YUN-CHENG (JOE) WANG

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EDUCATION

University of Southern California   Jan 2021 - Dec 2023
Ph.D. in Electrical and Computer Engineering, GPA: 3.97/4.0
Thesis advisor: Professor C.-C. Jay Kuo, Degree Conferral Date: Dec 13, 2023

University of Southern California   Aug 2018 - Dec 2019
M.S. in Electrical and Computer Engineering, GPA: 4.0/4.0

National Taiwan University   Sep 2014 - Jun 2018
B.S. in Electrical Engineering, GPA: 3.8/4.3

CAREER OBJECTIVES

Research and teaching in 1) sustainable and interpretable AI; 2) generative AI at scale; and 3) domain-specific AI integration (from theory/algorithms to edge-cloud computing infrastructure).

RESEARCH INTERESTS

- **Sustainable and Interpretable AI**
  - Lightweight knowledge graph completion and refinement
  - Green blind image/video quality assessment
  - Feature learning and selection from high-dimensional data
- **Generative AI at Scale**
  - Collaborative edge-cloud solutions for green generative AI
  - Efficient task offloading for large-scale generative AI services
- **Domain-specific AI Integration**
  - Green AI in healthcare and medicine
  - Green AI in multi-media (language and vision)

EMPLOYMENT

Research Scientist at Yahoo Research   May 2023 - Aug 2023
Supervisor: Dr. Rao Shen, Director, Research

Research Assistant at University of Southern California   Jan 2021 - Dec 2023
Advisor: Professor C.-C. Jay Kuo

Research Intern at Yahoo Research   May 2023 - Aug 2023
Supervisor: Dr. Nicolas Torzec, Director, Research

TEACHING ASSISTANT AND COURSE MENTORSHIP

EE503: Probability for Electrical and Computer Engineers   Fall 2019
Instructor: Professor Konstantinos Psounis, University of Southern California

EE512: Stochastic Process for Financial Engineering   Spring and Fall 2023
Instructor: Professor George Papavassilopoulos, University of Southern California

EE669: Multimedia Data Compression   Fall 2022, Fall 2023
Instructor: Professor C.-C. Jay Kuo, University of Southern California

PUBLICATIONS

[1] Tsung-Shan Yang, **Yun-Cheng Wang**, Chengwei Wei, C.-C. Jay Kuo, "GHOI: A Green Human-object-interaction Detector," Submitted to *ICME* 2024.

[2] Xiou Ge, **Yun-Cheng Wang**, Bin Wang, C.-C. Jay Kuo, "Knowledge Graph Embedding: An Overview," Accepted for publication in *APSIPA Transactions on Signal and Information Processing.*

[3] Jintang Xue, **Yun-Cheng Wang**, Chengwei Wei, Xiaofeng Liu, Jonghye Woo, C.-C. Jay Kuo, "Bias and Fairness in Chatbots: An Overview," Accepted for publication in *APSIPA Transactions on Signal and Information Processing.*

[4] **Yun-Cheng Wang**, Jintang Xue, Chengwei Wei, C.-C. Jay Kuo, "An Overview on Generative AI at Scale with Edge-Cloud Computing," *IEEE Open Journal of the Communications Society, vol. 4,* 2023.

[5] **Yun-Cheng Wang**, Xiou Ge, Bin Wang, C.-C. Jay Kuo, "AsyncET: Asynchronous Learning for Knowledge Graph Entity Typing with Auxiliary Relations," Submitted to *ACM KDD 2024.*

[6] Xiou Ge, **Yun-Cheng Wang**, Bin Wang, C.-C. Jay Kuo, "Knowledge Graph Embedding with 3D Compound Geometric Transformations," Submitted to *IEEE Transactions on Knowledge and Data Engineering.*

[7] Zhanxuan Mei, **Yun-Cheng Wang**, C.-C. Jay Kuo, "Blind Video Quality Assessment at the Edge," Submitted to *IEEE Transactions on Multimedia.*

[8] Zhanxuan Mei*, **Yun-Cheng Wang***, Xingze He, Yong Yan, C.-C. Jay Kuo, "Lightweight High-Performance Blind Image Quality Assessment," Submitted to *APSIPA Transactions on Signal and Information Processing*

[9] Chengwei Wei, **Yun-Cheng Wang**, Bin Wang, C.-C. Jay Kuo, "An Overview on Language Models: Recent Developments and Outlook," Accepted for publication in *APSIPA Transactions on Signal and Information Processing.*

[10] **Yun-Cheng Wang**, Xiou Ge, Bin Wang, C.-C. Jay Kuo, "GreenKGC: A Lightweight Knowledge Graph Completion Method," *The 61st Annual Meeting of the Association for Computational Linguistics (ACL),* 2023.

[11] Xiou Ge, **Yun-Cheng Wang**, Bin Wang, C.-C. Jay Kuo, "Compounding Geometric Operations for Knowledge Graph Completion," *The 61st Annual Meeting of the Association for Computational Linguistics (ACL),* 2023.

