JINGXUAN TU

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RESEARCH INTEREST

Artificial Intelligence, Machine Learning, Natural Language Processing
Large Language Models, Semantic Reasoning, Event Understanding, etc.

ACADEMIC AFFILIATIONS

Brandeis University Waltham, MA
Ph.D under Prof. James Pustejovsky *September 2019 - May 2025 (expected)*
Brandeis University Waltham, MA
M.S. Computational Linguistics *September 2017 - June 2019*
University of International Relations Beijing, China
B.E. Information Management and System Program *September 2013 - June 2017*

INDUSTRY EXPERIENCE

Applied Scientist Intern in Amazon Inc., Boston, MA June 2024 - September 2024
Infromation Retrieval with LLMs

· Fine-tuned large language models for concurrent passage extraction and reranking.

Linguistics Intern in CodaMetrix, Boston, MA June 2023 - September 2023
NLP for Medical Code Processing

· Applied transformer models to predict ICD codes on preprocessed medical notes; applied LLMs to extract supporting evidence from medical texts for ICD code classification and mapping

Linguistics Intern in Hiscox Inc., New York, NY August 2020 - August 2021
NLP for Insurance Processing

· Used OCR/heuristics to extract unstructured information from various insurance schedules of PDF format. Post-processed extracted text using date/currency parsers and hand-crafted rules. Built syntax and semantic model to map the structured texts to their loss type.

Linguistics Intern in Seagull Cognition, Inc., Concord, MA January 2019 - July 2019
NLP for Insurance Processing

· Worked on building a linguistically motivated contract analyzer for homeowner insurance that can provide a simplified contract management. Worked on using heuristics and derived linguistic rules to extract critical information from contracts based on user's specification.

PUBLICATIONS

(*Equal contribution; ˆMentored students)

· Zhao, J., **Tu, J.**, Du, H., and Xue, N. Media Attitude Detection via Framing Analysis with Events and their Relations. *In EMNLP 2024.*
· **Tu, J.**, Xu, K.ˆ, Yue, L.ˆ, et al. Linguistically Conditioned Semantic Textual Similarity. *In ACL 2024.*
· **Tu, J.**, Obiso, T.ˆ, et al. GLAMR: Augmenting AMR with GL-VerbNet Event Structure. *In LREC-COLING 2024.*
· Khebour, I., Lai, K., ..., **Tu, J.**, et al. Common Ground Tracking in Multimodal Dialogue. *In LREC-COLING 2024.*
· Obiso, T.ˆ, **Tu, J.**, and Pustejovsky, J. HaRMoNEE at SemEval-2024 Task 6: Tuning-based Approaches to Hallucination Recognition. *In SemEval 2024.*
· Ye, B., Tu, J., Rim, K., and Pustejovsky, J. Scalar Anaphora: Annotating Degrees of Coreference in Text. *In CRAC at EMNLP 2023.*
· **Tu, J.***, Rim, K.*, et al. Dense Paraphrasing for Textual Enrichment. *In IWCS 2023.*
· Rim, K.*, **Tu, J.***, Ye, B., and Pustejovsky, J. The Coreference under Transformation Labeling Dataset: Entity Tracking in Procedural Texts Using Event Models. *In Findings of ACL 2023.*

- **Tu, J.**, Rim, K., and Pustejovsky, J. Competence-based Question Generation. *In COLING 2022.*
- Ye, B.*, **Tu, J.***, et al. Interpreting Logical Metonymy through Dense Paraphrasing. *In CogSci 2022.*
- Ide, N., Suderman, K., **Tu, J.**, et al. 2022. Evaluating Retrieval for Multi-domain Scientific Publications. *In LREC 2022.*
- **Tu, J.**, Holderness, E, Maru, M, et al. 2022. SemEval-2022 Task 9: R2VQ Competence-based Multimodal Question Answering. *In SemEval 2022.*
- **Tu, J.**, Verhagen, M., Cochran, B.H., and Pustejovsky, J. Exploration and Discovery of the COVID-19 Literature through Semantic Visualization. *In Student Research Workshop at NAACL 2021.*
- **Tu, J.** and Lignos, C. TMR: Evaluating NER Recall on Tough Mentions. *In Student Research Workshop at EACL 2021.*
- Wang, Q., Li, M., Wang, X., ..., **Tu, J.** et al. COVID-19 Literature Knowledge Graph Construction and Drug Repurposing Report Generation. *In NAACL 2021 Demonstrations.*
- Qu, X., Liukasemsarn S., **Tu, J.**, Higgins, A., Hickey, T. and Hall, M. Identifying Clinically And Functionally Distinct Groups Among Healthy Controls And First Episode Psychosis Patients By Clustering On EEG Patterns. *In Frontiers in Psychiatry Neuroimaging and Stimulation.*
- Rim, K., **Tu, J.**, Lynch, K. and Pustejovsky, J. Reproducing Neural Ensemble Classifier for Semantic Relation Extraction in Scientific Papers. *In LREC 2020.*

RESEARCH PROJECTS

Dense Paraphrasing for Event Coreference January 2024 - Present
Advised by Prof. James Pustejovsky & Prof. Nianwen Xue *In collaboration with Jin Zhao*

