Wufei Ma

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EDUCATION

Purdue University West Lafayette, IN
Ph.D. in Computer Science *Sep 2021 - Present*

Rensselaer Polytechnic Institute Troy, NY
B.S. in Computer Science & B.S. in Mathematics *Jan 2017 - May 2020*
- Summa Cum Laude, GPA: 3.97/4.0, Dean's Honor List in every semester
- Outstanding performance recognized: Prof. Lirong Xia, Prof. David Goldschmidt

Columbia University *May - Aug 2020*
Summer session in computer science
- GPA: 4.0/4.0

Wuhan University *Sep 2015 - Nov 2016*
B.S. in Mathematics (transferred to RPI)
- GPA: 3.4/4.0
- Undergraduate Scholarship from Ministry of Education in China

Internship Experience

CCVL, Johns Hopkins University Baltimore, MD
Research Intern *May 2021 - Present*
- Supervisor: Prof. Alan Yuille, Dr. Adam Kortylewski
- Research focus: robust 3D object detection with neural mesh models

Microsoft Research Asia Beijing, China
Research Intern *Jan - Aug 2021*
- Supervisor: Dr. Bin Li, Dr. Jiahao Li
- Research focus: deep learning-based video compression; ensemble learning
- "Stars of Tomorrow" Award of Excellence

Megvii (Face++) Research Beijing, China
Research Intern *Aug 2020 - Jan 2021*
- Supervisor: Dr. Zhikang Liu
- Research focus: monocular 3D object detection with occlusion-reasoning

Research Experience

Robust 6DoF Object Detection with Neural Mesh Models *May 2021 - Present*
Supervised by Prof. Alan Yuille and Dr. Adam Kortylewski from JHU
- Investigate robust methods based on neural mesh models and differentiable neural rendering that can effectively locate objects and estimate viewpoint on PASCAL3D+ dataset.
- Investigate model robustness on out-of-distribution data, such as camera viewpoints, weather conditions, and object appearances that are unseen during training.

Deep Learning-Based Video Compression *Jan - Aug 2021*

Supervised by Dr. Bin Li and Dr. Jiahao Li from Microsoft Research Asia

- Investigate different entropy model designs and adversarial training strategies to improve model robustness and save bits for out-of-distribution video clips.
- Propose an uncertainty-aware decoding module with deep ensembles that can effectively improve the state-of-the-art performance of deep learning-based video compression.

Monocular 3D Object Detection *Aug 2020 - Jan 2021*

Supervised by Dr. Zhikang Liu from MEGVII (Face++) Research

- Investigate keypoint-based methods for monocular 3D object detection on KITTI dataset.
- Propose an occlusion-reasoning module based on discriminative losses to accurately detect hard samples with large occlusion and achieves SOTA performance on KITTI.

Representation Learning with Generative Adversarial Networks *Mar 2019 - Jul 2020*

Supervised by Prof. Bülent Yener from RPI

- Build conditional GAN models to generate microstructure segmentation map using the material properties as the generative conditions and add textures using style transfer GANs.
- Characterize microstructures by collecting interpretable computer vision features and traditional texture features, and further predict the material science features.

Microstructure Characterization with Computer Vision *Sep 2018 - Mar 2019*

Supervised by Prof. Bülent Yener from RPI

- Build an image segmentation pipeline to quantify different microstructures across 5 phases.
- Characterize material properties and kinetically model the changes over time.

Publications

Uncertainty-aware deep video compression with ensembles

***Wufei Ma**, Jiahao Li, Bin Li, Yan Lu*

- Manuscript submitted to *ICLR 2022*

Making group decisions from natural language-based preferences

*Farhad Moshin, Lei Luo, **Wufei Ma**, Inwon Kang, Zhibing Zhao, Ao Liu, Rohit Vaish, Lirong Xia*

- Manuscript submitted to *NeurIPS 2021*

Image-driven discriminative and generative machine learning algorithms for establishing microstructure-processing relationships

***Wufei Ma**, Elizabeth Kautz, Arun Baskaran, Aritra Chowdhury, Vineet Joshi, Bülent Yener, Daniel Lewis*

- Published on *Journal of Applied Physics*

The adoption of image-driven machine learning for microstructure characterization and materials design: a perspective

*Arun Baskaran, Elizabeth Kautz, Aritra Chowdhury, **Wufei Ma**, Bülent Yener, Daniel Lewis*

- Published on *Journal of the Minerals, Metals, and Materials Society*

An image-driven machine learning approach to kinetic modeling of a discontinuous precipitation reaction

Elizabeth Kautz, **Wufei Ma***, Saumyadeep Jana, Arun Devaraj, Vineet Joshi, Bülent Yener, Daniel Lewis (* for equal contribution)*

- Published on *Materials Characterization*

Professional Service

25th International Conference on Learning Representations (2022)
Reviewer

Teaching

Foundations of Computer Science *Fall 2021*
Graduate Teaching Assistant

Leadership

Soccer Team, College of Mathematics *Sep 2015 - Nov 2016*
Captain
• Enter semi-final and quarter-final of WHU Soccer Champion Cup in 2015 and 2016, out of 32.
• Host weekly training and organize friendly matches every month.

Shanghai High School Rubik's Cube Club *Jan 2014 - Jan 2015*
President
• Organize tutorials, workshops, and competitions for various Rubik's Cubes.

SKILLS & OTHERS

• Programming: Python, C++, MATLAB, Java
• Other skills: web development, web scrapping, Linux, Apache server, Flask
• Coursera: Machine Learning, Deep Learning, Introduction to Cyber Attacks
• Community service: TensorFlow Localization Team Reviewer (2019)