K Vikas Mahendar

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Education

Indian Institute of Technology, Madras *Chennai, India*

- B.Tech in Mechanical Engineer + M.Tech in Robotics (Integrated Dual Degree) *May 2018 - May 2023*
- Minors in Computer Science + Minors in Artificial Intelligence[#].

Work Experience

Microsoft Research USA *Redmond, Washington, USA*

Undergraduate Student Researcher - Guide : Vibhav Vineet *Sept. 2021 - Ongoing*

- Introduced a new Deep Learning training paradigm termed ***deepSIFT*** to tackle the vulnerability of traditional pipelines to distributional shifts.
- Proposed a differentiable SIFT module, a robust local representation, as a replacement for RGB-image inputs for CNN and ViT pipelines.
- Proposed approach surpasses state-of-the-art domain-generalization benchmarks by **10 points without loosing image properties**.

Ernst & Young *Bangalore, India*

Deep Learning Engineer *May 202022 - Aug. 2022*

- Developed a personalized banking-product recommendation system based on the user's web-search patterns and social profile.
- Introduced a ML framework, **the first in Indian banking industry**, to identify the optimal marketing-channel and perform campaigns.
- Proposed framework **improved revenues by 3%** in simulations and is expected to be deployed in practise from 2023.

IBM Research *Bangalore, India*

Software Engineer *Dec. 2020 - Mar. 2021*

- Developed a model-agnostic approach for providing interpretable explanations for predictions of any GNN-based model.
- Framework is capable of identifying potential nodes in a knowledge-graph responsible for a model's prediction.
- Added the ability to visualize semantically relevant structures to interpretability and provided insights into errors of faulty GNNs.
- Involves the identification of a mask for each graph-edge that contributes towards a prediction. **Extended abstract submitted at ICML'21**.

Research Experience

Interpretable Explanations & Quality Estimation for Endoscopic Videos *Guide - Prof. Chandrasekhar*

IIT Madras (Dual Degree Thesis) *Mar. 2022 - Ongoing*

- Developed a two-stage hierarchical transformer to identify the correctness of a medical-endoscopic procedure.
- Designed a framework that uses trained self-attention weights to identify key-frames of video procedures that are faulty.
- Working on developing a quality measure to evaluate a video procedure of a surgeon with that of an expert. Planning to submit the work to ICRA 2023.

Phyics Informed Neural Networks for complex engineering simulations *Guide - Prof. Vishal Nandigana*

AIDesign Pvt. Ltd., IIT Madras *May 2019 - Jan. 2021*

- **Foremost work** on applying Neural Networks on physics-based computational engineering with improved speed & accuracy.
- **Improved the speeds by 10^6 times** while achieving close to identical results as inefficient traditional methods.
- Had direct impact over **9 target industries** with successful collaborations with **Mercedes-Benz, Rolls-Royce & Boeing**.
- Attracted attention of media, investors & startups and led the team to grow into a startup with a net worth of **$4 Million**.

Efficient Document summarization using hybrid CNN-Transformers *Prof. Chaitanya Bandi*

Northwestern University, USA *May 2021 - Sept. 2021*

- Developed a novel entity-extraction model to extract keywords from long documents such as publications/articles.
- Sentence embeddings created using the proposed convolutional modules **removes the quadratic-nature** of self-attention mechanism.
- Proposed architecture is **vocabulary-independent** and directly maps sentences to summaries without regressing word-tokens.
- Provided insights on growth rate and hotness of research fields for the use of National Science Foundation, US Govt.

Publications

[1] A Dravid[*], **V Mahendar**[*], Yunhao Ge, H Behl, M Varma, Y Rawat, A Katsaggelos, N Joshi, V Vineet, DeepSIFT: Rethinking Domain Generalization via Invariant Input Representations, Computer Vision & Pattern Recognition, 2022 - *Under Review*

[2] **Vikas Mahendar**[*], Mukund Varma T[*], A Lottery Ticket Perspective to Data-Deficient Language Understanding, Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), 2023 - *Under Review*

[3] Vishal Nandigana[*], **K. Vikas Mahendar**[*], Real Electrical Signals to Text, International Journal of Advance Research, Ideas and Innovations in Technology (IJARIIT), 2021

[*] indicates equal-contribution (first authors) [#] indicates on-going work

Leadership & PORs

Karams Solar Designs, Pvt Ltd — *Chennai, India*

Technical Lead — *Mar. 2020 - May 2021*

- Led a startup & provided technical expertise on projects given by clients with a team of 20 engineers.
- Spearheaded a 3-tiered team across technology vertical with 4 engineering disciplines & managerial teams.
- Generated an annual turn-over of INR 10 Lakhs & won 2 competitions conducted by Microsoft & Naascom.

Deep Learning for Imaging, IIT Madras — *Chennai, India*

Teaching Assistant (Prof. Kaushik Mitra) — *Aug. 2022 - Nov. 2022*

- Helped with ongoing development and design of the curriculum in a manner supporting a hands-on approach to student learning.
- Conducted weekly programming classes on topics ranging from Neural Networks to GANs for a class of 50 students. [Material]

Internship Team, IIT Madras — *IIT Madras*

Head of Student Body — *May 2021- May 2022*

- Single point of contact for 150+ companies that offer 200+ profiles like Consulting, SWE, Analytics etc..
- Succeeded by producing 178 offers from 28 companies on Day 1 hiring amidst the recession due to Covid-19 pandemic.
- Key initiator in coordinating a network of 15 coordinators to handle a student body with 1200+ population and taking care of logistics.

iBot Robotics Club, IIT Madras — *IIT Madras*

Club Head — *May 2019- Mar. 2020*

- Led an undergraduate community of 40 students working towards impacting real-world problems by harnessing Deep Learning.
- Spearheaded and Mentored several projects in Computer Vision and NLP along with startups, NGOs and research labs.

Achievements & Awards

[1] **Top 5 + Invitee to Conference, National[#],** Datathon - Indian Symposium on Machine Learning (IndoML) Conference, India *2022*

[2] **National Winner,** All India Flipkart Grid 2.0 Software Challenge, India *2020*

[3] **Silver Medal, International,** Kaggle Deep Learning - Colleridge Show US the Data, United States *2021*

[4] **16th Place, International,** International Data Analytics Olympiad (IDAO) - Data Science, Moscow *2021*

[5] **National Winner,** American Express Campus Challenge, India *2021*

[6] **National Winner** - Eye in the Sky, Indian Innovation Growth Programme (IIGP 2.0) + Microsoft Code-Fundo Challenge, India *2019*

[7] **Best Researcher Award,** ISSN International Research Awards 2022 (IIRA-2022) , India *2022*

Extracurricular Activity

Association of People with Disability (APD), NGO — *Bangalore, India*

Project Head — *Feb. 2021 - July 2021*

- Developed an AI-assisted solar-powered wheel-chair for the disabled in collaboration with APD, a NGO based out of Bangalore.
- Designed a simple easy-to-use bio-feedback device for remote and self-diagnosis and preliminary treatment.

Vaazhvi, NGO — *Chennai, India*

Volunteer — *Sep. 2022 - Ongoing*

- Part of the 20 member team to feed the poor and support education for the needy.

IIT Madras — *Chennai, India*

Workshop Speaker — *Dec. 2019*

- Delivered a 1-day workshop lecture on “Computer Vision for IoT devices” during Shaastra, the technical festival of IIT Madras.