

# Ziyi Liu

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## Education

*M.Sc. Computer Science* Aug 2021-Present

**University of Southern California**, Los Angeles, CA

- Focus areas: Natural Language Processing
- GPA:3.75/4
- Advisor: Xiang Ren

*B.Sc. Computer Science*

Aug 2016-Jul 2020

**Shaanxi Normal University**, Xi'an, China

- GPA:88.1/100
- Rank:1/50

## RESEARCH EXPERIENCE

**Measuring Utility of Free-text Rationale**

Advisor: Xiang Ren

Aug 2022 - Present

- Studied how machine-generated free-text rationales benefit humans in solving complex question answering tasks.
- Proposed different dimensions to of rationale property, including surface-level properties such as validity and grammaticality, and efficiency-level properties such as coherency and conciseness.
- Generated free-text rationale using prompt template inspired by few-shot self rationalization and chain of thought; Conducted user study on MTurk to evaluate the utility of rationales.

**Evaluating Explanation Regularization Methods for NLP models**

Advisor: Xiang Ren

Feb 2022 - July 2022

- Proposed ER-TEST-a unified Explanation Regularization benchmark to regularize explanation generated from model with human rationales to improve the model robustness.
- Conducted various instance prioritization methods in instance prioritization methods (Least Confidence, Entropy, etc.) to show ER-TEST's utility in low-resource learning, given ER rationale annotation budgets.
- Conducted distantly-supervised annotating in rationales, compared the performance of lexicon-based and instance-based methods in ID and OOD datasets.

**Interpretable Question Asking in Collaborative VLN**

Advisor: Jesse Thomason

2022 Jan - 2022 May

- Implemented interpretable tools (LIME, Input-X-Gradient) on Vision Language Navigation models to study what affects model to raise questions in a turn-based dialogue: what to ask and when to ask.
- Proposed two methods to analyse model interpretability: TF-IDF inspired approach to study attribution scores distribution of words towards target across documents; Comparing attribution scores and prediction confidence to measure the alignment between explanation and prediction.

### **Human-in-the-loop Debugging of NLP models**

Advisor: Xiang Ren

2021 Oct - 2021 Dec

- Built an HITL annotating pipeline to enable human to intervene into model inference process by modifying model explanation to improve the model prediction accuracy using xlm-roberta-large as language model.
- Conducted multiple settings including time budget, annotating method to study how human intervention help in model performance improvement.

## **PROJECTS EXPERIENCE**

### **Google Summer of Code - Chinese Pipeline with Red Hen Lab**

Advisor: Mark Turner

May 2019-Sept 2019

- Recorded Chinese TV as dataset and develops ASR, NLP pipelines on it.
- Data preprocessing and model fine-tuning: Employed WebRTCvad to split the audios according to the pause and finetuned hyperparameter; Improved acc of baseline model by 10%.
- Designed the specification of NLP pipeline, catering to the practical needs and preprocessed the ASR output.

### **Story Generation based on BART**

Sept 2021-Nov 2021

- Inspired by PlanAndWrite, built an pipeline generating stories from story titles and story lines using BART.
- Proposed 4 criteria (Alignment, Commonsense, Relatedness and Comparison) to evaluate model performance and conducted evaluation to quantify the completeness and novelty of generated stories; results on BART outperformed the baseline.

### **Machine Reading Comprehension based on DuReader**

Jan 2020-Apr 2020

- Data preprocessing: cleaned useless data, filtered important information, and converted data formats.
- Fine-tuning: performed system optimization by adjusting parameters and testing BERT and XLNet for pre-training.
- Evaluation: Analyzed the performance of different types of problems of tasks against benchmark, and summarized the existing model verification methods and problems in the data set.

## **INDUSTRY EXPERIENCE**

### **1DATA(Algorithm Engineer Intern)**

Nov 2021-Jul 2021

#### **Document key-value extraction project**

- Extracted key-value pairs of airway bill forms from specific format to fasten the process of user operations.
- Used OCR, basic rules based on domain knowledge and form format to extract key value pair; Wrote validation metrics based on commonsense and relationships between keys to calculate confidence, to ensure the correctness of high confident results.
- Achieved the accuracy of 99.9% at 70% confidence level.

#### **Format-free document parsing project**

- Extracted specific information (port, shipper, address, etc) in shipping order forms in all kinds of format to help users fill in the forms.

- Used semi-supervised method to learn domain knowledge from curated sample set.
- Combined learned knowledge of both semantic and positional relationship to parse key value pair independent of form format.
- Evaluated accuracy vs computational time tradeoffs and iterated quickly to implement best shipping order solution for customers.
- Achieved the validation accuracy of 85% overall.

**Silexon AI Technology(Algorithm Engineer Intern)** Jul 2020-Nov 2021

- Crawled and collated peptide-protein interaction dataset and studied on interaction prediction based on deep learning framework.
- Applied relation extraction technology to mine drug-target relations in PubMed document.

**PUBLICATIONS** Brihi Joshi\*, Aaron Chan\*, **Ziyi Liu\***, Xiang Ren, et al. ER-Test: Evaluating Explanation Regularization Methods for NLP Models. **Findings of EMNLP 2022**

Brihi Joshi\*, **Ziyi Liu\***, Zhewei Tong, Aaron Chan, Xiang Ren. Measuring Human Utility of Free-Text Rationales in Human-AI Collaboration. OpenReview preprint.

Lee, Dong-Ho, Akshen Kadakia, Brihi Joshi, Aaron Chan, **Ziyi Liu**, Kiran Narahari, Takashi Shibuya et al.XMD: An End-to-End Framework for Interactive Explanation-Based Debugging of NLP Models.arXiv preprint arXiv:2210.16978

Yipin Lei, Shuya Li, **Ziyi Liu**, Fangping Wan, Tingzhong Tian, Shao Li, Dan Zhao, Jianyang Zeng. A deep learning framework for multi-level peptide-protein interaction prediction. **Nature Communication**

**HONORS** **SNNU Honor Graduate - top 1%** 2020  
(Selected) Shaanxi Normal University

**National Scholarship - top 0.3 %** 2017  
The Ministry of Education of P.R. China

**SNNU Fellowship - top 2 %** 2017  
Shaanxi Normal University

**COURSES**

**University of Southern California**

CSCI570: Algorithm Analysis

CSCI544: Applied Natural Language Processing

CSCI585: Database

CSCI699: Special Topics(Grounding Natural Language)

**Shaanxi Normal University(selected)**

Math: Calculus, Discrete Math, Linear Algebra, Statistics and Probability

Programming: C, Object-oriented programming, Web Technology

System: Database, Computer Network, Operating System

**COMPUTER  
SKILLS**

**Programming Skills:** Python, PyTorch, C++, Java, JavaScript, HTML, SQL, Matlab

**Keywords:** Natural Language Processing, Grounding Natural Language, Deep Learning, Human-in-the-loop NLP