KAREEM ELSAWAH

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OBJECTIVE

Computer Engineering student with a passion for machine learning and robotics. My most recent interests have been generative modeling, causal inference, and robotics. I am currently interested in applied research opportunities in these fields.

EDUCATION

Bachelors of Computer Engineering, Ain Shams University, Faculty of Engineering — Expected 2023
Major in Computer Engineering and Software Systems — GPA: 3.89
Minor in Data Science
Thesis: Swarm of Autonomous Drones for Environment Mapping

EXPERIENCE

AI Team Leader — Nov 2019 - Now
ASU Racing Team — *Cairo, Egypt*

- Led Formula AI and Shell AI teams for the 2021 season where we won several awards
- Designed and Implemented a novel deep learning architecture capable of detecting the types and 3D positions of cones at speeds exceeding 40 fps (a modified version of LaserNet).
- Developed and tested a graph-based SLAM algorithm for the Formula AI problem
- Created low-level control on a real-life car and tested the system using it
- Held a summer AI & Robotics workshop with over 200 applicants filtered to over 40 attendees
- Wrote a research gate article on the system developed in 2021

Internship — July 2022 - October 2022
Microsoft, Advanced Technology Lab — *Cairo, Egypt*

- Worked on low-resource machine translation and speech recognition
- Used language models to implement basic rescoring algorithms and improved the baseline by 4% (BLEU) using rescoring during training rather than inference (language model prior)
- Started work on transfer learning between languages in the embedding space using contrastive learning approaches

Perception Internship — Jan 2021 - Sep 2021
ARL, Autotronics Research Lab — *Cairo, Egypt*

- Worked on the perception system for a self-driving car, especially object detection and tracking
- Used LiDAR and RGB Cameras to detect objects in 3D using PVCNN
- Tracked objects in 2D and 3D using SORT, DeepSORT, and similar 3D variants.
- Created a visualizer in Unreal Engine to view all of the cars' perceptions (surrounding cars, lanes, traffic lights, path planning, pedestrians, etc.)

Junior ML Engineer — Aug 2021 - Oct 2021
Omdena

- Contributed to data wrangling, data analysis, and modeling on a real-world time series problem
- Tested early baselines using SARIMAX
- Built a Bayesian AR model using PyMC3 with a learned prior (to have few-shot learning)

AWARDS

Dell - Hacktrick.23, 2nd place 2023

International Conference on Smart Cities Competition, 2nd place 2023

Shell Eco-Marathon, Pitch the future, Global 1st place 2022

Shell Eco-Marathon, Autonomous Programming, 5th place 2022

Machathon 1.0, 2nd place 2020

AI Crowd, AI Blitz 3, 4th place 2020

SKILLS

Machine/Deep Learning: PyTorch, Tensorflow, NumPy, Pandas, Scikit-learn
Game Development: Unreal Engine 4/5, Blender
Languages: Python, C++
Others: ROS, Flask, Node.js
Topics: Computer Vision, Reinforcement Learning, Generative Models, NLP, Causal Inference

PROJECTS

GANVAS: PyTorch implementation of various generative models including: Autoregressive models, Normalizing Flows, Variational Autoencoders, and Denoising Diffusion models.

Zeta: Implementation of REINFORCE, A2C, and PPO from scratch using only NumPy including an implementation of a deep learning framework with CNNs. Trained on several OpenAI gym environments: continuous and discrete action spaces as well as some with images as inputs instead of states. We also created a 3D physics engine from scratch to create custom environments such as a walking spider and a drone to train PPO.

Why: a causal inference library for structural causal modeling and identification. "Why" implements a variety of algorithms including the PC algorithm for causal discovery; GNN and CGNN for edge orientation; COM, GCOM, and TARNet estimators; Backdoor adjustment; Bounds and Sensitivity analysis

BROS: Bandwidth Reduction for Online Streaming. A computer vision and deep learning tool to reduce the required bandwidth for streaming lectures by removing the lecturer (while showing where he/she is pointing) and discretizing the shown board.

EXTRA-CURRICULAR ACTIVITIES

Technical Team Leader, STP Oct 2020 - March 2023

- Organized the Machathon 4.0 autonomous driving competition using both simulations and real-life cars.
- Led three teams to deliver workshops on Machine Learning, Web & Cloud, and Python & Arduino with a focus on projects and implementing algorithms from scratch.
- Organized Machathon 3.0 with a focus on computer vision: reading car license plates.
- Delivered advanced sessions on Machine Learning with a focus on Natural Language Processing to prepare participants for the Machathon 2.0
- Organized the Machathon 2.0 competition with a focus on Arabic NLP

Music Team Member October 2018 - Now

- Play the piano and guitar, currently the lead pianist. Check us out at facebook.com/musicasufoe
- Member of the faculty team where we won every university competition announced starting from 2018.
- Member of the university team where we won 1st place in the national competitions of 2020 and 2021.