Debapriya Tula

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Education

University of California, Los Angeles *2024 - Present*
MS/PhD in Electrical and Computer Engineering GPA: **4.0**/4.0

Indian Institute of Information Technology, Sri City *2017 - 2021*
Bachelor of Technology in Computer Science and Engineering GPA: **9.35**/10.0

Research Experience

UCLA Computational Machine Learning Lab *Oct 2024 - Present*
Graduate Researcher
Advisors: Dr. Cho-Jui Hsieh

- Exploring data selection for finetuning small LLMs and small Vision models.

Google Deepmind, India *Aug 2022 - Aug 2024*
Pre-Doctoral Researcher
Advisors: Dr. Prateek Jain & Dr. Sujoy Paul

Test-time adaptation of OCR models.

- Pioneered test-time adaptation of state of the art OCR models for a **single image** of a user's handwriting.
- Developed a novel confidence and consistency-based self-training approach leading to over **7** % gains in prediction accuracy for benchmark datasets.
- Implemented the method for **250**+ internal datasets and improved prediction accuracy by more than **15** % for Arabic.

Streamlined encoding of text for vision-language models.

- Presented a novel method to embed textual content of an image within the image, allowing removal of text encoder from a vision-language model.
- Achieved over **2x** gains in exact match scores compared to baseline vision models for benchmark VQA datasets.
- Designed a suite of **4** datasets using the PaLM 2 model to serve as an extensive pretraining dataset.

Efficiency in video and image generation

- Created a parallel decoding schedule utilising different model granularities, with distillation loss for imposing structured learning across granularities.
- Achieved **3x** reduction in number of FLOPS for transformer based image/video generation models.

IIT Delhi, India *May 2020 - July 2020*
Computer Vision Research Intern
Advisor: Dr. Brejesh Lall

- Designed an efficient pipeline for the problem of motion segmentation of fish in **underwater scenarios** solved as an **unsupervised** learning task.
- Modelled underwater disturbances and designed a temporal autoencoder based pipeline for the problem.

Tezpur University, India *May 2019 - June 2019*
Research Intern
Advisor: Dr. Siddhartha S. Satapathy

- Developed an algorithm for maximizing stacking regions to estimate most stable secondary structures for RNA sequences.
- Designed a dynamic programming based solution and used graph concepts like maximum independent sets and circle graphs to simplify the problem.
- Awarded the **best paper** at **ICCCIoT, 2020**.

Publications

- **Masked Generative Nested Transformers with Decode Time Scaling.**
  S Goyal*, **D Tula***, G Jain, P Shenoy, P Jain, S Paul*.
  Under submission at ICML 2025 - Accepted at ICLR DeLTa workshop 2025
- **Target Aware Network Architecture Search and Compression for Efficient Knowledge Transfer.**
  S Basha, **D Tula**, S Vinakota, S R Dubey.
  Multimedia Systems, 2024 (Journal).
- **Is it an i or an l: Test-time Adaptation of Text Line Recognition Models.**
  D Tula, S Paul, G Madan, P Garst, R Ingle, G Aggarwal.
  Arxiv Preprint, 2023.

- **Offense Detection in Dravidian Languages using Code-Mixing Index based Focal Loss and Cosine Normalization.**
  D Tula, Shreyas Ms, V Reddy, P Sahu, S Doddapaneni, P Potluri, R Sukumaran, P Patwa.
  Springer Nature Computer Science, 2022 (Journal).
- **Ensemble of Multilingual Language Models with Pseudo Labeling for Offense Detection in Dravidian Languages.**
  D Tula, P Potluri, Shreyas Ms, S Doddapaneni, P Sahu, R Sukumaran, P Patwa.
  *DravidianLangTech @ European Association for Computational Linguistics (**EACL**), 2021*
- **Estimating RNA Secondary Structure by Maximizing Stacking Regions.**
  P Sen, **D Tula**, S K Ray, S S Satapathy.
  *International Conference on Computer Communication and Internet of Things (**ICCCIoT**), 2021.*
  🏆 **Best Paper Award**.
- **Incorporation of transition to transversion ratio and nonsense mutations, improves the estimation of the number of synonymous and non-synonymous sites in codons.**
  S K Ray, R Aziz, P Sen, P Beura, S Das, **D Tula**, M Dash, N D Namsa, R C Deka, E J Feil, S S Satapathy.
  DNA Research, 2022 (Journal).

