Xuyang Wu

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Research Interests

Deep Learning, Information Retrieval, Search and Ranking, Recommendation System, Responsible AI, Large Language Model, Multi-task Learning, Meta Learning.

Education

- **Santa Clara University** *2019.09 - present*
  Ph.D, Computer Science Santa Clara, USA
  - Advisor: Prof. Yi Fang
- **University College London** *2013.09 - 2015.09*
  M.Sc., Web Science and Big Data Analytics London, UK
  - Advisor: Prof. Jun Wang
- **Coventry University** *2011.09 - 2013.07*
  B.Sc., Computer Science Coventry, UK
  - GPA: First Honer Degree

Experience

- **DOCOMO Innovation, Inc.** *2020.07 - present*
  Visiting Researcher Sunnyvale, USA
  - Quickly prototyped the deep learning models on real-world applications.
  - Implemented and improve the 3D reconstruction model with 2D images.
- **Walmart Global Tech** *2022.06 - 2022.09*
  Data Scientist Sunnyvale, USA
  - Proposed meta learning approach on learning to rank models with sparsely labeled data, improve model generalization and fast adaptation.
  - Outperform LTR methods on sparsely labeled data with different ranking losses.
  - Paper accepted by *ACM TOIS*.
- **Walmart Global Tech** *2021.06 - 2021.09*
  Data Scientist Remote
  - Proposed a novel end-to-end multi-task learning framework for product ranking with BERT to improve data and search quality, and predictive capabilities.
  - AUC of Click was improved by 5.8% over XGBoost on walmart.com Dataset.
  - Paper accepted by *ACM WWW 2022*.
- **Santa Clara University** *2021.01 - 2022.01*
  Teaching Assistant Santa Clara, USA
  - Organized and taught Machine Learning, Operating System, Database System and Object-Oriented Programming Laboratory.
- **Markkula Center for Applied Ethics, Santa Clara University** *2020.01 - 2021.01*
  Research Assistant Santa Clara, USA
  - Collaborated with professors and colleagues to detect journalistic behavior boundaries.
  - Paper accepted by *ISOJ 2023*.
- **Beijing QingLan Information Technology Co., Ltd.** *2016.08 - 2019.08*
  The Technical Director Beijing, China
  - Designed and deployed News Recommendation System / Online Advertising System, REST API based service for over 30 media websites/mobile App.
- **Beijing Ruangao Information Technology Co., Ltd.** *2015.11 - 2016.07*
  Senior Algorithm Engineer Beijing, China
  - Implemented the machine learning models for online advertising.

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, W=WORKSHOP, S=IN SUBMISSION, *=FIRST/CORRESPONDING AUTHOR

[C.1] **Wu, X.***, Li, S., Wu, H. T., Tao, Z., & Fang, Y. (2024). Does RAG Introduce Unfairness in LLMs? Evaluating Fairness in Retrieval-Augmented Generation Systems. In *Proceedings of the 2025 Joint International Conference on Computational Linguistics (COLING 2025)*.

[C.2] Wang, Y., **Wu, X.**, Wu, H. T., Tao, Z., & Fang, Y. (2024). Do Large Language Models Rank Fairly? An Empirical Study on the Fairness of LLMs as Rankers. In *Proceedings of the 2024 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (Volume 1: Long Papers) (NAACL 2024)*, 5712-5724.

[C.3] **Wu, X.***, Magnani, A., Chaidaroon, S., Puthenputhussery, A., Liao, C., & Fang, Y. (2022). A Multi-task Learning Framework for Product Ranking with BERT. *Proceedings of the ACM Web Conference 2022 (WWW 2022)*, 493–501.

[C.4] Chen, H., Fei, X., Wang, S., Lu, X., Jin, G., Li, W., & **Wu, X.** (2014). Energy Consumption Data based Machine Anomaly Detection. *In 2014 Second International Conference on Advanced Cloud and Big Data (CBD 2014)*, 136–142.

