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Application Credentials

Jiancheng Yang
May 20, 2025

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1	Recommendation from Prof. Hanspeter Pfister	Confidential Letter of Recommendation or Evaluation	2 pages	CONFIDENTIAL
2	Recommendation from Prof. Mingguang He	Confidential Letter of Recommendation or Evaluation	3 pages	CONFIDENTIAL
3	Recommendation from Prof. Pascal Fua	Confidential Letter of Recommendation or Evaluation	2 pages	CONFIDENTIAL

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Harvard John A. Paulson
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Prof. Hanspeter Pfister
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December 12, 2024

Dear Faculty Hiring Committee:

I enthusiastically support the application of Dr. **Jiancheng Yang** for a Tenure Track Assistant Professorship. His research lies at the intersection of artificial intelligence and healthcare, with pioneering contributions to medical imaging, 3D computer vision, and AI-driven clinical applications. He has published extensively in premier venues, including IEEE TMI, Nature Portfolio's Scientific Data, and MICCAI, and his work has received widespread recognition. Dr. Yang has been listed among Stanford's Top 2% Scientists Worldwide and Forbes 30 Under 30 Asia (Healthcare & Science), marking him as a rising star with an outstanding academic career ahead.

For those unfamiliar with my background, I have been on the faculty at Harvard University since 2007 and hold the position of An Wang Professor of Computer Science in the School of Engineering and Applied Sciences (SEAS) and an Affiliate Faculty member of the Harvard Center for Brain Science. I served as Academic Dean of Computational Sciences and Engineering and Director of the Institute for Applied Computational Science at SEAS. My research in visual computing lies at the intersection of visualization, computer graphics, and computer vision. It spans various topics, including scientific visualization, biomedical image analysis, interpretable machine learning, and data science. I have a Ph.D. in Computer Science from Stony Brook University, NY, and an M.Sc. in Electrical Engineering from ETH Zürich, Switzerland. Before joining Harvard, I worked for over a decade at Mitsubishi Electric Research Laboratories as Associate Director and Senior Research Scientist. I was elected as an ACM Fellow in 2019 and an IEEE Fellow in 2023. I present my assessment in the context of a 30-year career in visual computing.

I had the privilege of hosting Dr. Yang as a visiting research fellow in my Visual Computing Group (VCG) during his PhD studies. During his time with us, he distinguished himself through his exceptional research capabilities, technical ingenuity, and remarkable ability to foster collaboration. He was a key contributor to six collaborative papers with our group, demonstrating his productivity and ability to work effectively across various research domains.

Dr. Yang's research focuses on advancing the intersection of artificial intelligence and healthcare, with particular emphasis on medical imaging, 3D computer vision, and clinical applications. His work addresses fundamental challenges in making AI systems more effective and accessible for healthcare applications—a critical area as we move towards more sophisticated medical technologies. His research combines theoretical innovation with practical implementation, leading to widely adopted tools and frameworks that have significantly impacted academic research and clinical practice.

Dr. Yang is best known for the **MedMNIST** project, which has become an influential benchmark in medical image analysis. This large-scale initiative encompasses twelve 2D and six 3D datasets in a unified format, spanning various medical imaging modalities from microscopic histopathology to larger-scale X-ray images. The project's impact has been extraordinary, with over 600 citations, recognition as an ESI Highly Cited and Hot Paper, and more than 200,000 downloads. MedMNIST has become a cornerstone resource for research, education, and development in medical AI. It is widely used in research projects, hackathons, and academic courses at various levels. Its success demonstrates Dr. Yang's ability to create resources that will have a lasting impact on the field.

His innovative work on **RibSeg** showcases his technical expertise and original thinking in medical image analysis. Dr. Yang pioneered using sparse volume representation and point cloud-based deep learning for rib segmentation from CT scans. This novel approach achieved a remarkable 60-times speedup compared to traditional methods while improving accuracy. The work, initially published at MICCAI 2021 and later extended to **RibSeg v2** in TMI, demonstrates his ability to solve complex domain-specific problems through principled design and innovative solutions. Additionally, he co-organized the MICCAI **RibFrac Challenge**,

which attracted over 1,200 teams globally, establishing a new benchmark for rib fracture instance segmentation.

