Jiayun (Peter) Wang

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RESEARCH INTERESTS	My research lies at the intersection of machine learning, data science and computer vision, with a focus on learning structure-aware representations from the real-world data. To that end, my goals are : 1) calibrate ML for real-world data issues towards robust performance ; 2) learn hierarchical representations towards interpretable models ; 3) improve learning efficiency for ML deployment.

EDUCATION

University of California, Berkeley   Aug. 2018 - May 2023
Ph.D. in Vision Science. Area : Computer Vision. Advisors : Stella X. Yu and Meng C. Lin.
Thesis : Structure-Aware Representation Learning and Its Application to Healthcare
Certificate in Teaching and Learning in Higher Education.

Xi'an Jiaotong University   Aug. 2014 - June 2018
Bachelor in Electrical Engineering. Visiting student at UC Berkeley from 2017 to 2018.

RESEARCH EXPERIENCE

California Institute of Technology   Pasadena, CA
Postdoctoral Researcher in Computing and Mathematical Sciences   July 2023 - Present
Advisor : Anima Anandkumar
Topics : AI for science, specifically representation learning for inverse problems and imaging with applications to lung and brain imaging with ultrasound and photoacoustic tomography

University of California, Berkeley   Berkeley, CA
Graduate Student Researcher   Aug. 2018 - May 2023
Topics : Real-world representation learning (learning from imperfect data, 3D visual representations and efficient learning), as well as their applications to healthcare (ML for dry eye disease diagnosis)

HONORS AND AWARDS

Best Paper Award, Machine Learning for Health (ML4H) Symposium	2023
Vector Institute Fellowship (offered)	2023
Best Paper Award, HKSTP	2019
Best Paper Award, CVPR PBVS workshop	2019
Seagate Fellowship	2018
Outstanding Graduate Award, Xi'an Jiaotong University	2018
Top 10 Undergraduate Award, Xi'an Jiaotong University	2017
National Scholarship of China	2015 - 2017
Meritorious Winner, the International Mathematical Contest in Modeling (top 8%)	2016

GRANTS (CO-AUTHORED)

NSF-2313151, "Lie Group Representation Learning for Vision" (200k)	2023
NIH-R21EY033881, "Towards a New Paradigm in Meibomian Gland Evaluation Using AI" (250k)	2022
BAIR Commons, "Scene Sketch to Photo Synthesis"	2021
Berkeley Deep Drive, "Learning Dynamic Point Set Neighbourhoods for 3D Object Detection"	2020

PREPRINTS

[1] Beyond Closure Models: Learning Chaotic-Systems via Physics-Informed Neural Operators
C. Wang, J. Berner, Z. Lin, D. Zhou, **J. Wang**, J. Bae, A. Anandkumar

[2] Lung Histology Reconstruction from Ultrasound Radio-Frequency Signal via Physics Simulation
J. Wang, O. Ostras, B. Tolooshams, M. Sode, Z. Li, K. Azizzadenesheli, G.F. Pinton, A. Anandkumar

[3] Fast and Resolution-Invariant 3D Photoacoustic Computed Tomography via Operator Learning
J. Wang, Y. Aborahama, J. Berner, Z. Li, K. Azizzadenesheli, L.V. Wang, A. Anandkumar

[4] Temporal Neural Operator for Fast Functional Ultrasound Imaging Enabling Real-Time Brain-Computer Interface
B. Tolooshams, **J. Wang**, L. Lin, T. Callier, K. Azizzadenesheli, R.A. Andersen, A. Anandkumar

[5] Downsampling-Invariant Medical Imaging with Neural Operators
A. Jatyani*, **J. Wang***, Z. Wu, A. Anandkumar

JOURNAL ARTICLES

[1] Artificial Intelligence Models Utilize Lifestyle Factors to Predict Dry Eye Related Outcomes
A.D. Graham, **J. Wang**, T. Kothpalli, J. Ding, H. Tasho, A. Molina, V. Tse, S.M. Chang, S.X. Yu, M.C. Lin
Nature Scientific Reports, 2024

[2] A Machine Learning Approach to Predicting Dry Eye-Related Signs, Symptoms and Diagnoses
A.D. Graham, T. Kothpalli, **J. Wang**, J. Ding, V. Tse, P. Asbell, S.X. Yu, M.C. Lin
Heliyon, 2024

[3] Open Long-Tailed Recognition in a Dynamic World
Z. Liu, Z. Miao, X. Zhan, **J. Wang**, B. Gong, S.X. Yu
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2022

[4] Predicting Demographics from Meibography Using Deep Learning
J. Wang, A.D. Graham, S.X. Yu, M.C. Lin
Nature Scientific Reports, 2022

[5] Spatial Transformer for 3D Point Clouds
J. Wang, R. Chakraborty, S.X. Yu
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 2021

[6] Quantifying Meibomian Gland Morphology Using Artificial Intelligence
J. Wang, S. Li, T.N. Yeh, R. Chakraborty, A.D. Graham, S.X. Yu, M.C. Lin
Optometry and Vision Science, 2021

[7] A Deep Learning Approach for Meibomian Gland Atrophy Evaluation in Meibography Images
J. Wang, T.N. Yeh, R. Chakraborty, S.X. Yu, M.C. Lin
Translational Vision Science and Technology (TVST), 2019

[8] Insights and Approaches Using Deep Learning to Classify Wildlife
Z. Miao, K.M. Gaynor, **J. Wang**, Z. Liu, O. Muellerklein, M.S. Norouzzadeh, A. McInturff, R.C.K. Bowie, R. Nathon, S.X. Yu, W.M. Getz
Nature Scientific Reports, 2019.