- We leverage LLMs to dense paraphrase event mentions, by simplifying the Cross-Document Event Coreference (CDEC) annotation task to sentence pairs with enriched context
- We develop a denser and more expressive CDEC dataset with faster annotation speed and high-quality labels on English news articles
- We explore the media framing task by integrating media devices with event mentions, CDEC, and causal event relations
- We show that framing device models outperform baseline models, offering more explainable and nuanced media framing insights

Dense Paraphrasing for Entity State Tracking January 2022 - January 2024
Advised by Prof. James Pustejovsky

- We propose Dense Paraphrasing (DP), a generic linguistically-motivated textual enrichment strategy through both lexical semantics and dynamic contribution to the text in the whole narrative
- We leverage the capabilities of LLMs in generating DP-enriched texts
- DP-enriched texts are applied to improve entity coreference resolution through transformation-based entity linking
- Create GLAMR dataset of Abstract Meaning Representations (AMR) extended with Generative Lexicon (GL) subevent structure
- Enhance GLAMR-to-text conversion by generating dense paraphrases with implicit subevent and arguments

Understanding Implicit Semantics in Instructional Texts January 2021 - December 2022
Advised by Prof. James Pustejovsky *In collaboration with Sapienza University of Rome*

- We develop a question generation method that focuses on implicit arguments and subevent structures of verbs from the cooking domain
- Generated questions from cooking recipes are categorized representing specific semantic reasoning competencies
- We propose a dataset and semantic evaluation task for question answering on implicit semantics

Knowledge Discovery and Understanding August 2019 - January 2021
Advised by Prof. James Pustejovsky *In collabration with UIUC & Tufts University*

- Knowledge extraction from the overwhelming volume of scientific literature is challenging
- We develop a knowledge discovery framework extracting fine-grained multimedia knowledge from scientific literature
- We propose semantic visualization as a linguistic visual analytic method for exploring complex networks
- User studies show the effectiveness of semantic visualization in finding relevant biomedical information and uncovering unknown associations

See more projects at the end of this CV.

ACADEMIC SERVICE

Reviewer April 2022 - Present

- Association of Computational Linguistics Rolling Review (ARR)
- Association of Computational Linguistics (ACL)
- North American Chapter of the Association for Computational Linguistics (NAACL)
- International Conference on Computational Linguistics (COLING)
- International Conference on Language Resources and Evaluation (LREC)
- Special Interest Group on Discourse and Dialogue (SIGDIAL)

Organizer July 2022

- SemEval-2022 Task 9: R2VQ - Competence-based Multimodal Question Answering

MENTORSHIP

Timothy Obiso September 2023 - August 2024

- Master from Brandeis University
- Currently in the PhD program at Brandeis University
- Published 1 first-author and 1 non-first paper

Keer Xu May 2023 - May 2024

- Bachelor from Brandeis University
- Currently in the Master program at Carnegie Mellon University
- Published 2 non-first papers

Liulu Yue May 2023 - May 2024

- Bachelor from Brandeis University
- Currently in the Master program at Yale University
- Published 2 non-first papers

Bingyang Ye September 2021 - May 2022

- Master from Brandeis University
- Currently in the PhD program at Brandeis University
- Published 1 co-first-author paper

TEACHING EXPERIENCE

Teaching Assistant - Logic Reasoning Brandeis University
COSI-112: Modal, Temporal, and Spatial Logics *January 2023 - May 2023*

Teaching Assistant - Information Retrieval Brandeis University
COSI-132: Information Retrieval *January 2019 - May 2022*

Teaching Assistant - Natural Language Processing Brandeis University
COSI-114: Fundamentals of CL *January 2019 - May 2019*

Teaching Assistant - Natural Language Processing Brandeis University
LING-131: Introduction to NLP *September 2018 - January 2019*

RESEARCH PROJECTS (CONT'D)

Exploring Dynamic Passage Extraction for Improved Ranking June 2024 - September 2024
Work done as an intern at Amazon

- Passages from current datasets are pre-selected by human or of fixed length from chunking
- We propose ranking with machine-extracted passages, and leverage LLMs capability in passage extraction

· We demonstrate that short responses from LLMs contains concise and accurate answers, while long responses contains rich and comprehensive answers

Tuning LLMs for Hallucination Recognition January 2024 - May 2024
Advised by Prof. James Pustejovsky

· We participate SemEval-2024 Task 6: SHROOM, a Shared-task on Hallucinations
· We leverage transformer-based models and LLMs for hallucination recognition
· Our proposed systems rank #1 for the model-aware subtask

Question Answering for Sentence Textual Similarity October 2023 - March 2024
Advised by Prof. James Pustejovsky

· We improve the Conditional Semantic Textual Similarity (C-STS) task by correcting annotation errors in the C-STS validation set
· We propose a QA-based training approach leveraging model understanding of conditions, outperforming baselines
· We introduce a Typed-Feature Structure for entity types, enabling better conditionality annotations

Re-evaluation of Named Entity Recognition August 2020 - February 2021
Advised by Prof. Constantine Lignos

· No widely-used diagnostic metrics that further analyze the performance of Named Entity Recognition (NER) systems that are close in F1
· We introduce Tough Mentions Recall (TMR) metrics for evaluating NER performance on challenging mention types
· TMR focuses on unseen mentions (not observed in training), and type-confusable mentions (multiple types)
· TMR metrics reveal nuanced model performance patterns beyond traditional precision, recall, and F1 scores