Jianfeng He *Jan. 1993*

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Research Areas: Uncertainty Estimation, Text Understanding/Generation, Image Manipulation

EDUCATION

Virginia Tech — Falls Church, USA
Ph.D. Student in Computer Science — *Jan. 2019 – May 2024*
- Overall GPA: 3.95/4.0

University of Pittsburgh — Pittsburgh, USA
Ph.D. Student in Computer Science (Transferred to Virginia Tech) — *Aug. 2018 – Dec. 2018*
- Admitted with first-year fellowship scholarship

University of Chinese Academy of Science — Beijing, China
Master in Computer Technology — *Sep. 2014 – Jul. 2017*
- **Admitted with exam exemption** • Rank: Top 2

Institute of Computing Technology, Chinese Academy of Sciences — Beijing, China
Visiting Student in Group of Visual Information Processing and Learning — *Jul. 2015 – Jul. 2017*

Central China Normal University — Wuhan, China
Bachelor in Digital Media Technology — *Sep. 2010 – Jun. 2014*
- Rank: 2/43

FIRST-AUTHOR PUBLICATIONS

[1] (**KDD** 2023, research track) **J.He**, X. Zhang, S. Lei, F. Chen, A. Alhamadani, B. Xiao, C. Lu. CLUR: Uncertainty Estimation for Few-Shot Text Classification with Contrastive Learning. [C] In Proceedings of the 29th ACM SIGKDD international conference on knowledge discovery & data mining.

[2] (**SIGIR** 2023, demo paper) **J.He**, S. Wu, A. Alhamadani, C. Chen, W. Lu, C. Lu, D. Solnick, Y. Li. MetroScope: An Advanced System for Real-Time Detection and Analysis of Metro-Related Threats and Events via Twitter. [C] In Proceedings of the 46th International ACM SIGIR Conference on Research and Development in Information Retrieval: 3130-3134.

[3] (**Neurocomputing** 2022) **J.He**, X. Zhang, S. Lei, S. Wang, Q. Huang, C. Lu, B. Xiao. Semantic inpainting on segmentation map via multi-expansion loss. [J] Neurocomputing 501 (2022): 306-317.

[4] (**ICCV Workshop** 2021) **J.He**, B. Xiao, X. Zhang, S. Wang, S. Lei, and C. Lu. Exploiting Characteristics in Semantic Inpainting on Segmentation Map: Semantic Metrics and Noise Reduction [C]. In Proceedings of the IEEE/CVF International Conference on Computer Vision 2021 (pp. 1876-1885).

[5] (**EMNLP** 2020) **J. He**, X. Zhang, S. Lei, Z. Chen, F. Chen, A. Alhamadani, B. Xiao and C. Lu. Towards More Accurate Uncertainty Estimation In Text Classification [C]. In Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing: 8362-8372.

[6] (**Neurocomputing** 2018) **J. He**, B. Ma, S. Wang, Y. Liu and Q. Huang. Multi-label Double Layers Learning for Cross-Modal Retrieval [J]. Neurocomputing, 2018, 275: 1893-1902.

[7] (**MATES Workshop** 2017) **J. He**, S. Wang, Q. Qu, W. Zhang and Q. Huang. Efficient Cross-Modal Retrieval Using Social Tag Information Towards Mobile Applications [C]. International Workshop on Mobility Analytics for Spatio-temporal and Social Data. Springer, Cham, 2017: 157-176.

[8] (**ACM Multimedia** 2016, short paper) **J. He**, B. Ma, S. Wang, Y. Liu and Q. Huang. Cross-modal Retrieval by Real Label Partial Least Squares [C]. Proceedings of the 2016 ACM on Multimedia Conference: 227-231.

FIRST-AUTHOR PREPRINTS

[9] **J.He**, J. Salazar, K. Yao, H. Li, J. Cai. Zero-Shot End-to-End Spoken Language Understanding via Cross-Modal Selective Self-Training. ArXiv preprint arXiv:2305.12793 (2023)

[10] Y. Sun (co-first author), **J. He** (co-first author), L. Cui, S. Lei, C. Lu. Med-MMHL: A Multi-Modal Dataset for Detecting Human- and LLM-Generated Misinformation in the Medical Domain. ArXiv preprint arXiv:2306.08871 (2023).