Another significant contribution is the **A3D** (Asymmetric 3D Context Fusion) project, where Dr. Yang developed a novel operator for 3D medical imaging that combines the benefits of 2D pretraining with asymmetric 3D context fusion. This innovative approach, which predated similar architectures like MLP Mixer, achieved state-of-the-art performance on the DeepLesion benchmark and maintained the top position for over a year. This work, published at MICCAI 2021, demonstrates his ability to innovate ahead of emerging trends in the field.

Through collaborations with various VCG and Harvard members, including Donglai Wei, Leslie Gu, Zudi Lin, Won-Dong Jang, and Siyu Huang, Dr. Yang has shown remarkable productivity across diverse topics. His work spans from multi-task curriculum learning for partially labeled datasets to lung cancer immunotherapy response prediction. His collaborative spirit and technical expertise have consistently elevated the quality of our group's research. Dr. Yang has also proven to be an exceptional mentor and leader. His mentorship of Leslie Gu, who began as an undergraduate at SJTU and later became my Ph.D. student at Harvard, exemplifies his impact on developing young talent. Their continued collaboration has resulted in multiple TMI submissions.

Dr. Yang is an exceptional researcher and student mentor. His innovative research, leadership abilities, and collaborative spirit make him a rising star in AI for healthcare. I know he will continue to do exceptional work as a professor and be a powerful asset to any institution. He gets my strong recommendation for a Tenure Track Assistant Professorship.

Sincerely,

A handwritten signature in black ink, reading "Hanspeter Pfister". The script is fluid and cursive, with the first name and last name clearly distinguishable.

Hanspeter Pfister
An Wang Professor of Computer Science
Harvard John A. Paulson School of Engineering and Applied Sciences
Affiliate Faculty Member, Harvard Center for Brain Science

7 December 2024

Re: Recommendation for Dr. Jiancheng Yang

To Whom It May Concern,

It is my great pleasure to write this letter of recommendation for Dr. Jiancheng Yang, who has collaborated extensively with my research team at The Hong Kong Polytechnic University. As Chair Professor of Experimental Ophthalmology and Director of the Research Centre for SHARP Vision, I have had the privilege of observing Jiancheng's exceptional contributions to our joint projects in biomedical AI and ophthalmology. Jiancheng has consistently impressed me with his deep technical expertise, his ability to address complex medical challenges, and his strong collaborative spirit. Working closely with Research Assistant Professor Dr. Danli Shi, my PhD students Weiyi Zhang and Shanfu Lu, and other team members, Jiancheng has played an integral role in driving several groundbreaking research projects that exemplify his innovation and collaborative strengths.

As a physician scientist specializing in ophthalmology, I have always been keenly interested in the application of deep learning, particularly the transformative potential of multi-modal and generative AI in clinical practice. Our collaboration with Jiancheng began with a focus on addressing challenges associated with color fundus photography and fluorescein angiography—two essential imaging modalities in ophthalmology. Comprehensive annotation of such datasets is labor-intensive and time-consuming. Leveraging the inherent consistency between these modalities, Jiancheng led efforts to develop a robust pretraining mechanism for cross-modality learning. This resulted in a one-shot segmentation method for retinal artery and vein segmentation, significantly reducing the need for annotated data while achieving state-of-the-art performance. Published in *Ophthalmology Science* (2024), this work exemplified Jiancheng's ability to devise scalable and impactful solutions for real-world clinical problems.



