Menglu Li

Google Scholar Profile

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Education

- **Toronto Metropolitan University** — Toronto, Canada
  Ph.D - Electrical and Computer Engineering; GPA: 4.33/4.33 — *Jan. 2021 - Dec. 2025 (Expected)*
- **Toronto Metropolitan University** — Toronto, Canada
  Master of Engineering - Electrical and Computer Engineering; GPA: 4.26/4.33 — *Sep. 2019 - Dec. 2020*
- **University of Toronto** — Toronto, Canada
  Bachelor of Applied Science - Computer Engineering; 4th year GPA: 3.88/4.00 — *Sep. 2014 - Jun. 2019*

Courses: *Machine Learning, Deep Learning, Probability, Big Data, Algorithms, IoT Analytics, Statistical Inference*

Experience

- **Toronto Metropolitan University** — Toronto, Canada
  ML Research Assistant — *Sep 2019 - Present*
  - **Research Project Design:** structured deep learning projects for speech processing and outlier detection, overseeing experimental design, model development, and evaluation metrics. Supervised two master's-level research assistants.
  - **DL Algorithm Development:** Developed and optimized ML/DL models with a focus on robustness, interpretability, and performance across diverse datasets.
  - **Data Collection:** Managed data collection and preprocessing, including multilingual data handling, synthesized data generation, and metadata creation.
- **Easy Education** — Remote
  Instructor (Part-time) — *Jan. 2021 - Apr. 2022*
  - **Tutorial - Software Tools and System Programming:** Delivered tutorials on C programming and shell scripting, covering foundational programming concepts and hands-on coding exercises.
  - **Impact:** Taught over 250 students, achieving a 95% positive feedback rate and emphasizing effective teaching strategies and student engagement.

Selected Projects

- **Deepfake Speech Detection (Audio Processing, Deep Learning)**
  - Generated and processed synthesized speech data across 5+ languages by fine-tuning over 10 generative models, ensuring diverse and representative datasets.
  - Conducted a comprehensive analysis of 16 handcrafted physical, perceptual features and deep embeddings using statistical methods to identify key indicators of deepfake speech.
  - Developed an interpretable detection model with a temporal attention mechanism, allowing visualizable interpretation of results while improving detection accuracy by 11%.
  - Addressed partially deepfake speech issues by leveraging temporal consistency, fine-tuning wav2vec2 features to increase detection accuracy by 4% over the published SOTA model.
- **Customer Rating Distribution Analysis (Statistics, Data Science)**
  - Collected and preprocessed customer rating data from hotel and movie reviews using NumPy and Pandas for efficient data handling and cleaning.
  - Uncovered a statistical relationship between the mean and variance of rating distributions using linear programming, demonstrating that customer ratings can be modeled as a finite discrete distribution.
  - Performed rigorous hypothesis testing to reveal patterns in user preferences and rating behaviors, informing customer satisfaction analyses.
- **Unsupervised Learning Model for Outlier Detection (Machine Learning)**
  - Trained five clustering-based outlier detection models as benchmarks across six datasets with varying sizes and outlier densities to assess detection efficacy.
  - Developed a multi-level, clustering-based outlier detection algorithm, dynamically adapting to dataset characteristics and improving detection rates by up to 20% over baseline models.

Skills Summary

- **Languages** Python, C, SQL, JAVA, Matlab
- **Frameworks** Scikit, Pytorch, HuggingFace, Spipy, Matplotlib, Seaborn, NLTK, TensorFlow, Keras, OpenCV
- **Tools** GIT, MySQL, Jupyter Notebook, Visual Studio Code
- **Soft Skills** Leadership, Critical Thinking, Event Management, Writing, Public Speaking, Time Management

Selected Publications

- **M. Li** and X.-P. Zhang, "Interpretable temporal class activation representation for audio spoofing detection," Interspeech 2024, pp. 1120–1124, Sep. 2024. (Oral)
- **M. Li**, X.-P. Zhang, "Robust Audio Anti-Spoofing System Based on Low-Frequency Sub-Band Information," 2023 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), 2023
- **M. Li**, Y. Ahmadiadli, X.-P. Zhang, "Speech Deepfake Detection: A Survey," Under Second Round Review in ACM Computing Surveys

Honors and Awards

- Ontario Graduate Scholarship Recipient - 2023, 2024
- Bronze Medal in IEEE ComSoc FNS Project Competition, 2023
- Toronto Metropolitan Graduate Scholarship Recipient - 2022