[9] Deep Ranking Model by Large Adaptive Margin Learning for Person Re-identification
J. Wang, S. Zhou, J. Wang, Q. Hou
Pattern Recognition (PR), 2018

CONFERENCE/
WORKSHOP
PAPERS

[10] Pose-Aware Self-Supervised Learning with Viewpoint Trajectory Regularization
J. Wang, Y. Chen, S.X. Yu
European Conference on Computer Vision (ECCV) **Oral** (2.3%), 2024

[11] Insight: A Multi-Modal Diagnostic Pipeline using LLMs for Ocular Surface Disease Diagnosis
C.H. Yeh, **J. Wang**, A. D. Graham, A. Liu, B. Tan, Y. Chen, Y. Ma, M.C. Lin
Conference on Medical Image Computing and Computer Assisted Intervention, (MICCAI), 2024

[12] Human Reposing and Virtual-Try-On from Multi-View Images
J. Wang, A. Kheradmand, H. Arora
Winter Conference on Applications of Computer Vision (WACV), 2024

[13] Deep Multimodal Fusion for Surgical Feedback Classification
R. Kocielnik, E. Wong, T. Chu, L. Lin, D. Huang, **J. Wang**, A. Anandkumar, A. Hung
Machine Learning for Health. PMLR. **Best Paper**, 2023

[14] Recurrent Parameter Generators
J. Wang*, Y. Chen*, S.X. Yu, B. Cheung, Y. LeCunn
Winter Conference on Applications of Computer Vision (WACV), 2023

[15] 3D Shape Reconstruction from Free-Hand Sketches
J. Wang, J. Lin, Q. Yu, R. Liu, Y. Chen, S.X. Yu
European Conference on Computer Vision Workshop (ECCVW), 2022

[16] Unsupervised Scene Sketch to Photo Synthesis
J. Wang, S. Jeon, S.X. Yu, X. Zhang, H. Arora, Y. Lou
European Conference on Computer Vision Workshop (ECCVW), 2022

[17] Tracking the Dynamics of the Tear Film Lipid Layer
T. Kothpalli, C. Shou, J. Ding, **J. Wang**, A.D. Graham, T. Svitova, S.X. Yu, M.C. Lin
Conference on Neural Information Processing Systems Workshop (NeurIPSW), 2022

[18] Orthogonal Convolutional Neural Networks
J. Wang, Y. Chen, R. Chakraborty, S.X. Yu
Conference on Computer Vision and Pattern Recognition (CVPR), 2020

[19] Large-scale Long-Tailed Recognition in an Open World
Z. Liu, Z. Miao, X. Zhan, **J. Wang**, B. Gong, S.X. Yu
Conference on Computer Vision and Pattern Recognition (CVPR) **Oral** (5%), 2019

[20] Sur-Real: Frechet Mean and Distance Transform for Complex-Valued Deep Learning
R. Chakraborty, **J. Wang**, S.X. Yu
Conference on Computer Vision and Pattern Recognition Workshop (CVPRW) **Best Paper**, 2019

[21] Point to Set Similarity Based Deep Feature Learning for Person Re-identification
S. Zhou, J. Wang, **J. Wang**, Y. Gong, N. Zheng
Conference on Computer Vision and Pattern Recognition (CVPR), 2017

Patent	[22] Image Generation Based on a Multi-Image Set and Pose Data

Patent   [22] Image Generation Based on a Multi-Image Set and Pose Data
A. Kheradmand, **J. Wang**, H. Arora
File number : P80654-US01 ; Date : March 20, 2023.

Teaching

Guest Lecturer, Caltech   Winter 2024
Machine Learning and Statistical Inference (CS165)
Taught materials covering Bayesian and Neyman-Pearson detection, UMVU estimator and Cramér-Rao lower bound. Mentored student projects on diffusion models for inverse problems.

Graduate Student Instructor, UC Berkeley   Fall 2018, 2019, 2020 and Spring 2023
Deep Neural Networks (CS182/282)
Designed course materials illustrating both fundamentals of deep neural networks (e.g. regularization, weights and gradients of CNNs at different layers) as well as advanced applications (e.g. to deep learning systems and biomedicine). 400 students are enrolled.

Machine Learning (CS189/289)
Gave guest lectures, designed real-world problem-focused homework and exams on EM algorithm, long-tailed distribution, research topics like medical imaging, etc., led discussion sessions, and help facilitate course projects. 400 students are enrolled in the class.

Visual Perception (VS205)
Led discussions and lab sessions to help around 70 students understand basic psychophysical and statistical methods in visual perception.