Building on this success, we launched a project to directly generate fluorescein angiography videos from color fundus photographs. This innovative approach aimed to enhance diagnostic information and support clinical decision-making in resource-constrained settings. Jiancheng collaborated closely with Dr. Shi, Weiyi Zhang, and Shanfu Lu to develop Fundus2Video, a cross-modal angiography video generation framework. This system, presented at MICCAI 2024, transforms static fundus images into dynamic videos, offering time-resolved insights into retinal blood flow. Jiancheng's ability to integrate advanced AI methodologies with clinical expertise was instrumental in creating this impactful tool. Furthermore, his work on generative AI culminated in a project submitted to *npj Digital Medicine*, where he demonstrated the potential of generative models trained with clinical constraints to serve as powerful foundation models for various downstream tasks.

Jiancheng also made pivotal contributions to two highly ambitious projects: EyeCLIP and EyeFound. EyeCLIP is a visual-language foundation model for multi-modal ophthalmic image analysis, showcasing Jiancheng's expertise in self-supervised learning and multi-modal contrastive techniques. Collaborating with Dr. Shi and my students, Jiancheng played a key role in developing the model's architecture, enabling it to excel in disease classification, visual question answering, and cross-modal retrieval tasks, even in few-shot and zero-shot scenarios. EyeFound, a multimodal foundation model trained on an extensive dataset comprising ophthalmic images from 227 hospitals, was submitted to *Nature Communications*. Jiancheng's contributions to designing training strategies and benchmarking were critical to the model's success, which has shown immense potential in diagnostic, classification, and retrieval applications across diverse imaging modalities.

These projects not only highlight Jiancheng's technical expertise but also his deep understanding of clinical needs and his ability to translate them into actionable AI solutions. Beyond his technical contributions, Jiancheng's meticulous manuscript revisions have consistently elevated the quality of our publications, ensuring interdisciplinary relevance and rigor.



In addition to his research accomplishments, Jiancheng has demonstrated outstanding leadership within the global Chinese-speaking community of biomedical AI and technology. He is the initiator and organizer of the HIT (Healthcare, Intelligence, and Technology) Webinar, a Chinese-language webinar series that has hosted over 90 sessions since its launch in April 2022. This fully open, non-profit initiative has become a vital platform for knowledge exchange, showcasing Jiancheng's vision and leadership. I firmly believe that this endeavor will have a lasting positive impact on his career development and professional network.

I give Jiancheng my highest and strongest recommendation. His exceptional contributions to research, combined with his leadership and collaborative spirit, make him an outstanding candidate for a faculty position. Jiancheng possesses the rare ability to bridge technical innovation and clinical application, positioning him as a future leader in his field. I am confident that he will excel as a faculty member, driving impactful research, education, and community-building initiatives at your institution.

Please do not hesitate to contact me if you require further information or have any questions.

Sincerely,

Mingguang He MD PhD FRANZCO

Chair Professor of Experimental Ophthalmology, School of Optometry

Director, Research Centre for SHARP Vision

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Lausanne, 08/12/2024

Re: Recommendation for Dr. Jiancheng Yang

Dear members of the committee:

It is a pleasure to write a letter of recommendation for Jiancheng. As a Full Professor at EPFL and the head of the Computer Vision Laboratory (CVLab), I have had the privilege to first supervise Jiancheng during a one-year PhD visit from 2021 to 2022 and then to re-invite him as a postdoctoral fellow from October 2022 until now. Throughout our collaboration, Jiancheng has distinguished himself as an exceptional researcher, a dedicated mentor, and a capable leader. His intellectual curiosity, technical expertise, collaborative spirit, and leadership qualities make him one of the most talented individuals I have had the pleasure of working with in the field of AI and computer vision for bioimaging. During that time, Jiancheng has made many remarkable contributions, collaborated with numerous people, and published papers in the best venues.

