

Bin Wang, PhD

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PARTICULARS

Education

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| Ph.D., Eletrical Engineering, Minor in C.S. University of Southern California (USC) Supervisor: Prof. C.-C. Jay Kuo | <i>Aug. 2017 - May. 2021</i> Los Angeles, USA |
| M.S., Eletrical Engineering University of Southern California (USC) Supervisor: Prof. C.-C. Jay Kuo | <i>Aug. 2017 - May. 2019</i> Los Angeles, USA |
| B.Eng., Electronic Information Engineering University of Electronic Science and Technology of China (UESTC) Supervisor: Prof. Jin Qi; Rank: 2/351 | <i>Sep. 2013 - June 2017</i> Chengdu, China |
| Exchange, Electrical and Electronics Engineering City University of Hong Kong (CityU) GPA: 4.3/4.3 | <i>Sep. 2015 - Jan. 2016</i> Hong Kong |

Work Experience

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| Research Scientist Aural and Language Intelligence, Institute for Infocomm Research (I ² R) Agency for Science, Technology and Research (A*STAR) Focus: Language Generation and Conversational AI | <i>Apr. 2023 - Now</i> Singapore |
| Research Fellow Human Language Technology Laboratory lead by Prof. Haizhou Li National University of Singapore (NUS) Focus: Conversational AI, Language Semantics | <i>Sep. 2021 - Mar. 2023</i> Singapore |
| Research Assistant Supervisor: Prof. C.-C. Jay Kuo, University of Southern California (USC) Focus: Representation Learning on Words, Sentences and Graphs | <i>Aug. 2017 - May 2021</i> Los Angeles, USA |
| Ph.D. Research Intern Manager: Dr. Jing Huang, JD.com AI Research Focus: Commonsense Knowledge Graph Reasoning | <i>May 2020 - Aug. 2020</i> Mountain View, USA |
| Undergraduate Research Intern Supervisor: Prof. Haoxiang Lang, Ontario Tech University Focus: 3D-based Hand Gesture Recognition | <i>July 2016 - Oct. 2016</i> Toronto, Canada |

Teaching Experience

- Teaching Assistant**, Applied and **Cloud Computing** for Electrical Engineers *Spring 2021*
University of Southern California, w/ Dr. Brandon Franzke
Lead Discussions, Tutorials, Office hours.
- Teaching Assistant**, Applied **Linear Algebra** for Engineering *Fall 2020, 2019*
University of Southern California, w/ Prof. Antonio Ortega
Lead Lab sessions. Lab design. Office hours.
- Teaching Assistant**, **Computer Programming** for Electrical Engineers *Spring 2020*
University of Southern California, w/ Prof. Sandeep Gupta
Lead Discussions. Office hours.
- Teaching Assistant**, Introduction to **Digital Signal Processing** *Spring 2019, Fall 2018*
University of Southern California, w/ Prof. Richard Leahy, Dr. Robert Popoli
Lead Discussions. Exams. Office hours.

PUBLICATIONS

Research Interests

My research interests encompass the intersection of natural language processing and machine learning. I am particularly interested in language generation (e.g. LLMs), conversational AI, and representation learning.

Peer-reviewed Papers

1. **Bin Wang**, Zhengyuan Liu, Nancy F Chen
Instructive Dialogue Summarization with Query Aggregations
EMNLP, 2023. **25% Acceptance Rate.**
2. Ridong Jiang, Wei Shi, **Bin Wang**, Chen Zhang, Yan Zhang, Chunlei Pan, Jung Jae Kim, Haizhou Li
Speech-Aware Multi-Domain Dialogue State Generation with ASR Error Correction Modules
SIGDial DSTC11, 2023. **4th in Challenge.**
3. **Bin Wang**, Haizhou Li.
Relational Sentence Embedding for Flexible Semantic Matching
ACL RepL4NLP, 2023. **Sentence Embedding.**
4. Yun-Cheng Wang, Xiou Ge, **Bin Wang**, C.-C. Jay Kuo.
GreenKGC: A Lightweight Knowledge Graph Completion Method
ACL, 2023. **23% Acceptance Rate.**
5. Xiou Ge, Yun-Cheng Wang, **Bin Wang**, C.-C. Jay Kuo.
CompoundE: Knowledge Graph Embedding with Translation, Rotation and Scaling Compound Operations
ACL, 2023. **23% Acceptance Rate.**
6. Chengwei Wei, Yun-Cheng Wang, **Bin Wang**, C.-C. Jay Kuo.
An Overview on Language Models: Recent Developments and Outlook
APSIPA TSIP, 2023. **Language Modeling.**
7. Xiou Ge, Yun-Cheng Wang, **Bin Wang**, C.-C. Jay Kuo.
TypeEA: Type-Associated Embedding for Knowledge Graph Entity Alignment
APSIPA TSIP, 2023. **Entity Alignment.**
8. Chengwei Wei, **Bin Wang**, C.-C. Jay Kuo.
SynWMD: Syntax-aware Word Mover's Distance for Sentence Similarity Evaluation
Pattern Recognition Letters, 2023. **Sentence Similarity.**
9. **Bin Wang**, Chen Zhang, Yan Zhang, Yiming Chen, Haizhou Li.
Analyzing and Evaluating Faithfulness in Dialogue Summarization
EMNLP, 2022. **22.1% Acceptance Rate.**
10. Yiming Chen, Yan Zhang, **Bin Wang**, Zuozhu Liu, Haizhou Li.
Generate, Discriminate and Contrast: A Semi-Supervised Sentence Representation Learning Framework
EMNLP, 2022. **22.1% Acceptance Rate.**

