Zilin Wang

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Education

University of Michigan — Ann Arbor, MI
M.S. in Computer Science & Engineering; ***GPA: 4.00/4.00*** — *Aug 2021 – May 2023*

The Ohio State University — Columbus, OH
B.S. in Computer Science & Engineering; ***GPA: 3.947/4.00*** *(Summa Cum Laude)* — *Aug 2017 – May 2021*

Research Experience

Stella Yu Group, University of Michigan — Ann Arbor, MI
Research assistant / Advisee — *Sept 2022 – Present*

- Working on novel object discovery from natural scene images where we aim to localize and segment every object in an image, including those whose categories are unseen during training.
- By the term "novel", we naturally work under the settings where we only have annotations for a few categories or do not have any annotations at all.

C. Galban Lab, Michigan Medicine — Ann Arbor, MI
Research assistant — *Nov 2021 – Present*

- Designed iSparseUnet, a 3D Unet-like semantic segmentation model that is highly efficient in terms of computation and memory consumption when the ground truth masks are intrinsically sparse.
- Built the encoder on reversible blocks and the decoder on sparse layers(e.g. sparse convolution) in a way that allows the model to generate multi-class segmentation masks in octree format.
- Implemented vectorized code to work with sparse tensors, such as calculating cross entropy loss on sparse tensors from all levels of the octree and reconstructing dense segmentation masks from the octree.
- Benchmarked the model on pulmonary artery/vein segmentation, which suggested that it only takes 0.7 seconds and 16GB of GPU memory to infer on a CT scan of 34 million pixels while achieving 0.84 dice score on the test set.

Professional Experience

Genentech — South San Francisco, CA (remote)
Imaging science intern with Dr. Acner Camino — *May 2022 – Aug 2022*

- Developed a multi-task learning algorithm for retinal OCT-A image segmentation that significantly improves the performance on the main task of foveal avascular zone(FAZ) segmentation.
- Proposed a data augmentation technique that diversifies the noise patterns of input images and improves the model's robustness across different domains(scanner type and disease stage).
- Demonstrated that models trained from this algorithm achieved human-level performance on the test set and only made "mistakes" in cases where human experts do not have definite answers.
- Performed a series of statistical tests and correlation analysis to further validate the model.

Hunan Infopass Information Technology — Changsha, China
Computer vision R&D intern — *June 2018 – Aug 2018*

- Assisted in training a multi-column neural network for estimating crowding levels from cameras in subway trains.
- Led a team of interns to efficiently collect and annotate images, which was later used for training and testing.

Teaching experience

SI670 - Applied Machine Learning — Ann Arbor, MI
Instructional aide with Prof. Kevyn Collins-Thompson — *Fall 2021*

CSE3521/5521 - Introduction to Artificial Intelligence — Columbus, OH
Grader with Dr. Prashant Serai — *Spring 2020*

Academic projects

Transferring Inductive Bias through Leveled Knowledge Distillation | *Report* | *Poster*

- Demonstrated that, by distilling knowledge from a convolutional neural networks(CNNs) teacher, a multi-layer perceptron(MLP) can learn a set of weights that mimics CNNs' translational equivariance.
- Proposed two approaches to further improve the student's performance and robustness: distilling from a less capable(more leveled with the student) teacher and feature matching.

External Wrench Recovery Using Visual-Tactile Sensors for Robotics Manipulation | *Report* | *Slides*

- Introduced a dataset for external wrench recovery from visual-tactile sensor images, where the images are collected from the interaction of the robot and the ground truth wrenches are measured from an external sensor.
- Presented an algorithm to estimate the external forces and torques applied to a robotic manipulator equipped with visual-tactile sensors that combines correspondence matching, classical rendering techniques, and PointNet.

Verifying the Learnability of Bounded-Convex-Lipschitz Problem | *Report*

- Implemented stochastic gradient descent for logistic regression given two scenarios of different domain and feature space.
- Analyzed the M-bound and ρ-Lipschitz of each scenario and proved the estimate of expected excess risk is up bounded.

Inspecting Ultrasound Image of Unborn Fetus by Deep Learning Integrated System | *Website*

- Designed and trained a fined-grained image classifier and an object detector(yolov5) to robustly detect 41 different body parts of unborn fetuses from ultrasound images.
- Deployed a website for doctors and ultrasound operators to interact with the models directly, which improves doctors' diagnosis process and accelerates ultrasound operators' qualifying process.

Adaptive Optics-Scanning Laser Ophthalmoscopy Image Analysis Using Deep Learning | *Report* | *Slides*

- Presented both semantic segmentation and object detection techniques to localize and distinguish between two types of photoreceptors from AO-SLO images of the human retina.
- This project later evolved into the *RC-UPerNet*.

Key Coursework

University of Michigan: Deep Learning for Computer Vision; Advanced Topics in Computer Vision; Machine Learning; Matrix Methods for Signal Processing and Machine Learning.

The Ohio State University: Neural Networks; Machine Learning; Speech & Language Processing; Knowledge Systems; Data Mining.

Skills

Programming: Python, Java, C/C++, Julia, MATLAB, JavaScript, Scheme, SQL, Ruby.

Math & Statistics: Multivariate Calculus, Advanced Linear Algebra; Probability and Random Process, Engineering Statistics, Ordinary and Partial Differential Equations, Higher Mathematics.

Languages: English (fluent), Mandarin (fluent).