[12] Xiou Ge, **Yun-Cheng Wang**, Bin Wang, C.-C. Jay Kuo, "TypeEA: Type-Associated Embedding for Knowledge Graph Entity Alignment," *APSIPA Transactions on Signal and Information Processing,* 2023.

[13] Zhanxuan Mei, **Yun-Cheng Wang**, Xingze He, C.-C. Jay Kuo, "GreenBIQA: A Lightweight Blind Image Quality Assessment Method," *IEEE MMSP,* 2022. **(Top 10% Paper Award)**

[14] **Yun-Cheng Wang**, Xiou Ge, Bin Wang, C.-C. Jay Kuo, "KGBoost: A Classification-Based Knowledge Base Completion Method with Negative Sampling," *Pattern Recognition Letters,* 2022.

[15] 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.

[16] Bin Wang, Fenxiao Chen, **Yun-Cheng Wang**, C.-C. Jay Kuo, "Efficient Sentence Embedding via Semantic Subspace Analysis," *IEEE International Conference on Pattern Recognition (ICPR),* 2020.

[17] Fenxiao Chen, **Yun-Cheng Wang**, Bin Wang, C.-C. Jay Kuo, "Graph Representation Learning: A Survey," *APSIPA Transactions on Signal and Information Processing,* 2020.

[18] Bin Wang, Angela Wang, Fenxiao Chen, **Yun-Cheng Wang**, C.-C. Jay Kuo, "Evaluating Word Embedding Models: Methods and Experimental Results," *APSIPA Transactions on Signal and Information Processing,* 2019. **(Sadaoki Furui Prize Paper Award, 2022; Google Scholar Citations: 281)**

RESEARCH PROJECTS

Multi-modal Knowledge Integration and Inference — Aug 2023 - Present

- Sponsored by Army Research Lab.
- Connect different modalities in embedding spaces and knowledge graphs for multi-modal reasoning tasks.
- Detect human-object interactions using spatial and latent features with relation-specific XGBoost classifiers.
- Project features from vision and language domains to a joint space for text-to-image and image-to-text retrieval.

Domain-specific Dialogue Agent in Healthcare — Aug 2023 - Present

- Collaboration with Harvard Medical School on a Joint NIH Proposal.
- Develop lightweight and trustworthy chatbots for healthcare applications.
- Reasoning agents are controlled by a medical knowledge graph constructed from medical records, literature, images, and a healthcare-specific schema.
- Leverage lightweight language models as natural language understanding and generation agents.

Scalable Generative AI Services under Edge-Cloud Computing — Jan 2023 - Present

- Define the memory, computation, and network requirements to deploy generative AI services, e.g., ChatGPT, at scale.
- Analyze the latency for generative AI services under different network communication frameworks.
- Identify design considerations for generative AI models for better efficiency, computation offloading, and privacy.

Explainable Reasoning on Knowledge Graphs using Lightweight Models — Jan 2021 - Present

- Infer missing information, including entity types and relationships, in knowledge graphs based on observed triples.
- Train embeddings for entities, relations, and types in knowledge graphs.
- Design grouping and clustering algorithms on relation and entity types for efficient training and inference.
- Achieve SOTA results in low dimensions on link prediction, where results are competitive to models in high dimensions.

No-Reference Image and Video Quality Assessment — Aug 2021 - Dec 2022

- Founded Project by Meta Platforms, Inc.
- Predict user perceptual experience on images and videos without references.
- Develop a lightweight pipeline deploying on user devices and achieve SOTA results on synthetic datasets and competitive results on authentic datasets with 54 times smaller model size.
- Manage real-time inference on CPUs with a throughput of over 26 images/s.

Representation Learning on Graphs and Texts — Aug 2018 - May 2021

- Propose lightweight and efficient models to compose sentence embeddings from BERT embeddings.
- Develop lightweight graph convolutional networks with linear and transparent transformations for node classification.
- Improve word embeddings for Chinese by leveraging structured word definitions in E-HowNet, a lexical knowledge base with 95K annotated Chinese words, to generate compositional word embeddings.

PROFESSIONAL SERVICES AND MEMBERSHIPS

- Journal reviewer: IEEE/ACM TASLP (2022), IEEE IoT Magazine (2023), IEEE JBHI (2024).
- Conference reviewer: ECML-PKDD (2022-2024), ACL Rolling Review (2022-2024).
- Student member, *Association for Computational Linguistics*, since 2023.
- Student member, *IEEE, Signal Processing and Communication Society*, since 2018.

TECHNICAL SKILLS

- **Languages:** Mandarin (Native), English (Proficient).
- **Programming Languages:** Python, C++, Matlab, SPARQL, Bash, LaTeX.
- **Software:** Neo4j, Git, PyTorch, TensorFlow, Huggingface, scikit-learn, XGBoost, nltk, OpenCV.