Yu (Bryan) Zhou

Personal Website: bryanzhou008.github.io

Email: bryanzhou008@ucla.edu   LinkedIn: linkedin.com/in/yu-zhou-997359178   GitHub: github.com/bryanzhou008

Education

University of California, Los Angeles (UCLA)

B.S. Computer Science and Applied Mathematics, Class of 2024

- Major GPA: 3.98/4.0
- Overall GPA: 3.96/4.0
- Dean's Honors List (All Quarters)
- GRE: 330/340

Research Experience

BLENDER NLP Lab at UIUC School of Computer Science [Adviser: Prof. Heng Ji, Prof. Mohit Bansal]   Jun 22 - Jan 23

Undergraduate Researcher:

- Proposed the new task of Non-sequential Graph Script Induction for procedural tasks aiming to capture optional & interchangeable steps. Transformed the graph script induction problem to a path generation problem by grounding procedural videos in HowTo100M and CrossTask to a WikiHow textual step library and treating the grounded step sequence as an observed sub-path on the latent ground truth graph script.
- Designed pre-processing and grounding pipelines for labeled and unlabeled video datasets. Pre-trained and finetuned various seq2seq models on our grounded step sequences while imposing Path-Level Constraints by defining a new contrastive loss. Implemented Step-constrained Beam Search to automatically generate probabilistic non-sequential graph scripts for WikiHow tasks.
- Our best model outperforms SOTA text/vision baselines by 17.52% absolute gains in F1@3 for Next Step Prediction and 13.8% absolute gains in Acc@1 for Partial Sequence Completion. Human evaluation show that our model outperforms WikiHow linear baselines by 48.76% absolute gains in Acc@1 for capturing sequential and non-sequential step relationships in auto-generated graph scripts.

Knowledge Engineering Group (KEG) at Tsinghua University CS Dept. [Adviser: Prof. Juanzi Li]   Jun 21 - May 22

Undergraduate Researcher:

- Implemented the Iterative Strict Density-Based Clustering for News Stream (ISDC) model for Chinese News Stream Clustering, which tracks news article cluster density based on article embeddings produced by multilingual-sentence-BERT and iteratively splits low-density news clusters.
- Designed a robust pre-processing method to filter candidate news pairs by entity co-occurrence and semantic similarity. Implemented baseline SOTA models on CStory for the task of storyline relation classification.
- ***Publication (Co-author): "CStory: A Chinese Large-scale News Storyline Dataset" , (CIKM, 2022)
(dataset contains 71,742,231 news storyline relation pairs, 11,978 articles)
Publication (Co-author): "Iterative Strict Density-Based Clustering for News Stream" , (CCIR, 2021)***

Structures-Computer Interaction Laboratory at UCLA Samueli School of Engineering   Sept 20 - Mar 21

Undergraduate Researcher:

- Worked with PhD student to design and implement a 2D LiDAR-based passage identification and navigation SLAM algorithm in C++, outperforming Multi-Ransac and Pearl by more than 30% in road-boundary classification accuracy, while being 72% more efficient.
- Improved the pervious algorithm to perform odometry with an Extended Kalman Filter (EKF), allowing it to fuse data from IMU, Robot-Wheel-Encoder, Lidar, and Monocular Camera.
- Built and configured a simulated operable robot model on RViz and Gazebo to generate training data for the SLAM algorithm. The model receives and displays odometry results from the EKF.

Research Course Projects

[Hard Label Black Box Node Injection Attack on Graph Neural Networks](#) *[Adviser: Prof. Yizhou Sun]*

Proposed a novel non-targeted hard-label black-box low-budget node injection attack on Graph Neural Networks for graph classification. The method assumes no prior knowledge about: (1) the model architecture of the GNN being attacked, (2) the GNN model's gradients, (3) the GNN model's output logits. We restrict the optimization process of existing edge perturbation attack to formulate the node injection attack. We evaluate the attack performance on three datasets: COIL-DEL (100-class object classification), IMDB-BINARY (binary classification on social network), and NCI1 (binary prediction of chemical properties). Experiments demonstrated that our method achieves high attack success rate with low perturbation budget on COIL-DEL (63.89%), IMDB-BINARY (53.95%), and NCI1 (63.19%).

[Improving Transformers' capabilities in Commonsense Reasoning](#) *[Adviser: Prof. Nanyun Peng]*

Used the following methods to improve Transformers' capability in commonsense reasoning demonstrated via classification on the Com2Sense Benchmark: (1) Commonsense knowledge transfer from the SemEval and SQuAD2 Datasets, (2) Defined and implemented Pairwise Contrastive Loss to help model learn to differentiate commonsensical statements from semantically similar counterparts, (3) Used Model Ensemble across different Transformer architectures to boost final prediction performance. Our best model improves Pairwise Accuracy (primary metric of Com2Sense Benchmark) on the Com2Sense hidden test set by 32.43% absolute gains over previous SOTA.

[Current Developments in Object Detection via MMDetection (Survey)](#) *[Adviser: Prof. Bolei Zhou]*

Investigated current SOTA object detection algorithms and their implementations in the MMDetection library. Analyzed and classified key component structures (detection-head/neck/backbone) of current object detection models. Evaluated models on COCO-2017, Pascal-VOC benchmarks and constructed a detailed interactive results table. For empirical analysis, deployed SOTA object detection algorithms on real-time videos and photos taken on UCLA campus and provided qualitative error analysis; then further performed black-box adversarial attacks on SOTA object detection models and evaluated their effects.

Skills

Languages:
- ➢ Python, C++, SQL, R, JavaScript, Spark, MapReduce, Shell Script, Markdown/Latex, MATLAB, Lisp

Machine Learning:
- ➢ PyTorch, HuggingFace, OpenMMLab, TensorFlow, NLTK, NumPy, Pandas, Matplotlib, Scikit-learn

Web Dev:
- ➢ PostgreSQL, Node.js, MongoDB, Mongoose, Neo4j, Apache Spark, React.js, HTML & CSS

Relevant Coursework

- ➢ **Computer Science**: Natural Language Processing, Deep Learning for Computer Vision, Graph Neural Networks (graduate course), "Fairness, Accountability, and Robustness in NLP"(IP, graduate course), Machine Learning, Algorithms and Complexity, Fundamentals of Artificial Intelligence, Software Development Laboratory, Object Oriented Programming, Computer Organization and Systems Architecture
- ➢ **Mathematics/Statistics:** Real Analysis, Complex Analysis, Optimization, Linear Algebra, Numerical Analysis, Multivariable Calculus, Differential Equations, Discrete Mathematics, Probability, Mathematical Statistics, Statistical Programming, Data Science (IP), Stochastic Processes (IP), Mathematical Modelling (IP)

Extracurriculars

Student Groups: ACM-AI-UCLA
Interests/Hobbies: Cooking, Hiking, Road Trip, Badminton, Piano