Maxwell Jones

PhD Candidate
Machine Learning Department
Carnegie Mellon University

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Education

Carnegie Mellon University

Machine Learning Department, PhD. Advisors: Jun-Yan Zhu and Ruslan Salakhutdinov — 2024 - Present

Machine Learning Department, MS (GPA: 3.93/4.3) — 2023-2024

B.S Artificial Intelligence (GPA: 4.0/4.0) — 2019-2023

B.S Discrete Math and Logic (GPA: 4.0/4.0) — 2019-2023

Thomas Jefferson High School for Science and Technology — 2015-2019

High School Diploma 2019 (GPA: 4.1/5.0)

Publications

- **Maxwell Jones**, Sheng-Yu Wang, Nupur Kumari, David Bau, and Jun-Yan Zhu. *Customizing Text-to-Image Models with a Single Image Pair* . SIGGRAPH Asia 2024. [Paper].
- Dravyansh Sharma, and **Maxwell Jones**. *Efficiently learning the graph for semi-supervised learning* . UAI 2023. [Paper].
- Melissa Hall, Laurens Van der Maaten, Laura Gustafson, **Maxwell Jones**, and Aaron Adcock . *A systematic study of bias amplification* . CVPR TSRML Workshop 2022. [Paper].

Work Experience

Meta FAIR Labs — Summer 2022

Software Engineer Intern, Research Team

- Co-authored paper to benchmark algorithmic Bias Amplification of models from biased datasets
- Developed scripts to run custom config files using both bash and python
- Managed project tasks for myself and lead weekly meetings
- See third publication for results

Meta Probability and Uncertainty Team — Summer 2021

Software Engineer Intern, Research Team

- Developed data perturbation training/evaluating/testing pipeline using python, pytorch
- Tested probabilistic models including Bayesian, Ensemble, and Dropout with LeNet-5 architecture
- Evaluated models on perturbed image data (Random Cropping, Rotation, Jittering)

Fiat Chrysler Automobiles — Summer 2020

Software Engineer Intern

- Worked on amount of absentee workers prediction model across production plants
- Improved model performance by using Random Forests and XGBoost
- Cross referenced crew data across plants for more robust/generalized inference
- Significant increase in model accuracy for absentee worker prediction at all plants (2% increase, 5000+ employees)

Teaching/Involvement

- Member, AI Curriculum Review Committee — Fall 2024
- Teaching Assistant, 10703 Deep Reinforcement Learning — Fall 2024
- Teaching Assistant, 15-251, Great Ideas in Theoretical Computer Science — Spring 2023
- Head Teaching Assistant, 15-151/21-128 Mathematical Foundations for Computer Science — Fall 2023
- Teaching Assistant, High School AI Scholars Program @ CMU — Summer 2023
- Judge, WWP Hacks 2022 (HS hackathon, $5000+ in prizes) — Spring 2023
- Head Teaching Assistant, 15-151/21-128 Mathematical Foundations for Computer Science — Fall 2022
- Teaching Assistant, 15-251, Great Ideas in Theoretical Computer Science — Spring 2022
- Head Teaching Assistant, 15-151/21-128 Mathematical Foundations for Computer Science — Fall 2021
- Teaching Assistant, 15-251, Great Ideas in Theoretical Computer Science — Spring 2021
- Teaching Assistant, 15-151/21-128 Mathematical Foundations for Computer Science — Fall 2020

Awards/Honors

- ULSAC (University Leadership Student Advisory Council) 2023-Present
- CMU Rales Fellowship (∼80k/yr, 2 yrs) 2024-Present
- Siebel Scholarship (35k) Spring 2024
- CMU Mark Stehlik Introductory and Service Teaching Award (statement) Spring 2023
- CMU Phi Beta Kappa Honor Society Fall 2023

Projects

- **Decision Transformer and Action Diffusion Implementation** Fall 2024
  - Implemented Decision Transformer and Diffusion Policy from scratch to be given in deep reinforcement learning class as a HW (see Teaching Fall 2024).
  - Implemented value guidance (similar to classifier guidance) from diffusion RL paper, improving diffusion performance
  - Able to match performance of expert trajectories on openAI gym environment collected using a trained PPO model
- **Story Generation** Spring 2024
  - Generate stories on team of 4 (new story captions and corresponding images) from a single initial story caption/image
  - Generate separate story captions for story and conditioning captions to be used for text-to-image model (novel idea)
  - Finetuned Stable Diffusion for image generation and llava model for caption generation using LoRA (Low Rank Adapters) (project link)
  - Improved performance over baselines with same task
- **Solving Graph Problems with Diffusion** Spring 2024
  - Use Graph Neural Networks and Diffusion to solve graph problems like MST (minimum spanning tree) quickly on team of 3
  - Using Kruskals algorithm with ordering from our predicted edges, we find less cycles when computing the MST (project link)
- **Cozmo Depth Map** Spring 2023
  - On team of 2, programmed a robot to use MiDaS, a relative monocular depth estimation model on camera input with 8 GB GPU
  - Given real world sparse depth from aruco markers, calculate optimal scaling factor for relative depth map
  - Allow users to query any pixel on screen and output real world depth estimate (codebase) (slides)
- **MIT Battlecode!**
  - Created Java software on team of 4, for AI bot to compete against other teams in month-long MIT lead tournament, competed for 3 years
  - Leveraged distributed communication algorithms and pathfinding to increase bot's effectiveness
  - Implemented bit packing methods, Priority Queues and Stacks, and K-Means Clustering to improve performance
  - Placed top 10 out of 250 teams internationally (2021, 2022, 2023), 1st out of all first-time teams(2021), $2000+ in prize winnings (full overview)

Coursework/Skills

Coursework:
11-777 Multimodal ML
10-708 Probabilistic Graphical Models
10-703 Deep Reinforcement Learning
10-725 Convex Optimization
36-700 Statistics
15-485 Intro to Deep Learning
16-385 Computer Vision
10-315 Intro to Machine Learning
15-210 Parallel Algorithms
15-213 Computer Systems
21-484 Graph Theory
21-301 Combinatorics

Languages:
Python
Java
C
Javascript
HTML/CSS
LaTeX
SQL
Julia

Tools/Frameworks:
Pytorch
NumPy
SciPy
Unix Command Line
Git
Sklearn
Keras
Pandas
Jupyter Notebook
regex
Matplotlib
OpenCV
Slurm
bash script