SELECTED CO-AUTHOR PUBLICATIONS

[11] (**ACL**) S. Lei, X. Zhang, **J. He**, F. Chen, C. Lu. TART: Improved Few-shot Text Classification Using Task-Adaptive Reference Transformation. [C] In 61st Annual Meeting of the Association for Computational Linguistics.

[12] (**ECCV**) S. Lei, X. Zhang, **J. He**, F. Chen, C. Lu. Cross-Domain Few-Shot Semantic Segmentation. [C] Cross-Domain Few-Shot Semantic Segmentation. In Computer Vision–ECCV 2022: 17th European Conference, Tel Aviv, Israel, October 23–27, 2022, Proceedings, pp. 73-90. Cham: Springer Nature Switzerland.

[13] (**NAACL Findings**) S. Lei, X. Zhang, **J. He**, F. Chen, C. Lu. Uncertainty-Aware Cross-Lingual Transfer with Pseudo Partial Labels. In Findings of the Association for Computational Linguistics: NAACL 2022 (pp. 1987-1997).

[14] (**ICME**) S. Lei, X. Zhang, **J. He**, F. Chen, C. Lu. Few-Shot Semantic Segmentation via Prototype Augmentation with Image-Level Annotations. In 2021 IEEE International Conference on Multimedia and Expo. 2021 Jul 5 (pp. 1-6). IEEE.

[15] (**IJCAI**) L. Zhang, B. Ma, **J. He**, G. Li, Q. Huang and Q. Tian. Adaptively Unified Semi-supervised Learning for Cross-Modal Retrieval [C]. Twenty-Sixth International Joint Conference on Artificial Intelligence, 2017: 3406-3412.

FIRST-AUTHOR ONGOING WORKS

[16] Uncertainty Estimation on Named Entity Recognization by Evidential Neural Network. It will be submitted to **ARR** 2023 by Oct. 2023.

[17] SiCF Score: Uncertainty Estimation for Dialogue Summarization in Semantic Invariance, Coverage, and Faithfulness. It will be submitted to **ARR** by Oct. 2023.

[18] A Survey: Uncertainty Estimation Models and Applications in Natural Language Understanding And Generation. It will be submitted to a journal by Feb. 2024.

WORK EXPERIENCE

NLP Research Intern — Manager: Hang Su
Amazon AWS AI lab — *May 2023 – Aug. 2023*

NLP & Audio Research Intern — Manager: Kaisheng Yao
Amazon AWS AI lab — *May 2022 – Aug. 2022*

NLP Research Intern — Advisor: Linfeng Song
Tencent America — *May 2021 – Aug. 2021*

Research/Teaching Assistant — Advisor: Chang-Tien Lu
Virginia Tech — *Jan. 2019 – Present*

TECHNICAL SKILLS

Languages and Technologies: C++, Matlab, Python(including **PyTorch**), Shell, Github, LaTex.

Traditional Machine Learning Models: Subspace Learning, Metric Learning, Reinforcement Learning, etc.

Deep Learning Theory and Models: CNN, GCN, GAN, Transformer, BNN, ENN, Contrastive Learning, etc.

RESEARCH PROJECTS

Uncertainty Estimation In Dialogue Summarization — Advisor: Hang Su
Key Researcher — *May 2023 – Aug. 2023*

Project Goal: Develop uncertainty estimation models to assess the quality of generated text summarization.
My Responsibilities: Research and develop models to enhance the accuracy of uncertainty scores for generated texts.
My Achievements: Our proposed SiCF scores are effective on both uncertainty estimation and semi-supervised dialogue summarization. We plan to submit a paper for ARR OCT 2023.
Key Techniques: Bayesian Neural Network (BNN), Transformer, Beam Search Sampling.

