Ao Xu

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Education

University of Southern California **Los Angeles, CA**
B.S. in Computer Science Sep. 2017 - Jun. 2021
University of Southern California
M.S. in Computer Science Aug.2021 - May. 2023
Core Courses: CSCI401 Capstone: Design and Construction of Large Software Systems (Grade: A), DSCI553 Data Mining (A-), CSCI567 Machine Learning (A-), CSCI560 Artificial Intelligence (A-), MATH226 Calculus III (A), MATH407 Probability Theory(A-), MATH225 Linear Algebra(A-)

Research Experience & Projects

Lifelong Learning Project (ShELL): USC iLab Research Assistant by Prof.Itti May. 2022 – Now
- Explore the effects of using selected intermediate features extracted by the pretrained Exception model in learning 100 classification tasks
- Reviewing the object detection literature and testing the model performance (e.g., yolov5 and yolov7) on multiple object detection tasks by freezing selected intermediate layers to reduce the number of shared parameters.

Research Assistant at USC Rong Lu Lab May. 2022 – Aug.2022
- Conducted cell segmentation and quantification on microscopy images of bone marrow sections with U-net and cell Profiler.
- Trajectory inference for hematopoiesis process by analyzing the scRNA data on HSCs.
- Applied random forest, partial linear regression, and principal component regression to identity a pattern of HSCs differential process.

Novel Causal Discovery Model: USC iLab Research Assistant instructed by Yunhao Ge Dec. 2021 – May.2022
- Familiarized with the literature in causal discovery and GNN on representing causal relations.
- Devoted to developing the Invariant Structure Learning model based capable of mining causal relationships on tabular data
- Synthesizing datasets and evaluating the performance between the invariant causal discovery model and NOTEAR, CASTLE, and DARING.

Recommendation System: H&M Personalized Fashion Recommendation Marh.2022-May.2022
- Built an item-based collaborative filtering system combined with clustering to make personalized recommendation for H&M customers and won a bronze for the Kaggle H&M personalized fashion recommendation.
- Built a similar hybrid recommendation system for Yelp Restaurant review prediction by item-based approach and content-based modeling with sentiment analysis and feature engineering. The model achieved an RMSE < 1 on test set.

USC Deep-Learning Group Led by Iordanis Fostriopoulos Aug. 2021 – Dec.2021
- Implemented a VQ-VAE model for generative tasks and tested on CIFAR10 dataset
- Working on achieving a lossless compression of image data by learning the residuals of its reconstructions from various lossy compression algorithms (e.g., BGP, VQ-VAE)

Intelligent small-Go Player: An intelligent go player that learns to play Sep. 2021 – Oct. 2021
- Implemented the Q-learning algorithm to learn the utilities of moves under different configurations of a 5*5 board by playing against a random player, a greedy player, and a minimax player.
- After learning and fine-tuning of the learning rate, the Q-learner achieved over 90%-win rate against the minimax players with search-depth of 3 on a 5 by 5 board.

Publication

- Invariant Structure Learning for Better Generalization and Causal Explainability: https://arxiv.org/abs/2206.06469

Internship

Institute of Software, Chinese Academy of Science Dec. 2020 – Jan. 2021
Program: Making easier Psychiatric Diagnosis（A remote research project）
- Collected data of patients' responses to MMPI along with their diagnosis results.
- Used the SVM and random forest algorithms to evaluate the sensitivity and specificity of the questions in MMPI with respect to the diagnostic results of patients.
- Used forward feature selection to determine the most contributing factors for psychiatric diagnosis.