Shamika Likhite

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EDUCATION

Northwestern University, Evanston, IL, USA **September 2022 - December 2023**
Master of Science in Computer Engineering (Artificial Intelligence specialization) GPA: 3.62/4.0

Visvesvaraya National Institute of Technology, Nagpur, India (NIT Nagpur) **July 2018 - May 2022**
Bachelor of Technology in Electrical Engineering GPA: 8.06/10

PUBLICATIONS

- **Likhite, S.**, Mohapatra, P., Biswas, S., Islam, B., & Zhu, Q. (2024). "Missingness-resilient video-enhanced multimodal disfluency detection", Interspeech 2024.
- **Likhite, S.**, Tapia, L. S., Katsaggelos, K. A. (2025). "Minimum GMACs for motion video deblurring" (in preparation).
- **Likhite, S.**, Mohapatra, P. "Multimodal_dataset", figshare. Dataset, Interspeech 2024
- **Likhite, S**. (2024). video-audio-recorder – PyPi package for simultaneous video and audio recording.
- **Likhite, S.**, Lambat, N., Kavalekar, V. (2021). "RFID-based embedded security system", TechRxiv.

EXPERIENCE

Machine Learning Engineer: SpeechAce, LLC **September 2024 – Present**
Mentor: Ahmed El-Shimi

- **Pioneered SpeechAce's shift into a new modality: text** by developing an AI writing assessment tool using advanced NLP techniques to evaluate and offer feedback on written language proficiency.
- The writing assessment suite is used by K-12 educators, corporate trainers, publishers, and universities in 20+ countries.
- Fine-tuned GPT-3.5 & GPT-4 on 8,000+ texts, improving evaluation rubric alignment and cutting scoring variance by 35%.
- Implemented a feedback pipeline that performs atomic token edit extraction on text pairs to identify minimal, meaningful changes and appended these edits to the sentence pair for additional context.
- Deployed LLMs with prompt engineering pipelines for automated error taxonomy classification and generation of feedback, utilizing few-shot learning and chain-of-thought reasoning on enriched embeddings.
- Optimized the scoring and feedback models using multi-threaded invocation and batch inference to deliver sub-300 ms latency.
- Embedded the scoring and feedback engine into a serverless REST API (AWS Lambda + API Gateway) for production.
- Built a quality assurance pipeline and a Retool interface to flag problematic annotations for relabeling, then retrain the model, improving data quality and system reliability through a streamlined feedback loop.

Research Assistant, Video Deblurring: Image & Video Processing Lab (IVPL) **June 2024 – February 2025**
Mentor: Prof. Aggelos K. Katsaggelos

- Designed a **novel** approach for video deblurring that restores a single frame (keyframe) and enhances subsequent frames by sharing learned weights, effectively trading off resolution quality (PSNR) for significant reductions in computational complexity.
- Developed a single-frame diffusion model architecture based on the NAFNeT model to deblur a subset of video frames.
- Designed a transformer-based student model to enhance the subsequent frames.
- Utilized optimal flow estimation to assess content similarity across frames, dynamically adjusting weights for improved accuracy.
- Applied temporal consistency loss to penalize abrupt changes between frames, ensuring smoother transitions in video processing.
- Achieved accelerated processing speed and reduced computational overhead, enabling real-time video deblurring.
- Utilized the VRT architecture to develop a video-based baseline model, ensuring smooth transitions between frames.
- Benchmarked the model against the baselines, comparing resolution enhancement and computational efficiency.
- Our manuscript on resource-efficient video deblurring using a single frame diffusion model is currently **in preparation.**

Multimodal Learning for Speech Disfluency Detection: Ideas Lab **June 2023 – September 2024**
Mentor: Prof. Qi Zhu

- Built the **first** 'Missingness'-Resilient Speech Disfluency Detection & Emotion Recognition multimodal model using **clinical audio and structured video samples** from the Apple Stuttering Event Dataset.
- The transformer-based model uses a **novel** weight-sharing encoder for feature fusion which ensures high performance even with up to 50% missing video samples **(SOTA)**, outperforming audio-only models.
- Curated **the first annotated** audio-visual dataset of atypical speech from clinical episodes for speech disfluency analysis.
- Utilized pre-trained NLP models for audio (wav2vec and HuBERT) and video (Auto-AVSR) feature extraction.

