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 (Expected)*

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
Computer Vision Researcher   *Sept 2022 − Present*
- Working on novel object discovery where we aim to localize objects whose categories are unseen during training from natural scene images.
- By the term "novel", we naturally work under the settings where we only use annotations of a few categeries(if any) or weak supervision from other modalities like text.

C. Galban Lab, University of Michigan   Ann Arbor, MI
Graduate Student Research Assistant   *Nov 2021 − Present*
- Designed iSparseUnet, a 3D Unet-like semantic segmentation model for CT scans that consists of a dense encoder built on invertible layers, and a sparse decoder built on sparse operations(e.g. sparse convolution).
- Reformulated the traditional fully convolutional decoders in a way that allows iSparseUnet to generate multi-class segmentation masks in octree format, which significant improved memory and computation efficiency.
- Implemented vectorized code to deal 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.
- Engineered the model to be easily re-usable by encapsulating the dirty details inside the model so that users only need to prepare the training data in the traditional way.
- Quantitatively, the model is able to segment tubular structures from pulmonary CT scans of ~ 33 million pixels in one forward pass within 0.7 second, while achieving a Dice score of ~ 0.84 on our validation set.
- Working on a semi-supervised algorithm based on Generative Adversarial Networks(GANs) to exploit the much larger amount of unlabeled CT scans.

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 OCT-A image segmentation where the input images are from different domains – produced by multiple types of scanners on patients at different disease stages.
- Performed a series of statistical tests on the groundtruth annotations to ensure reliability.
- Computed quantitative features from the inference results run on a longitudinal dataset, performed the same statistical tests, visualized and analyzed the results to identify useful biomarkers of diabetic retinopathy.

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.

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 recoverey 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 by combining 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 a object detector(yolov5) to robustly detect 41 different body parts of unborn fetus from ultrasound images.
- Deployed a website for doctors and ultrasound operators to directly interact with the models, 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 human retina.
- This project later evolved into the *RC-UPerNet*.

TEACHING

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*

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, TOEFL MyBest scores 109), Mandarin (native).