NATARAJAN BALAJI SHANKAR

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EDUCATION

University of California, Los Angeles (UCLA) — Los Angeles, CA
Ph.D. Electrical and Computer Engineering
Advisor: Dr. Abeer Alwan

University of California, Los Angeles (UCLA) — Los Angeles, CA
M.S. Electrical and Computer Engineering — June 2023
Specialization in Signals and Systems — **GPA: 3.97/4.0**

National Institute of Technology Tiruchirappalli (NIT Trichy) — Tiruchirappalli, India
B.Tech Electronics and Communication Engineering — June 2020
Minor in Computer Science — **GPA: 8.57/10**
First Class with Distinction

RESEARCH EXPERIENCE

Speech Processing and Auditory Perception Laboratory (SPAPL), UCLA — Jan 2022 – present
Advisor: Dr. Abeer Alwan

- Designed a pipeline for automatic scoring of child reading assessments based on domain adapted generation of transcripts and extraction of linguistic features
- Devised a framework for automatic dialect density estimation of African American English based on the extraction of grammatical features, speaker embeddings, and prosodic representations of child and adult speech
- Developed an encoder only CTC-alignment single-step non-autoregressive transformer based Automatic Speech Recognition (ASR) system to increase transcription speed from speech segments during inference
- Formulated a technique for unsupervised domain adaptation of speech foundation models for low resource domains, resulting in a 29% relative Word Error Rate reduction on noisy speech
- Assisted in the creation of the CORAAL QA database for spoken question answering from spontaneous speech

Signal and Image Processing Laboratory, NIT Trichy — May 2019 – July 2019
Advisor: Dr. Varun Gopi

- Integrated usage of anisotropy preserving Shearlet transform with contrast limited adaptive histogram equalization and adaptive gamma correction to obtain greater edge and contour preservation in fundus images.
- Devised a novel method to perform macula detection in fundus images with severe degradation using known optic disc data and morphological transformations to enhance darker regions and to help in further exudate grading.

Pattern Recognition and Computational Intelligence Laboratory, NIT Trichy — May 2018 – July 2018
Advisor: Dr. E.S. Gopi

- Overcame presence of instrumental acoustic sounds by extracting MFCCs from segments to perform Automatic Separation of Vocal and Non-Vocal Segments Present in South Indian Songs
- Designed and implemented several classifier models for feature separation, including a SVM with a modified kernel and generated a 26% relative classification accuracy improvement over a standard Gaussian kernel.

TEACHING EXPERIENCE

Digital Speech Processing ***Graduate Teaching Assistant (UCLA)***

- Course focused on the theory of digital processing of speech signals, mathematical models of human speech production and perception mechanisms, and techniques for speech analysis and synthesis.
- Conducted discussion sections, created and graded assignments, and designed course projects based on speech recognition in noisy environments.

Python with Applications I ***Graduate Teaching Assistant (UCLA)***

- Course introducing principles of Python programming, with a focus on data visualization and text processing
- Conducted discussion sections, and designed and graded programming assignments and projects focused on data scraping and visualization.

Introduction to Programming ***Graduate Teaching Assistant (UCLA)***

- Course introducing basic principles of programming using C++.
- Conducted discussion sections, and designed and graded programming assignments.

Intermediate Programming ***Graduate Teaching Assistant (UCLA)***

- Course introducing algorithmic analysis and data structures using C++.
- Conducted discussion sections, and designed and graded programming assignments.

PROFESSIONAL EXPERIENCE

KLA Corporation June 2022 – Sep 2022
Algorithms Intern Milpitas, CA

- Developed license generation system using Python and Flask to authenticate access requests for eligible clients for an internal tool.
- Migrated backend for wafer inspection tool from Windows to Linux to facilitate multi-GPU execution.
- Devised data transmission framework to enable client-side wafer inspection tool GUI to communicate with Linux based remote backend.

thiMk Nov 2018 – Jan 2019
Machine Learning Intern Bangalore, India

- Analyzed data about derivatives and options using different Machine Learning techniques to observe trends present in the Indian derivative market with Python, using TensorFlow libraries.
- Collaborated with a team of traders and developed a tool to dynamically provide a signal of buy or sell based on historical data and observed real time trends and fluctuations using a LSTM neural network.

PUBLICATIONS

An Equitable Framework for Automatically Assessing Children's Oral Narrative Language Abilities.
A. Johnson, H. Veeramani, **N. B. Shankar**, and A. Alwan in Proc. Interspeech 2023

Towards Automatically Assessing Children's Oral Picture Description Tasks
H. Veeramani, A. Johnson, **N. B. Shankar**, and A. Alwan in Proc. 9th Workshop on Speech and Language Technology in Education (SLaTE)

A hybrid feature preservation technique based on luminosity and edge based contrast enhancement in color fundus images.
Palanisamy Gopinath, **Natarajan B. Shankar**, Palanisamy Ponnusamy, and Varun P. Gopi in Biocybernetics and Biomedical Engineering 40, no. 2 (2020): 752-763

SKILLS

Languages: C, C++, Python
Packages: PyTorch, Kaldi, TensorFlow, OpenCV, Flask, Langchain
Other Tools: Latex, MATLAB, PostgreSQL, Docker