

Yu (Bryan) Zhou

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Education

University of California, Los Angeles (UCLA)

Graduating Dec 23

B.S. Mathematics of Computation with Minor in Data Engineering, Class of 2024

- Major GPA: 3.97/4.0
- Dean's Honors List (All Quarters)
- Overall GPA: 3.95/4.0
- 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: 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 grounding pipelines for labeled and unlabeled video datasets. Pre-trained and finetuned LMs on our grounded step sequences while imposing Path-Level Constraints through contrastive loss. Implemented Step-constrained Beam Search to automatically generate probabilistic non-sequential graph scripts.
- 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.
- **Publication (First author):** ["Non-Sequential Graph Script Induction via Multimedia Grounding"](#) (ACL, 2023)

PLUS Lab and UCLANLP at UCLA CS Dept. [Adviser: Prof. Kai-Wei Chang, Prof. Nanyun Peng]

Feb 23 - Present

Undergraduate Researcher:

- Studied the role of Active Objects in Egocentric Vision and proposed SOTA methods to significantly improve performance in State Change Object Detection and Object Tracking on Ego4D and Epic-Kitchens Datasets.
- Designed an LLM symbolic knowledge extraction pipeline combined with a novel knowledge-enhanced grounding architecture for finetuning the GLIP OD model on existing data. Extensive experiments demonstrate models with enhanced Active Object knowledge to be zero-shot transferable for different tasks.
- **Submission (First author):** ["Localizing Active Objects from Egocentric Vision with Symbolic World Knowledge"](#), (EMNLP, 2023)
- **In-Progress (First author):** ["Resolving Phrase Ambiguities and Dialectal Bias in Text-to-Image Generative \(Diffusion\) Models"](#)

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)

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, TensorFlow, OpenMMLab, NLTK, NumPy, Pandas, Matplotlib, Scikit-learn

Web Dev:

- PostgreSQL, Node.js, MongoDB, Redis, Neo4j, Apache Spark, React.js, HTML & CSS

Relevant Coursework

- **Computer Science:** Natural Language Processing, Deep Learning for Computer Vision, Graph Neural Networks (graduate), "Fairness, Accountability, and Robustness in NLP" (graduate), Natural Language Generation (IP, graduate), 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, Mathematical Modelling, Game Theory (IP)

Extracurriculars

Student Groups: ACM-AI-UCLA

Interests/Hobbies: Cooking, Hiking, Road Trip, Badminton, Piano