Debapriya Tula

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Education

University of California, Los Angeles *2024 - 2026*
Masters in Electrical and Computer Engineering

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

Research Experience

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

Test-time adaptation of OCR models.

- Formulated the novel problem of test-time adaptation of OCR models to a **single** image of a writer's handwriting.
- Designed a confidence and consistency based self-training method to improve predictions over the single image iteratively.
- Improved CER over **0.4** % across **250**+ internal datasets.

Streamlined encoding of text-embedded images for efficient vision-language models.

- Developed a method to embed textual content of an image within the image, for direct processing by vision encoders.
- Achieved **twofold** improvement in exact match scores compared to baseline method without embedded textual content.

Efficiency in video and image generation

- Matryoshka type learning for transformer layers to decrease inference latency using nested models as per compute available.
- Initial efforts show promising results, with performance closer to baseline with significant reduction in FLOPS.

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.
- Implemented over 4 **video object segmentation** papers to assess their transferability to this challenging setting.

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

- **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.
  Ongoing submission towards TMLR
- **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.

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 the **order tracking** system to make it more seamless and fault-tolerant (**30%** reduction in user dropoffs).
- Redesigned LimeChat's **FAQ** and **Utterance management** systems and deployed them as core features in **5 weeks**.
- Designed an end-to-end chatbot for **Nissan**, LimeChat's biggest client undertaking hitherto.

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*

Academic Service and Volunteering

- *Volunteer at Google Booth* - **ICCV, 2023**.
- *Reviewer* - 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 %**.
- *Undergraduate Teaching Assistantship* - Computer Science and Engineering, IIIT Sri City
  - Advanced Data Structures and Algorithms - *Prof. Shiv Ram Dubey* *Fall 2019*
  - Data Structures and Algorithms - *Prof. Prerana Mukherjee* *Spring 2020*

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

Languages and Tools

Python, MATLAB, Javascript, **Git**, SQL, NoSQL, **Bash**, Rasa, **Tensorflow**, **Pytorch**, **Keras**, **JAX**, FastAI, Sklearn, **Numpy**, **Pandas**, Seaborn, LaTeX