged 50 reports resulted in Cohen κ of 0.55. CONCLUSIONS: Low interrater and intrarater agreement in triage decisions among PCPs limits the possibility to use human decisions as a reference for ML to automate triage in primary care.

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63745

10. The challenge of COVID-19 low disease prevalence for artificial intelligence models: report of 1,610 patients

作者: Quattrocchi, C C

文献来源: *Quant Imaging Med Surg*

摘要: It has been shown that artificial intelligence (AI) may yield rapid and improved detection of coronavirus disease 2019 (COVID-19) by integrating chest CT findings with clinical symptoms, exposure history and laboratory testing (1). Early detection and reduction of workload for healthcare workers have been proposed as main applications of AI in COVID-19 pandemic (2), despite limitations, constraints and pitfalls (3,4).

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63746

[专利]

1. 医疗系统

发明人: 盖瑞.A.弗里曼

申请人: 卓尔医学产品公司

摘要: 根据本发明实施例的医疗系统包括: 配置为监视病人生理状态和根据生理状态生成传感器数据的至少一个传感器; 用户接口设备; 可通信地耦合至用户接口设备的处理器, 该处理器配置为: 获取传感器数据并处理该传感器数据以生成生理数据; 使用户接口设备呈现两个或更多可能的输入单元的阵列, 每个输入单元对应于诊断或治疗途径; 根据在两个或更多可能的输入单元的阵列中的用户选择, 接收选定的输入单元, 该选定的输入单元对应于选定的诊断和治疗途径, 该选定的诊断和治疗途径具有沿着该治疗途径的决策点; 以及根据生理数据和从用户接收到的信息两者, 在用户接口设备上呈现协助该用户从一个决策点沿着选定的诊断和治疗途径移动到下一个决策点的信息。

链接: http://pan.ckcest.cn/rcservice//doc?doc_id=63750

[研究报告]

1. 人工智能在小儿眼科领域的应用研究进展

发布源：国际眼科杂志

发布时间：2020 年

摘要：近年来人工智能(artificial intelligence,AI)技术发展迅猛,在医学领域的实践与应用为医疗行业的发展带来新可能.在普通眼科领域,基于机器学习(machine learning,ML)的人工智能技术极大提高了诊断效率,但在小儿眼科方面取得的进展较少.目前人工智能技术已运用于自动检测早产儿视网膜病变(retinopathy of prematurity,ROP)、儿童白内障,检测斜视和屈光不正,预测未来高度近视,通过眼动追踪诊断阅读障碍以及对眼科图像的研究等方面.本文对人工智能在小儿眼科的应用现状、进展与未来发展做一综述.

链接：<http://d.wanfangdata.com.cn/periodical/mzgjkzz202008015>

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