- Empirically demonstrated that unified fusion outperforms early and late fusion on classifying atypical speech.
- Benchmarked the multimodal learning model, showing improved performance over audio-only and video-only baselines.
- Developed a **PyPi package** for streamlined, synchronized recording of multimodal (audio & video) data.
- Developed an inference pipeline for real-time on-device learning on Nvidia Jetson-Tx2 to analyze disfluencies.
- **Published** our work on missingness-robust multimodal learning in Interspeech 2024

Research Project, Human-AI Interaction in Organizational Networks: Sonic Lab **June 2023 – Dec 2023**
Mentor: Prof. Noshir Contractor

- Analyzed Human-AI teams (HATs) (HAT) by mining longitudinal data of organizational interactions pre- and post-AI chatbot implementation, to identify effects on organizational ties, for better AI integration at the workplace.
- Developed knowledge graphs from unstructured data to represent organizational interactions within surveyed HATs.
- Implemented **Logistic Regression (GLMs)** & **Stochastic Actor-Oriented Models (SAOM)** in R for predictive analytics.
- Used **statistical modeling & hypothesis testing** to examine the impact of AI on social ties during the surveyed period.
- Predicted future effects of AI on organizational dynamics, providing data-driven recommendations for optimal HAT design.
- Benchmarked SAOMs against GLMs, showing SAOMs were 25% more accurate in predicting AI adoption effects.

Machine Learning Engineer Intern: Ugam Solutions, A Merkle Company **May 2021 – July 2021**
Mentor: Mr. Abhishek Sharma

- Developed a Generative Adversarial Network (GAN) for image super-resolution and packaged it as an end-to-end application for data pre-processing for image processing tasks on Ugam's Cognitive Computing platform.
- Improved the accuracy of the platform on computer vision tasks from **74% to 80%**.
- Designed a **custom GAN generator** using a U-Net architecture with a ResNet-34 backbone.
- Implemented 'minibatch discrimination' to mitigate mode collapse and enhance feature generation quality.
- Designed a decaying learning rate scheduler and augmented training data to ensure stable GAN training & smooth convergence.
- Benchmarked the model against pre-trained Enhanced Deep Residual Networks and Fast Residual CNN, with the SRGAN producing images with better PSNR and SSIM.
- Developed a RestAPI for super-resolution using Flask for ease of beta-testing, showcasing model performance on input images.

TECHNICAL SKILLS

- **Programming**: Python, R, C, C++, HTML, JavaScript, Scala, Linux, CSS, Flask, Git
- **Database Management & Querying Tools**: SQL, PostgreSQL
- **Python & R Libraries**: Numpy, Scipy, scikit-learn, Pandas, Spacy, Pillow, OpenCV, NLTK, tidyverse, dplyr
- **Machine Learning Frameworks**: PyTorch, TensorFlow, HuggingFace, Keras
- **Data Visualization**: Tableau, R-Shiny, ggplot2, plotly, seaborn
- **ETL Pipelines and workflows**: Docker, Airflow, Kubernetes
- **Cloud Computing**: AWS, Azure

PROJECTS

Golden Globe Awards Tweets Mining - Text Data Analysis

- Built a text mining and tweet parsing system to identify hosts, award names, nominees, winners, presenters, and key moments for the Golden Globe Awards through sentiment analysis, generalizable to other award ceremonies.
- Created specialized search categories based on syntactic and semantic structures, reducing runtime, and ensured correct mapping of presenters, winners, and nominees by leveraging tweet patterns.

Interactive Cookbook - Natural Language Processing

- Applied various NLP and data mining techniques to develop a customizable Cooking Assistant.
- Implemented advanced framework to ensure transformations of the recipe along the requested dimensions.

Artist Style Imitation - Style Transfer using GAN

- Designed a Cycle GAN architecture that accurately mimics the styles of renowned painters, achieving 98% accuracy.
- Implemented GANs in a federated learning environment to enable scalable, secure artistic style transfer.

MENTORSHIP & LEADERSHIP

- Research Mentor, Ideas Lab (2024): Mentored a master's student for on-device deployment of a keyword identification model.
- Technical Secretary, IvLabs, VNIT (2020-2022): During my work at IvLabs (Robotics), trained incoming team members in computer vision, manual robotics, and hardware for the smooth functioning of the lab.
- Student Mentor, NIT Nagpur (2020-2022): Helped acquaint new students with policies and provided academic guidance.