Engineering Experience

Tata Consultancy Services - Innovation Lab, India *Aug 2021 - July 2022*
Machine Learning Engineer

- Built ML models for forecasting user health policy renewal on data ($\sim$ **20 GB**) provided by General Electric HealthCare.
- Developed a framework to process diverse tabular data using AutoML toolkits and deployed it.
- Developed modules for statistical data analysis of the results for user interpretability using Plotly.

LimeChat, India *Jan 2021 - June 2021*
NLP Software Development Intern

- Redesigned core backend systems of LimeChat leading to reduction in user dropoffs by **30%**.
- Formulated chat flows for major clients like **Nissan**, **Traya**, **WowSkinScience**.

Select Projects

- **Content-Based Image Retrieval** *Oct 2020 - May 2021*
  - Developed a curriculum learning method for retrieving images from large datasets.
  - Added a global attention module and an angular-based loss based soft to hard example sampler to help the model learn both simple and complex features.
- **Speech Emotion Recognition** *Sep 2020 - Dec 2020*
  - Applied augmentation to speech signals, extracted MFCC features and trained a Random Forest Classifier for identifying emotion from speech directly.
  - Accuracy obtained on datasets: RAVDESS: **73.5 %** & TESS: **98.6 %**.
- **Speech Dereverberation** *Sep 2018 - Dec 2018*
  - Implemented a statistical weighted prediction error model with a Gaussian prior over the reverb in a speech signal.
  - Similarity with original signal: **65 - 75 %**.

Awards and Honors

- **Dept Rank 5** among **160** students - Computer Science and Engineering, IIIT Sri City.
- **Best Paper Award** at ICCCIoT, 2020.
- Awarded Innovation in Science Pursuit for Inspired Research (**INSPIRE**) in 2013.
- **State rank 11** in National Science Talent Search Exam (**NSTSE**) in 2012.

Talks

- **Deep Learning - Then, Now and Beyond**
  - Central University of Odisha, India *Apr 2023*

Volunteering

- *Volunteer at Google Booth* - **ICCV, 2023**.
- *Reviewer* - **ICVGIP, 2024**; Workshops at **EACL 2021**, **NeurIPS 2022**, **ICCV 2023**.

- *AI Student Ambassador* - **Intel** *Oct 2019 - June 2021*
  - Organized 1 hr long hands-on sessions and paper reading sessions on topics related to AI/ML. Encouraged students to work on AI/ML projects and assisted them.
  - Implemented a video frame interpolation method using adaptive separable convolutions for efficient internet data usage. Average interpolation error on Visual Tracker Benchmark(VTB) dataset - **12.6 %**.

Academic Service

- *Graduate Teaching Assistantship* - University of California, Los Angeles
  - EC M146 (Introduction to Machine Learning) - *Prof. Suhas Diggavi* *Spring 2025*
  - LS 30B (Math for Life Scientists) - *Prof. Jane Shevtsov* *Winter 2025*
- *Undergraduate Teaching Assistantship* - Computer Science and Engineering, IIIT Sri City
  - Data Structures and Algorithms - *Prof. Prerana Mukherjee* *Spring 2020*
  - Advanced Data Structures and Algorithms - *Prof. Shiv Ram Dubey* *Fall 2019*

Relevant Coursework

Math - Discrete Mathematics, *Linear Algebra*, Probability Theory, Statistical Data Analysis, Advanced Statistical Methods
Computer Science - Theory of Computation, *Artificial Intelligence*, Digital Image Processing, Computer Graphics and Multimedia, *Deep Learning*, *Computer Vision*, Natural Language Processing

Technical Skills

Languages: Python, MATLAB, Javascript, SQL, NoSQL
Areas of expertise: Deep Learning, Machine Learning, Computer Vision, Multimodality, Efficiency.
Tools and Frameworks: Tensorflow, Keras, JAX, Pytorch, Scikit-learn, Pandas, Numpy, Rasa.