[J.1] **Wu, X.***, Puthenputhussery, A., Shang, H., Kang, C., & Fang, Y. (2024). Meta-Learning to Rank for Sparsely Supervised Queries. *ACM Trans. Inf. Syst (TOIS)*. 43, 1, Article 14 (January 2025), 29 pages.

[J.2] Peng, Z., **Wu, X.***, Wang, Q., & Fang, Y. (2024). Soft Prompt Tuning for Augmenting Dense Retrieval with Large Language Models. *Knowledge-Based Systems (KBS)*, 112758.

[J.3] Vincent, S., **Wu, X.**, Huang, M., & Fang, Y. Could Quoting Data Patterns Help in Identifying Journalistic Behavior Online?. In *International Symposium on Online Journalism (ISOJ)*, (p. 33).

[W.1] **Wu, X.***, Peng, Z., Sai, K. S. R., Wu, H. T., & Fang, Y. Passage-specific Prompt Tuning for Passage Reranking in Question Answering with Large Language Models. In *The Second Workshop on Generative Information Retrieval (Gen-IR)*.

[W.2] **Wu, X.***, Gao, X., Zhang, W., Luo, R., & Wang, J. (2019). Learning over Categorical Data Using Counting Features: With an Application on Click-through Rate Estimation. In *Proceedings of the 1st International Workshop on Deep Learning Practice for High-Dimensional Sparse Data (DLP-KDD)*, 1-9.

[S.1] **Wu, X.***, Nian, J., Tao, Z., & Fang, Y. (2025). Evaluating Social Biases in LLM Reasoning. arXiv preprint arXiv:2502.15361.

[S.2] Wei, T. R., Liu, H., **Wu, X.**, & Fang, Y. (2025). A Survey on Feedback-based Multi-step Reasoning for Large Language Models on Mathematics. arXiv preprint arXiv:2502.14333.

[S.3] Liu, H., **Wu, X.**, Sun, G., Tao, Z., & Fang, Y. (2024). ChainRank-DPO: Chain Rank Direct Preference Optimization for LLM Rankers. arXiv preprint arXiv:2412.14405.

[S.4] **Wu, X.***, Wang, Y., Wu, H. T., Tao, Z., & Fang, Y. (2024). Evaluating Fairness in Large Vision-language Models Across Diverse Demographic Attributes and Prompts. arXiv preprint arXiv:2406.17974.

[S.5] Peng, Z., **Wu, X.***, Wang, Q., Rajanala, S., & Fang, Y. (2024). Q-PEFT: Query-dependent Parameter Efficient Fine-tuning for Text Reranking with Large Language Models. arXiv preprint arXiv:2404.04522.

[S.6] Tian, Y., Shao, T., Demizu, T., **Wu, X.***, & Wu, H. T. (2024). HPE-CogVLM: New Head Pose Grounding Task Exploration on Vision Language Model. arXiv preprint arXiv:2406.01914.

[S.7] Wei, T. R., Liu, H., Hu, H. C., **Wu, X.**, Fang, Y., & Wu, H. T. (2024). CLERF: Contrastive LEaRning for Full Range Head Pose Estimation. arXiv preprint arXiv:2412.02066.

[S.8] Hu, H. C., **Wu, X.**, Wang, Y., Fang, Y., & Wu, H. T. (2024). Mathematical Foundation and Corrections for Full Range Head Pose Estimation. arXiv preprint arXiv:2403.18104.

PROJECTS

- **Customized Yolo-v5 for Head Direction Detection** *2023.02 - 2023.06*

  Tools: PyTorch, Yolo-v5, Python

  ◦ Design, train and deploy multi-task model for detect age, gender and head direction simultaneously, based on real-word data and synthetic data.

  ◦ Using Stable Diffusion web-UI with Control-Net, generate more synthetic images for model training to mitigate the imbalanced dataset problem.

  ◦ Customized Yolo-v5 model, train model with new data loader, objectives and loss function based on Yolo-v5 pre-train model weights.

