

题目: 医学影像之“大模型 vs 小数据”

Title: “Large Model vs Small Data” in Medical Image Processing

摘要: 医学影像往往被看作是计算机视觉技术的一个领域应用,但在应用中它还存在很多独特的行业特性。在当今大数据大模型的热潮和参数竞赛中,大模型对很多医学影像应用收效甚微。医学影像经常遭遇小数据挑战,既包含绝对数量的少也包含有优质标注的数据少。因为患者隐私、数据安全等法规要求,以及疾病的长尾分布的特性,疾病样本图片的获取本身就很难,成本也很高。另一方面,疾病的准确鉴别往往需要专家综合多方面信息才能确定,需要消耗大量的时间和费用,并且专家间的一致性往往也不太高。最后,因为影像设备的多样性和采集操作的差异,在广大基层使用的小品牌、低价设备上,往往难以获得好的应用效果。本讲座,从产业应用的角度出发,以眼科影像为例,详细阐述从“开源”和“节流”两个角度解决小数据问题。

Abstract: Although medical image processing is often regarded as an application of computer vision technology, it presents many unique industry characteristics in practice. In the big data boom and parametric competition, large models have limited effect on many medical image applications. The limited number of samples and high-quality annotations often challenges medical image processing methods. The acquisition of disease images is difficult and costly due to regulatory requirements such as patient privacy and data security, as well as the nature of the long-tail distribution of diseases. On the other hand, accurate disease identification requires experts to synthesize multifaceted information, which consumes a lot of time and costs, and often suffers from inter- and intra-variability. Finally, due to the diversity of imaging equipment and differences in acquisition operations, it is often difficult for medical image processing methods to achieve good application performance on small brands and low-priced devices used at the grassroots level. From the viewpoint of industrial applications, this lecture will take ophthalmic image processing as an example to elaborate on solving the “small data” problem from two perspectives: broadening data sources and fully utilizing existing data.

简介: 许言午博士,华南理工大学教授,前百度智慧医疗科学家,WHO 数字健康咨询委员会专家,新加坡眼科研究所客座教授,中国科学院宁波工研院客座研究员,南方科技大学业界导师,IEEE 高级会员,中国生物医学工程学会科技创新与产业促进工作委员会委员,中国医药教育协会数字影像与智能医疗专委会副主任委员,中国医药教育协会智能眼科分会常委、数字疗法工作委员会常委,北京卫生法学会大数据与互联网人工智能医疗专委会委员。自 2004 年起,他持续从事计算机视觉、机器学习理论及其应用研究,共发表了 150 余篇国际期刊及会议论文,谷歌引用 6800 余次,申请国际专利 20 多件和中国专利 70 多件。他目前担任医疗影像顶会 MICCAI 和 IPMI 组委, Springer Nature 旗下 BioMedical Engineering Online 期刊编委, Frontiers in Public Health 和 Diagnostics 期刊编委,中华医学会主办“中国科技期刊卓越行动计划”英文期刊 Intelligent Medicine 创刊编委, AAI、ACPR、ACCAS 等国际学术会议组委及 PC 委员,眼科医学影像国际会议 OMIA 和国际比赛平台 iChallenge 创始主席。他先后获聘公安部引智计划特聘专家、浙江省特聘专家、北京市特聘专家,获评 MICCAI 优秀审稿人、中国科协优秀审稿人、MICCAI 卓越领域主席。他主持了超过 2000 万人民币的国家级科研项目和超过 4000 万人民币的横向课题,作为项目负责人成功入围工信部和国家药监局合办的第一次“AI 医疗器械创新任务揭榜”。从 0 到 1 负责百度眼底 AI 产品获批全国

首张多病种 AI 三类证（同时也是国内首张青光眼 AI 三类证）。

Biosketch: Dr. Yanwu Xu is a Full Professor at South China University of Technology and a former Intelligent Healthcare Scientist at Baidu. He serves as an Expert of the WHO Digital Health Technical Advisory Group, an adjunct Principal Investigator at Singapore Eye Research Institute, an adjunct Professor at Ningbo Institute of Industrial Technology, Chinese Academy of Sciences, and an Industrial Mentor at Southern University of Science and Technology. He is also a Senior Member of IEEE, a Member of Science and Technology Innovation and Industry Promotion Working Committee of Chinese Society of Biomedical Engineering, a Vice Chairman of Digital Imaging and Intelligent Special Medical Committee of China Medical Education Association, a Standing Committee member of Intelligent Ophthalmology Sub-committee of China Medical Education Association, a Standing Committee Member of Digital Therapy Working Committee of China Medical Education Association, a Member of Big Data and Internet Artificial Intelligence Medical Special Committee of Beijing Health Law Society. Since 2004, he has been continuously engaged in research on computer vision, machine learning theory, and application research. He has over 150 publications in international journals and conferences with more than 6800 Google Scholar citations. He has applied for over 20 foreign patents and over 70 Chinese patents. He currently serves as the organizing committee member of the top medical imaging conferences MICCAI and IPMI, the associate editor of *BioMedical Engineering Online* by Springer Nature, and the editorial board member of *Frontiers in Public Health* and *Diagnostics*. He is also the founding editorial board member of *Intelligent Medicine*, an English journal sponsored by the Chinese Medical Association in the Excellent Action Plan for Chinese Science and Technology Journals. He also serves as the organizing committee and programming committee member of international academic conferences such as AAI, ACPR, and ACCAS and the founding chairman of MICCAI Workshop on Ophthalmic Medical Image Analysis (OMIA) and iChallenge, an international ophthalmic challenge platform. He has successively been appointed as a Distinguished Expert for the Ministry of Public Security's Talent Introduction Program, Zhejiang Province's Distinguished Expert, and Beijing's Distinguished Expert. He has been rated as an outstanding area chair of MICCAI conference, an excellent reviewer of MICCAI conference, and excellent reviewer of the China Association for Science and Technology. He has received government research grants over 20 million RMB and industrial research grants over 40 million RMB. His project has been successfully shortlisted for the first "AI Medical Device Innovation Task" jointly hosted by the Ministry of Industry and Information Technology and the National Medical Products Administration. He has led Baidu's AI fundus screening product from the ground up to obtaining the first AI Class-III NMPA (a.k.a. China FDA) medical device certificate for multi-disease (also the first AI Class-III NMPA medical device certificate for glaucoma) in China.