Volunteer teacher for elementary school students, Bay Area Scientists in Schools   2019 - 2022

Invited Talks

Towards Real-World Representation Learning and Its Applications to Healthcare
- Seminar at Stony Brook University   May 2023
- Seminar at Northwestern University   April 2023
- Seminar at Berkeley AI Research Lab   April 2023
- Seminar at Vector Institute   April 2023
- Seminar at California Institute of Technology   Mar 2023
- Seminar at Duke University   Jan 2023
- Seminar at Apple (Camera Incubation Team)   Jan 2023
- Seminar at NVIDIA (Self-Driving Team)   Jan 2023

Generate Photos and 3D from Sketches
- Bosch-ICSI Research Seminar   Aug. 2022
- Seminar at Amazon (FitScience Team)   June 2022

Redundancy and Compression in Deep Neural Networks
- Berkeley Oxyopia Seminar   Nov. 2021
- Berkeley MRI Seminar   Sep. 2021

Learning to Diagnose Dry Eye Diseases from Clinicians
- Seminar at Berkeley Vision Science Retreat   Nov. 2019

Mentorship

Jin Yao, PhD at UVA. Active. (co-advised with Z. Cheng)
Arushi Gupta, undergrad at Caltech. Active. (co-advised with A. Anandkumar)
Armeet Jatyani, undergrad at Caltech. Active. (co-advised with A. Anandkumar)
Martin Zhai, undergrad at UC Berkeley. Next : Master at Cornell University. (co-advised with S. Yu)
Jasmine Li, undergrad at University of Washington. Next : Master at University of Washington.
Tejasvi Kothpalli, undergrad at UC Berkeley. Next : PhD at UC Berkeley. (co-advised with S. Yu)
Shixuan Li, undergrad at UC Berkeley. Next : Master at Brown University. (co-advised with S. Yu)

Service and Leadership

Reviewer : CVPR, ICCV, ECCV, SIGGRAPH, NeurIPS, ICLR, ICML, AAAI, MICCAI, WACV, BMVC, ACCV, CPAL, IEEE-TPAMI, IEEE-TIP, IEEE-TCSVT, IEEE-JBHI, IEEE-JSTARS, IEEE-Access, ACM Comp Surv., ACM TOMM, IJMLC, PLOS One, OVS, TVST, Heliyon, Current Medical Imaging, Scientific Reports, Contact Lens and Anterior Eye, Quantitative Imaging in Medicine and Surgery
Editor : Frontiers in Computer Science, Journal of Imaging
Program Committee Member, AAAI   2021, 2024

Member, American Association for the Advancement of Science		2023 - Present
Member, Caltech AI Graduate Admissions Committee		2023 - 2024
Member, Berkeley Diversity, Equity, Inclusion, and Belonging (DEIB) Committee		2022 - 2023
Mentor, Berkeley AI Research Mentoring Program		2022 - 2023
Session Chair, Caltech Student-Faculty Program Summer Seminar Day		2024
Vice President, Chinese Graduate and Postdoctoral Scholars Association at UC Berkeley		2019 - 2021
Program Committee Chair, Bay Area Vision Research Day (BAVRD)		2019

INDUSTRIAL
EXPERIENCE

Aizip   Cupertino, CA
Founding Member, Research Scientist (part-time)   Oct 2020 - Aug. 2023
- Participating in core projects towards robust, efficient and scalable real-world AI-IoT solutions
- Worked on full-stack machine learning and delivered robust models and products to customers
- Built the tiniest human detection system with robust performance under different lighting conditions

Amazon   Sunnyvale, CA
Applied Scientist Intern   May 2022 - Nov. 2022
- Mentors : Himanshu Arora and Amin Kheradmand
- Developed multi-view human reposing and virtual try-on system that beats state-of-the-art methods
- The work has been submitted to CVPR, and as a patent application

Aibee   Palo Alto, CA
Research Intern   May 2020 - Aug. 2020
- Mentors : Song Cao and Silvio Savarese
- Developed novel algorithms for fine-grained long-tailed vehicle recognition and improved minority class accuracy by 20%

Sensetime   Shenzhen, China
Research Intern   Feb. 2018 - Aug. 2018
- Developed an RGBD-camera-based 3D portrait animation product, which was featured in Vivo's 2018 latest smartphone model
- Developed efficient classification algorithms for long-tailed fine-grained data and ranked 6th in [CVPR 2018 Fine-grained Visual Categorization Competition](#)
- Proposed novel deep networks for efficient point cloud detection and improved 4% performance

REFERENCES

[1] Anima Anandkumar, anima@caltech.edu
Bren Professor of Computing and Mathematical Sciences, California Institute of Technology

[2] Stella X. Yu, stellayu@umich.edu
Professor of Electrical Engineering and Computer Sciences, University of Michigan, Ann Arbor
Adjunct Professor of Electrical Engineering and Computer Sciences, UC Berkeley

[3] Meng C. Lin, mlin@berkeley.edu
Professor of Optometry and Vision Science, UC Berkeley

[4] Yubei Chen, ybchen@ucdavis.edu
Assistant Professor of Electrical and Computer Engineering, UC Davis