- **Offline Product/Shop Recommender** *2021.10 - 2022.05*

  Tools: PyTorch, Python

  ◦ Propose a novel location-based sequential recommendation model based on SASRec.

  ◦ Enhance model feature by user embedding (user id embedding + universal user embedding) and item embedding (offline location geographic embedding from latitude & longitude).

  ◦ Improve model structure by replacing the transformer module in SASRec with LMU and variant loss functions.

- **Detect journalistic behavior boundaries by quotes, Python/Java** *2020.01 - 2021.01*
  Tools: Stanford CoreNLP, Python, Java
  - Utilize NLP (leveraging the Stanford CoreNLP system, adapted and customized for journalistic writing) to identify quotes, providers of quotes, their gender, titles, and organizations.
  - Identify the evaluation metrics to learn useful patterns and insight from different sources of data.
  - Collaborate with professors and colleagues to push the models into production.
  - Paper accepted by *ISOJ 2023*.
- **News Recommendation System** *2016.08 - 2019.08*
  Tools: Java, Python, Scala, Spark
  - Customized news recommendation service (REST API) for the media website/mobile app, based on user behaviors and news information. Such as News feed recommendations, content page recommendations, etc.
  - Modules include an information synchronization module, data cleaning module, analysis and classification module, recommendation algorithm module, service interface, etc.
  - Mainly responsible for: designing different recommendation strategies and algorithms based on the variant usage scenario, implementing and optimizing the recommendation algorithm.

Skills

- **Specialized Area:** Information Retrieval, Search and Ranking, Large Language Models, Responsible AI, Recommendation System.
- **Data Science & Machine Learning:** Meta learning, Multi-task learning, Recommendation algorithms, NLP, Online advertising algorithms.
- **Deep Learning Framework:** PyTorch, TensorFlow.
- **Programming Languages:** Python, Java, Spark, Hadoop, HTML5, Javascript, C/C++, etc.
- **Database Systems:** FAISS, MySQL, MongoDB, PostgreSQL, Redis, ElasticSearch, etc.
- **Other Skills:** Large-scale data analysis, excellent communication and organizational skills, outstanding team work ability.

Professional Activities

- **Journal Reviewer**
  - IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
  - Neurocomputing
  - IEEE Access
  - Journal of the Frontiers of Computer Science
  - Connection Science
- **PC Member / Reviewer**
  - International Conference on Learning Representations (ICLR)
  - ACM Special Interest Group on Information Retrieval (SIGIR)
  - ACM The Web Conference (TheWebConf)
  - ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)
  - ACL Rolling Review (ARR)
  - International Conference on Web Search and Data Mining (WSDM)
  - Conference on Information and Knowledge Management (CIKM)
  - ACM SIGIR Conference on Information Retrieval in the Asia Pacific (SIGIR-AP)
  - ACM International Conference on the Theory of Information Retrieval (ICTIR)
  - Conference on Language Modeling (COLM)
  - KDD Workshop on Deep Learning Practice for High-Dimensional Sparse Data (DLP-KDD)
  - The Second Workshop on Generative Information Retrieval (Gen-IR)

Honors and Awards

- **Coventry University First Honor Degree** *2013.07*
  Coventry University
- **Coventry University Scholarship** *2011.09*
  Coventry University
- **National Endeavor Fellowship** *2011.03*

Leadership Experience

- **President of the Graduate Engineering Chinese Student Association (GECSA)** *2019.10 - Present*
  Santa Clara University
  - Organize activities and events that align with the association's mission, such as academic workshops, cultural celebrations, and networking opportunities.
  - Provide platforms for professional development, including networking with alumni and industry leaders.
  - Promote cross-cultural understanding within the university community.

Volunteer Experience

- **Food Pantry Volunteer** *2022.01 - present*
  The River of Life Foundation (ROLF)
  - Assisted in distributing food, managing inventory and provided other support services.
  - Developed skills in communication, teamwork, and problem-solving while deepening my understanding of diverse communities' challenges.