Uncertainty Estimation In Natural Language Undertanding — Advisor: Chang-Tien Lu
Key Researcher — *Jan. 2019 – present*

Project Goal: Develop uncertainty estimation models to analyze misclassification and out-of-domain samples in text classification, few-shot text classification, and named entity recognition.
My Responsibilities: Develop models to enhance the accuracy of uncertainty scores for both document-level and entity-level classified results.
My Achievements: Enhancing confidence in uncertainty scores for text classification by considering three distinct uncertainty types (aleatoric, epistemic, and parametric uncertainty) and mitigating overconfidence

in top scores. Employing uncertainty relations for adaptive learning of uncertainty scores. Published two papers in EMNLP and KDD, with experiment-finished work planned for ARR OCT 2023.
Key Techniques: Data augmentation, Few-Shot, CNN, RNN, BNN, Transformer, Contrastive Learning.

Zero-Shot Spoken Language Undertanding Advisor: Kaisheng Yao
Key Researcher *May 2022 – Aug. 2022*

Project Goal: Leveraging audio-text and text-semantics pairs to train a spoken language understanding model without requiring any audio-semantics pairs.
My Responsibilities: Develop a multi-modal to address the zero-shot spoken language understanding model and benchmark the task.
My Achievements: Significantly enhanced zero-shot spoken language understanding performance compared to baselines by introducing cross-modal selective self-training (CMSST) to tackle sample imbalance and label noise. One paper has been archived.
Key Techniques: Cluster, self-training, selective-learning.

Multimodal Dialogue System Advisor: Linfeng Song
Key Researcher *May 2021 – Aug. 2021*

Project Goal: Develop a multimodal dialogue system capable of generating system responses by considering the current user query and historical context, which can include both text and image inputs.
My Responsibilities: Develop and enhance the performance of a multi-modal dialogue system.
My Achievements: On 1% data, enhanced the performance of the multi-modal dialogue system compared to baselines by leveraging more fine-grained image information, including objects and their attributes, as well as incorporating OCR information from images.
Key Techniques: Multimodal Fusion, Transformer, Pre-trained Object Detection, Pre-trained OCR.

Semantic Inpainting On Segmentation Maps (SISM) Advisor: Chang-Tien Lu
Key Researcher *Aug. 2019 – May 2021*

Project Goal: Develop and enhance SISM models that focus on inpainting a masked area within a segmentation map based on the semantics defined by a target label, prioritizing coherence with the intended context.
My Responsibilities: Proposed more effective models to address the limitations of current global and local GANs in solving SISM, leveraging the unique characteristics present in segmentation maps.
My Achievements: Enhanced result consistency through the introduction of a novel multi-expansion loss, resulting in a significant reduction of noise pixels in the inpainted segmentation maps. Developed a novel metric to evaluate the semantic quality of the inpainted segmentation maps. Published two papers in ICCVW and Neurocomputing, respectively.
Key Techniques: GAN, Conditional GAN, Dilation Operation, and Image Processing.

Cross-Modal Retrieval Advisors: Bingpeng Ma & Qingming Huang
Key Researcher *Aug. 2015 – Feb. 2017*

Project Goal: Develop a model capable of retrieving results in one modality based on content similarity using queries from another modality.
My Responsibilities: Enhance the model performance in both single-label and multi-label settings.
My Achievements: Significant advancements have been achieved in cross-modal retrieval, including the development of a two-layer subspace learning model that iteratively learns a shared space for multiple modalities and latent spaces for multi-label labels. Additionally, a novel label representation has been introduced for single-label scenarios by integrating it into KPLS. Three papers have been published in ACM Multimedia, Neurocomputing, and a workshop.
Key Techniques: Dimensionality Reduction (PLS, KPLS), Matrix Derivations, Non-Linear Projection.

SELECTED AWARDS

SIGKDD **Student Travel Award** 2023, Jul. 2023.
First-year **Fellowship Scholarship** Admission to U.Pitt, Aug. 2018 - May 2019
China National Scholarships(only awards for top 2% students), Sep. 2017
University-level Merit Student for **Six Consecutive Years**, Sep. 2011 - Mar. 2017
University-level Scholarships for **Three Consecutive Years**, Sep. 2011 – Jun. 2014
State-level First Prize of Chinese National Mathematical Modeling Contest, Sep. 2013