Jiancheng's standout contribution is his work on implicit shape modeling. Deep implicit shape models have become popular in the computer vision community at large, but less so for biomedical applications. This is in part because large training databases do not exist and in part because biomedical annotations are often noisy. During his time at CVLab as a visiting PhD student, Jiancheng proposed an innovative way to overcome these difficulties. He developed a data-efficient shape modeling scheme based on implicit template deformation. Multiple templates and corresponding deformation fields can be learnt in a differentiable manner. When reconstructing a target shape, the model selects one of the learned templates and applies the corresponding deformation field. This method allows for accurate modeling of complex anatomical structures and provides a powerful tool for analyzing inter-subject variability in medical imaging datasets. Notably, this is one of the first times neural implicit fields have been applied to medical shape modeling, overcoming the data scarcity challenges common in this field. Thus, by constraining the model with templates, Jiancheng demonstrated that using implicit functions in medical scenarios with limited data is feasible and highly effective. This was published at CVPR'22, the major selective computer vision conference of the year. This is impressive because it is often more difficult to gain acceptance for bioimaging papers at CVPR than in conferences such as MICCAI, which are more oriented towards this particular domain.

During his post-doctoral fellowship, Jiancheng continued in this direction. He expanded his approach to handle multi-class templates and to apply a unified deformation field, ensuring anatomical accuracy of the generated heart structures. He also introduced implicit registration techniques to decouple rigid deformations from local ones. This was used to produce complex heart models from MRI data and to significantly improve upon existing techniques for heart segmentation from multi-center MRI scans through a data-centric retraining pipeline, effectively navigating the domain gaps inherent to such data. The corresponding paper was presented at MICCAI'24.

In collaboration with a CVLab PhD student that Jiancheng is helping me supervise and a surgeon from the local teaching hospital, he is now moving onto the next challenge, modeling the deforming heart during the cardiac cycle. The framework they are developing relies on deep tetrahedral meshes and hybrid representations, combining the strengths of implicit representations for modeling fine details with explicit

representations for deformation. Given an initial 3D model from pre-operative data, our system relies on an universal observation encoder to reconstruct coherent 3D cardiac motion from 3D volumes, a few 2D MRI slices, or even 1D signals. Experiments on cardiac intervention scenarios demonstrated the model's ability to generate anatomically consistent 3D motion reconstructions from such sparse real-time observations, highlighting its potential for real-time imaging and surgical planning. This work pushes the boundaries of what is achievable with limited data and is currently under review for CVPR'25. It was also instrumental in securing funding from the Swiss National Science Foundation for further research on this topic and actual deployment at the hospital the surgeon works at. This is truly exciting and I am looking forward to continuing this work for the foreseeable future.

To my mind, this would have been enough for a successful post-doctoral fellowship but Jiancheng is also engaged in an impressive number of side projects with many different people. Among others, he has addressed the issues of annotation quality in 3D medical imaging, the efficient anatomical labeling of pulmonary tree structures, and the application of generative models in medical contexts. This has resulted in many additional publications. In other words, in addition to his impressive research accomplishments, Jiancheng has been an extraordinary mentor and leader. He possesses excellent leadership and management skills. He has been actively mentoring numerous students, including two junior PhD students in CVLab, two master's thesis students, six master's semester projects, one summer intern at EPFL, and seven remote interns. His mentorship resulted in a series of high-quality publications, and many of the students he guided continue to collaborate with him to this day. Jiancheng has an exceptional ability to motivate and inspire his mentees, helping them achieve their full potential. His dedication to their growth and success, coupled with his ability to explain complex concepts clearly, has had a lasting impact on their academic development. He is also an outstanding team player, maintaining strong partnerships with many CVLab colleagues, such as Dr. Hieu Le, Dr. Udaranga Wickramasinghe, Yihong Chen, and Deniz Sayin Mercadier. Together, they continually exchange ideas, discuss techniques, and produce co-authored publications.

For all these reasons, I am very happy to recommend Dr. Jiancheng Yang in the highest terms. I think he will be a great asset to any department he joins.

Best regards

A handwritten signature in black ink, appearing to be 'P. Fua', with a stylized, fluid script.

Pascal Fua