11. **Bin Wang**, C.-C. Jay Kuo, Haizhou Li.
Just Rank: Rethinking Evaluation with Word and Sentence Similarities
ACL, 2022. **20.8% Acceptance Rate**.
12. Yun-Cheng Wang, Xiou Ge, **Bin Wang**, C.-C. Jay Kuo.
KGBBoost: A Classification-Based Knowledge Base Completion Method with Negative Sampling
Pattern Recognition Letters, 2022. **Knowledge Graph**.
13. Xiou Ge, Yun-Cheng Wang, **Bin Wang**, C.-C. Jay Kuo.
CORE: A Knowledge Graph Entity Type Prediction Method via Complex Space Regression and Embedding
Pattern Recognition Letters, 2022. **Knowledge Graph**.
14. Chengwei Wei, **Bin Wang**, C.-C. Jay Kuo.
Task-Specific Dependency-based Word Embedding Methods
Pattern Recognition Letters, 2022. **Word Embedding**.
15. Xie Tian, **Bin Wang**, C.-C. Jay Kuo.
GraphHop: An Enhanced Label Propagation Method for Node Classification
IEEE TNNLS, 2022. **Top Journal**.
16. Kaitai Zhang, **Bin Wang**, C.-C. Jay Kuo.
PEDENet: Image Anomaly Localization via Patch Embedding and Density Estimation
Pattern Recognition Letters, 2022. **Anomaly Detection**.
17. Kaitai Zhang*, **Bin Wang***, Wei Wang, Fahad Sohrab, Moncef Gabbouj, C.-C. Jay Kuo.
AnomalyHop: An SSL-based Image Anomaly Localization Method
IEEE VCIP, 2021. **Anomaly Detection**.
18. Kaitai Zhang, **Bin Wang**, Hong-Shuo Chen, Xuejing Lei, Ye Wang, C.-C. Jay Kuo.
Dynamic Texture Synthesis by Incorporating Long-range Spatial and Temporal Correlations
International Symposium on Signals, Circuits and Systems (ISSCS), 2021. **Texture Synthesis**.
19. **Bin Wang**, Guangtao Wang, Jing Huang, Jiaxuan You, Jure Leskovec, C.-C. Jay Kuo.
Inductive Learning on Commonsense Knowledge Graph Completion
IEEE IJCNN, 2021. **Knowledge Graph**.
20. **Bin Wang**, C.-C. Jay Kuo.
SBERT-WK: A Sentence Embedding Method by Dissecting BERT-based Word Models
IEEE/ACM TASLP, 2020. **Top Journal**.
21. **Bin Wang**, Fenxiao Chen, Yun-Cheng Wang, C.-C. Jay Kuo.
Efficient Sentence Embedding via Semantic Subspace Analysis
IEEE ICPR, 2020. **Sentence Embedding**.
22. Fenxiao Chen, Yun-Cheng Wang, **Bin Wang**, C.-C. Jay Kuo.
Graph Representation Learning: A Survey
APSIPA TSIP, 2020. **Graph Embedding**.
23. **Bin Wang***, Angela Wang*, Fenxiao Chen, Yun-Cheng Wang, C.-C. Jay Kuo.
Evaluating Word Embedding Models: Methods and Experimental Results
APSIPA TSIP, 2019. **Prize Paper Award, 2022**
24. **Bin Wang**, Fenxiao Chen, Angela Wang, C.-C. Jay Kuo,
Post-Processing of Word Representations via Variance Normalization and Dynamic Embedding
IEEE ICME, Oral, 2019. **30% Acceptance Rate**.
25. Yeji Shen, Yuhang Song, Hanhan Li, Shahab Kamali, **Bin Wang**, C.-C. Jay Kuo,
K-Covers for Active Learning in Image Classification
IEEE ICME Workshop, 2019. **Active Learning**.
26. Fenxiao Chen, **Bin Wang**, C.-C. Jay Kuo,
Deepwalk-Assisted Graph PCA (DGPCA) for Language Networks
IEEE ICASSP, 2019. **Graph Learning**.
27. **Bin Wang**, Yunze Li, Haoxiang Lang, Ying Wang,
Hand Gesture Recognition and Motion Estimation using the Kinect Sensor
Mechatronic Systems and Control, 2019. **Robotic**.
28. Fenxiao Chen, **Bin Wang**, C.-C. Jay Kuo,
Graph-Based Deep-Tree Recursive Neural Network (DTRNN) for Text Classification
IEEE SLT, 2018. **Text Classification**.

