

Zhaotian Weng

University of Southern California, Los Angeles, USA

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Education

University of Southern California, Los Angeles, USA

Aug.2023 - May.2025(Expected)

- M.S. in Computer Science, working with Professor Jieyu Zhao
- **Relevant Courses:** Analysis of Algorithm, Database Systems, Deep Learning and Its Application, Applied Natural Language Processing
- **GPA:** 4.0/4.0

Tsinghua University, Beijing, China

Sep. 2019- Jun. 2023

- Bachelor of Engineering in Software Engineering
- **Awards and Honors:** Outstanding undergraduate graduates from Tsinghua University; Academic Excellence Award Scholarship (2020, 2022); Academic Progress Award Scholarship; Scientific Research Excellence Award Scholarship; Sports Excellence Award Scholarship

Internships

Machine Learning Engineer, Mockai, Los Angeles

Feb. 2024- May. 2024

Professional Experience

Causal Analysis of Biases in Multimodal Model

Los Angeles, US

2023.11~2024.05

Research Assistant; Advisor: Jieyu Zhao, assistant professor at Thomas Lord Department of Computer Science, USC

- Revealed that GLIP model may use the latent information learned during training, like potential correlations between certain objects or scenes and specific genders or identities, and apply these correlations to their internal representations which will lead to bias during prediction process.
- Proposed a bias metric in vision-language model and used Causal Mediator Analysis method to understand how bias flows from input to output through different model components, and what is the causal role of different model components in bias generation.
- Defined two interventions *set-gender* and *mask-gender*, and chose the image encoder, text encoder and deep fusion encoder as the mediator z to figure out the direct effect and indirect effect of these model components.
- Found that intervening in the gender information within the image encoder could reduce the bias value by about 21%, and intervening in the text encoder could reduce the bias value by about 13%. Similarly, in the deep fusion encoder, it was found that image features contribute more to the representation than text features.
- Further explored which finer-grained components within the image encoder, text encoder, and deep fusion encoder make a major contribution to the generation of bias.
- The paper is in the process of submission

Online Open-set Semi-supervised Object Detection via Semi-supervised Outlier Filtering

Beijing, China

2023.02~2023.06

Research Assistant; Advisor: Guiguang Ding, professor at the School of Software, THU

- Utilized unbiased teacher-student model as a semi-supervised learning object detection framework, and building

upon this, incorporating an out-of-distribution (OOD) class detector.

- In the first stage, labeled data was utilized to train the teacher model, and the well-trained model is then used to initialize both the teacher and student models. In the second stage, the teacher model is employed to predict unlabeled data, and the student model is trained using pseudo-labels generated from these predictions.
- Trained an OOD class detector to filter out low-quality pseudo-labels while predicting pseudo-labels simultaneously. Utilized higher-quality pseudo-labels to train the student model and update model parameters.
- Used OvaNet as the detector's classification head, converting the classification problem of 80 classes into 80 binary sub-problems. Experiments were conducted on the COCO-Open and COCO-OpenImages datasets, utilizing Faster R-CNN as the backbone. The experimental results showed improvements in the mAP metrics.
- The article "Online Open-set Semi-supervised Object Detection by Valuable Instances Mining" has been submitted to AAAI for review.

Coref as NLI Los Angeles, US

2022.06~2022.09

Research Assistant; Advisor: Muhao Chen, assistant professor at Thomas Lord Department of Computer Science, USC

- Did mention detection on the Gap and ECBplus datasets and processed the data into pairwise representation format.
- Processed Gap dataset and finetuned the pretrained Roberta-large-mnli model on processed Gap dataset, resulting in an F1 score of 89.1, which was higher than existed sota F1 score(87.6).
- Processed ECBplus dataset, finetuned the pretrained Roberta-large-mnli model on processed ECBplus dataset, and conducted coreference resolution within and across documents on ECBplus dataset, resulting in an F1 score of 80.
- Optimized by generating more hard negative cases for training and pruned the edges in the inference graph during evaluation by conducting coreference chains clustering between the mentions with the same predicted type, thus the inference process can be more time-saving and more accurate.

Representation Learning with CGAN for Casual Inference Los Angeles, US(remote)

2022.06~2022.08

Research Assistant; Advisor: Pradeep Ravikumar, professor at the Department of Machine Learning, CMU

- Introduced CGAN model to optimize the representation function to polish the prediction step, enhancing the predictive performance getting more accurate results of causal inference.
- The article "Representation learning with CGAN for causal inference" has been accepted by the 3rd International Conference on Signal Processing and Machine Learning(CONF-SPML2023).

Skills and Others

Programming Languages and Tools: Proficient in C++ and C; Familiar with Python(PyTorch) and Java, HTML, MySQL, Javascript, Node.js

Technical Skills: Object-Oriented Design, Database, Web Development, Machine Learning, Deep Learning, Natural Language Processing, Computer Vision