# Wenbo Zhang

PhD Student · Informatics

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## Research Interests

Natural Language Processing, AI for Social Impact, Deep learning, Data Mining, Speech Processing, and Signal Processing.

## Education

**Pennsylvania State University (PSU)** *Pennsylvania, USA*

Doctor of Philosophy in Informatics (GPA: 4.0/4.0) *Aug. 2021 - Present*

- Advisor: Dr. Amulya Yadav

**University of Southern California (USC)** *California, USA*

Master of Science in Electrical Engineering *Aug. 2016 - May. 2018*

- Advisor: Dr. Cauligi Raghavendra

**University of Electronic Science and Technology of China (UESTC)** *Sichuan, China*

Bachelor of Engineering in Renewable Energy Materials and Devices *Sept. 2011 – Jul. 2015*

## Publications

### Published

[1] **Wenbo, Zhang**, Hangzhi Guo, Prerna Ranganathan, Jay Patel, Sathyanath Rajasekharan, Nidhi Danayak, Manan Gupta, Amulya Yadav. A Continual Pre-training Approach to Tele-Triaging Pregnant Women in Kenya. In Proceedings of the 37th AAAI Conference on Artificial Intelligence, 2023. (**System has been full-time deployed by Jacaranda Health**)

[2] Hangzhi Guo, Xinchang Xiong, **Wenbo Zhang**, Amulya Yadav. Efficient and Scalable Recourse Explanation Benchmark using JAX. XAI in Action: Past, Present, and Future Applications, 2023.

### In Prep

[1] **Wenbo, Zhang**, Hangzhi Guo, Ian Kivlichan, Vinodkumar Prabhakaran, Davis Yadav and Amulya Yadav. A Taxonomy of Rater Disagreement: Surveying Challenges & Opportunities from the Perspective of Annotating Online Toxicity. arXiv preprint arXiv:2311.04345

[2] **Wenbo Zhang**, Amulya Yadav. Do large language models understand code-mixed contents well?

## Research Experience

**Machine learning for phenotypic pattern identification of adolescents with drug usage** *Pennsylvania, USA*

Advisor: Dr. Amulya Yadav *Feb. 2023 - Jul. 2023*

- This research focuses on identifying potential students (in high school) who may use alcohol, cigarette or marijuana in the future. We analyze potential patterns which may lead such behaviors through the machine learning perspective.

**TRIM-AI: Harnessing language models for providing timely maternal & neonatal care** *Pennsylvania, USA*

Advisor: Dr. Amulya Yadav *Sept. 2021 - Jun. 2022*

- This work focuses on developing an NLP framework, using multi-lingual pretraining and continual pretraining, to predict the user's medical situation (emergency level) based on code-mixed SMS messages.
- This framework has been deployed inside the PROMPTS (digital health system developed by Jacaranda Health). According to the feedback from Jacaranda Health, this framework reduces the monthly system management cost by 22.8% and PROMPTS helpdesk's workload by ∼12%.

## Awards, Fellowships, & Grants

2023 **AAAI-23 student scholarship**, AAAI Conference on Artificial Intelligence (AAAI)

**PSU Student Travel Award**, College of Information sciences and technology, Pennsylvania State University

2022 **AI Societal Impact Award**, Center for Artificial Intelligence Foundations and Engineered Systems (CAFÉ) at Pennsylvania State University

2014 **3rd Class of National People's Scholarship (top 15%)**, University of Electronic Science and Technology of China

2013 **3rd Class of National People's Scholarship (top 15%)**, University of Electronic Science and Technology of China

2012 **3rd Class of National People's Scholarship (top 15%)**, University of Electronic Science and Technology of China

## Teaching Experience

Fall 2023 **DS 442 Artificial Intelligence**, Teaching Assistant at Pennsylvania State University
Spring 2022 **DS 442 Artificial Intelligence**, Teaching Assistant at Pennsylvania State University

## Industrial Experience

**Machine Learning Engineer** *Beijing, China*
AI Lab, Kingsoft Co., Ltd. *Jan. 2019 - Jul. 2021*

- Applied recent advanced NLP techniques to design modules inside knowledge graph.
- Employed NLP seq2seq models and speech processing techniques to construct the text-to-speech (TTS) system.

### Direction 1: knowledge graph

**Open domain knowledge graph construction** *Beijing, China*
Project Participant *Jan. 2021 - Jul. 2021*

- Designed modules (name entity recognition and relation extraction) for Chinese knowledge graph construction.
- The knowledge graph has been deployed inside the Kingsoft electronic notebook website.

### Direction 2: speech processing (especially TTS, generative AI for speech synthesis)

**English multi-speaker text-to-speech (TTS) system for novel website** *Beijing, China*
Project Participant *Jul. 2020 - Dec. 2020*

- Developed a system which generated speech with someone's tone through few minutes' voice recordings.
- Created a prototype for audiobook reading on English novel translation website to support multiple human voices.

**End-to-end framework for Chinese polyphone pronunciation prediction** *Beijing, China*
Project Leader *Apr. 2020 - Jul. 2020*

- Built end-to-end framework for pronunciation prediction of Chinese polyphone with multi-phonemic values.
- Improved the pronunciation correctness of Chinese speech synthesis system.

**NLP based Chinese text prosody prediction** *Beijing, China*
Project Leader *Jan. 2020 - Mar. 2020*

- Modeled the prosody (short pronunciation break among Chinese words) prediction as the sequence tagging problem.
- Improved the naturalness and quality of the synthesized speech generated from Chinese speech synthesis system.

**End-to-end Chinese text-to-speech (TTS) system** *Beijing, China*

Project Leader *Jan. 2019 - Apr. 2020*

- Implemented whole pipeline of end-to-end Chinese TTS system, including the text processing module (which extracts semantic information from input sentences), acoustic model (which predicts acoustic features based on the semantic information), and the vocoder model (which transforms acoustic features into speech signals).
- Applied on the Kingsoft policy question answer (QA) system.

## Past Internship and Research Visit

**Comprehend Information Technology Co., Ltd.** *Suzhou, China*

Mentor: Dr. Hengchang Liu *Jun. 2017 - Aug. 2017*

- NLP-based data mining on the traffic data (electronic checkpoints data) accessed from Suzhou City Brain.
- Predicted and partitioned whole city into different function regions (education area, central business area etc.).

## Skills

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| **DevOps** | Google Cloud Platform, Alibaba cloud, Docker |
| **Back-end** | Django |
| **Programming** | Python, R, C, LaTeX, Shell |
| **Framework** | Tensorflow, Pytorch |