MANIRATNAM MANDAL

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EDUCATION

Ph.D. in Electrical and Computer Engineering, *University of Texas at Austin* (GPA: 4.0/4.0) 2020 - Present

M. Tech. in Electrical Engineering, *Indian Institute of Technology, Kanpur* (GPA: 10/10) 2018 - 2019

B. Tech. in Electrical Engineering, *Indian Institute of Technology, Kanpur* (GPA: 9.1/10) 2014 - 2018

AREAS OF INTEREST

• Image & Video Quality Assessment • Computer Vision • Data Science • Computational Photography

RESEARCH EXPERIENCE

Text-in-Video Quality Assessment for User-Generated Content Aug'22 - Present

Supervisor: Dr. Alan C. Bovik (Sponsor: YouTube Media Algorithms)

- Created a unique embedded and overlaid text quality dataset for UGC videos.
- Developed state-of-the-art multi-task models for predicting quality of texts in videos.
- Developed text legibility models based on COCO-Text dataset and studied its relationship with quality.

Video Quality of Experience for Telepresence Applications Jun'22 - Aug'22

Research Intern, SMI Lab, Samsung Research America

- Designed an in-lab Video Quality of Experience Study involving real-time ratings for streaming applications.
- Developed a video quality metric for assessing spatio-temporal anomalies generated during data transmission.
- Assisted in modeling QoE anomalies prediction from Network Layer statistics.

Image Quality Assessment for Visually Impaired UGC Jan'21 - Jan'22

Supervisor: Dr. Alan C. Bovik and Dr. Danna Gurari (Sponsor: Meta AI Research) *TIP'23*

- Created the largest image quality and distortion dataset for content generated by visually impaired users.
- Developed state-of-the-art multi-task models for local and global quality and distortion prediction.
- Developed applications for real-time quality and distortion feedback for assisting visually impaired users.

Video Quality Assessment for User-Generated Content Jan'20 - Nov'20

Supervisor: Dr. Alan C. Bovik (Sponsor: Meta AI Research) *CVPR'21*

- Created the largest video quality database consisting of 39K videos and 117K video-patches.
- Conducted the largest subjective video quality study to date, collecting about 5.5M ratings.
- Developed a state-of-the-art blind video quality predictor that can also generate space-time quality maps.

Optimum Methods for Quasi-orthographic Surface Imaging Jul'18 - Jun'19

Master's Thesis, Supervisor: Dr. K. S. Venkatesh

- Proposed a novel method of approximate orthographic imaging and analyzed it on generated topographies.
- Formulated a novel method for computing imaging surfaces and derived bounds on imaging distance.
- Integrated boundary approx. algorithms for computing optimal capture points for surface reconstruction.
- Proposed and compared sequential filling and batch filling algorithms for optimizing capture points.

Blacklisting of Counterfeit 3D Tags Jul'18 - Sep'18

Research Intern, Computer Vision Group, Transpacks, IIT Kanpur

- Analyzed reflection patterns in contours under flash and non-flash photography in different settings.
- Implemented bit plane encryption and digital watermarking in Frequency, DCT, and Wavelet domain.
- Developed a counterfeit detection pipeline based on color contrast gradients and printing features.

ACADEMIC PROJECTS

Combining Compression Techniques for Computer Vision Sep'21 - Nov'21

- Compared the compression efficacy of quantization, pruning, and knowledge distillation for smaller networks.
- Analyzed the combination of different techniques when applied partially and sequentially to deep networks.

Improving Defensive Distillation using Teacher Assistant Feb'21 - May'21

- Evaluated distilled models for different distillation temperatures in terms of accuracy, sensitivity, and robustness.
- Demonstrated that multi-step distillation improves robustness against adversarial attacks in most cases.

COVID-19: Impacts and Insights Sep'20 - Nov'20

- Modelled death and case projections using Time-series analysis and LSTMs.
- Applied ML techniques to analyze and predict the impact of the pandemic on mental health and well-being.

Foreground Detection and Background Separation in Videos Jan'20 - May'20

- Explored algorithms based on PCA, GMM, and foreground motion estimation for detecting moving subjects.
- Developed algorithms based on motion estimation for removing moving objects to extract the static background.

Deep-fake Image and Video Detection Techniques Jan'20 - May'20

- Surveyed different types of facial manipulations in videos and images, and databases available for research on facial manipulation. Analyzed both classical and learning-based popular Deep-fake detection techniques.

Comparison of HRTF Pre-processing Techniques Jan'19 - Apr'19

- Investigated the perceptual effect of Head Related Transfer Function (HRTF) pre-processing techniques.
- Demonstrated using energy analysis that lower order SHT coefficients can be used for faster reconstruction.

Robust Optimization in Logistics Jan'19 - Apr'19

- Studied the retailer-supplier flexible commitment (RSFC) problem to manage the supply chain logistics.
- Implemented and analyzed three algorithms for optimizing the parameters based on uncertainty in demand.

Online Reconstruction from Big Data via Compressive Censoring Aug'18 - Nov'18

- Studied Sparsity-aware Censored Maximum Likelihood Estimator (SC-MLE), and tested the performance and convergence of the proposed optimization algorithm on sparse online data for real-time processing.

ACADEMIC ACHIEVEMENTS

2019 Awarded **Academic Excellence Award** by IIT Kanpur for **consecutive academic years 2014-18**.
2019 Awarded **Outstanding TA Award** by Dept. of Electrical Engineering, IIT Kanpur.
2018 Recipient of **Erasmus+** EU scholarship for semester exchange in France.
2014 Secured *All India Rank* **854** in **JEE Advanced** among 150,000 applicants.
2014 Secured *All India Rank* **111** in **JEE Mains** among 1.3 million applicants.
2014 Ranked **11th** in **WBJEE** among 120,000 students.
2013 Awarded **Kishor Vaigyanik Protsahan Yojana (KVPY)** scholarship by DST, Govt. of India.

RELEVANT CERTIFICATIONS

• Machine Learning (Stanford Online) • Deep Learning Specialization (Deeplearning.ai) • Deep Neural Networks with PyTorch (IBM) • TensorFlow Developer Professional Certificate (Deeplearning.ai) • Generative Adversarial Networks (GANs) Specialization (Deeplearning.ai)

MISCELLANEOUS

- **Teaching Assistantship:** For courses – **Introduction to Electronics (2018)**, **Image Processing (2019)** and **Solid State Devices (2019)**.
- **Member, English Proficiency Programme (2018-2021):** Management of the courses – English Proficiency and Scholarly Communication and the online course Practical English: Learning and Teaching (PELT).
- **Internship and Company Co-ordinator (2015-16):** Managed the placement and internship procedures and involved in collection and compilation of data about the recruitment process for preparation guides as a member of the **Student Placement Office, IIT Kanpur**.
- **Student Guide and Academic Mentor (2015-16):** Member of the **Counselling Service, IIT Kanpur**, responsible for the orientation, academic and personal guidance for the undergraduate freshmen batch.