Preprints

29. **Bin Wang***, Zhengyuan Liu*, Xin Huang, Fangkai Jiao, Yang Ding, Ai Ti Aw, Nancy F Chen.
SeaEval for Multilingual Foundation Models: From Cross-Lingual Alignment to Cultural Reasoning
arXiv 2309.04766, 2023. [LLM Evaluation](#).
30. Xiou Ge, Yun-Cheng Wang, Bin Wang, C-C Jay Kuo.
Knowledge Graph Embedding with 3D Compound Geometric Transformations
arXiv 2304.00378, 2023. [Knowledge Graph](#).
31. Xiou Ge, Yun-Cheng Wang, **Bin Wang**, C.-C. Jay Kuo.
Knowledge Graph Embedding: An Overview
arXiv 2309.12501, 2023. [Knowledge Graph](#).
32. Danqing Luo, Chen Zhang, Jiahui Xu, **Bin Wang**, Yiming Chen, Yan Zhang, Haizhou Li.
Enhancing Black-Box Few-Shot Text Classification with Prompt-Based Data Augmentation
arXiv 2209.11910, 2022. [Text Classification](#).
33. Yun-Cheng Wang, Xiou Ge, **Bin Wang**, C.-C. Jay Kuo.
AsyncET: Asynchronous Learning for Knowledge Graph Entity Typing with Auxiliary Relations
arXiv 2308.16055, 2023. [Entity Typing](#).

TALKS

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| From Semantic Understanding to Conversational AI The Chinese University of Hong Kong | <i>Nov 2022</i> Shenzhen, China |
| Word Representation Learning and its Evaluation APSIPA ASC 2022 | <i>August 2022</i> Chiang Mai, Thailand |
| Just Rank: Rethinking Evaluation with Word and Sentence Similarities ACL 2023 | <i>June 2022</i> Dublin, Ireland |

SELECTED PROJECT EXPERIENCES

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| Inductive Knowledge Graph Learning JD.com AI Research Center | <i>May 2020 - Aug. 2020</i> California, USA |
| I investigated the challenge of inductive learning for commonsense knowledge graph completion. This research directly benefits commonsense learning, particularly in the context of knowledge-based question-answering and chatbots. BERT encoder and graph convolutional networks are studied and the proposed method achieves over 48% improvement over present methods on inductive scenarios. | |
| Video Event Detection for Aircraft Maintenance University of Southern California (USC) | <i>2017 - 2018</i> California, USA |
| Our mission is to harness cutting-edge machine learning to enhance human capabilities in aircraft maintenance. We autonomously extract video features and discern potential hazards within aircraft engine video streams. My role encompasses crafting and executing strategies, such as video captioning and summarization. I've constructed a robust deep-learning model to facilitate cross-modal translation (visual and language) and an unsupervised image processing pipeline for identifying crucial frames. Additionally, I've engineered a video streaming module using WebRTC on Moverio BT-300 smart glasses, allowing for dynamic adjustments to video streaming quality in response to varying network conditions. | |
| Nuclei Localization for Microscopic Images University of Electronic Science and Technology of China (UESTC) | <i>2016 - 2017</i> Chengdu, China |
| This project focuses on medical image processing, specifically for addressing challenges in nuclei detection within breast cancer histopathology images. Confronted with a scarcity of annotated breast cancer histopathology images, we expanded our dataset by converting data from publicly available sources and applied data augmentation through image processing techniques. To facilitate the detection process, we introduced a streamed, real-time detection framework based on convolutional neural networks, which was fine-tuned and optimized for our collected data. | |
| Vision Instructed Robots Ontario Tech University (OTU) | <i>2016</i> Ontario, Canada |

Our emphasis lies on advancing visual-enhanced robotics. My contribution involves the development of a visual understanding module that interprets human gesture language from RGB-D images obtained via Kinect sensors. This module is integrated with Turtlebot hardware. Building upon our method in hand gesture recognition and motion estimation, the robotic system is empowered to execute predefined tasks with SLAM technology.

ACADEMIC SERVICES

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| EMNLP - Publication Chair | <i>2023</i> |
| APSIPA TSIP - Guest Editor Special Issue on <i>Pre-trained Large Language Models for Information Processing</i> | <i>2023</i> |
| APSIPA TSIP - Editor Board | <i>2022-2025</i> |
| IJCNN Session Chair Data Mining and Knowledge Discovery I | <i>2021</i> |
| Reviewer <i>ACL Rolling Review, ACL, NAACL, EMNLP, IEEE/ACM TASLP, ICME, ICASSP, AAAI, CSL, etc.</i> | <i>2018-</i> |

TECHNICAL SKILLS

- **Proficient:** *Python, PyTorch, L^AT_EX, Matlab*
- **Intermediate:** *C++, TensorFlow, HTML*
- **Open-source Projects:** <https://github.com/BinWang28>

LANGUAGES

Proficient in Chinese and English.

REFERENCES

C.-C. Jay Kuo
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