Ankita Ghosh

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Website . LinkedIn . GitHub . Google Scholar

Profile

My research interest and experience lies in the field of computer vision, deep learning, image processing, computer graphics and human-computer interaction.

Education

ETH Zürich 2022 – Present
MSc in Computer Science (Major in Visual and Interactive Computing)

Manipal Institute of Technology 2018 – 2022
B.Tech in Computer Science and Engineering (Minor in Graphics and Visualization) *CGPA: 9.27/10*

Hiranandani Foundation School, Thane 2016 – 2018
Higher Secondary (ISC) *93.8%*

Hiranandani Foundation School, Thane 2006 – 2016
Secondary School (ICSE) *97.7%*

Experience

Research Intern January 2022 – July 2022
Spectrum Lab, Indian Institute of Science *Bangalore, India*

- Worked under Dr. Chandra Sekhar Seelamantula on the topic of fundus image analysis for diabetic retinopathy.
- Trained models from EfficientNet, SqueezeNet and MobileNet family for five level diabetic retinopathy grading with an additional category for classifying **ungradable images**. AUC score: **88.6%**
- Visually evalutated the classification models by using **explainable algorithms** like GradCAM and ScoreCAM.
- Worked on the multi-class segmentation and detection of **four retinal lesions** by deploying DeepLabV3+ and applying image processing operations.

Mitacs Research Intern June 2021 – September 2021
Social and Intelligent Robotics Research Laboratory, University of Waterloo *Waterloo, Ontario*

- Recipient of the **Mitacs Globalink Research Internship** and accompanying scholarship of **15,000 CAD**.
- Worked under the supervision of Dr. Moojan Ghafurian and Dr. Kerstin Dautenhahn to develop an emotion recognition system which can be deployed on social robots.
- Worked on the social robot **Furhat** and implemented **Affect Control Theory** after conducting extensive literature review on computational emotion models like ALMA, TAME, MA/SDEC, etc.
- Designed **facial expressions** for Furhat robot using **Facial Action Coding System** and developed a model which maps emotions to facial gestures.

Undergraduate Research Assistant April 2021 – January 2022
Manipal Institute of Technology *Manipal, India*

- Worked under Dr. Harish Kumar J. R. on a deep learning project in the domain of opthalmology.
- Developed a model for **fovea disc segmentation** using semi-supervised learning built on DeepLabV3+ architecture with ResNet-18 as the backbone. Achieved a **dice score of 0.82** with only **484 datapoints** which surpasses the current best results.
- Worked on a **macular degeneration classification** model, handled **class imbalance of 1:5:5** by applying **augmentation** and **sampling**. Test accuracy: **93.6%**

Undergraduate Research Assistant November 2019 – November 2020
Kumudha Health Tech. Pvt. Ltd. *Manipal, India*

- Worked under the guidance of Dr. Hareesha K S to render anatomical parts in a **virtual environment using Oculus Rift**, aided by 3D Slicer, Unity and other software.
- Used Insight Toolkit and Visualization Toolkit to perform image processing operations like **registration and fusion on medical data**.

- Developed **Graphical User Interface** to perform real-time processing operations on data using Qt Software.

Co-Founder and Technical Head July 2020 – August 2022

The Research Society – MIT *Manipal, India*

- Founded the Research Society at Manipal Institute of Technology with the core aim of promoting inter-disciplinary research, publishing papers and securing funding for projects and patents across **10 domains** including AI, Electronics, Design and Psychology, Biotechnology etc.
- In addition to **hosting numerous webinars** with top researchers and conducting interactive sessions , we had **15 papers** accepted in prominent international journals and conference proceedings like CVPR, ACL and IEEE.
- Administered a student body of **100+ members** by managing project timelines and mentorship, executing collaborative events and resolving conflicts.
- Involved in providing active guidance to undergraduate students on research projects in the fields of deep learning and computer vision.

Projects and Research Work

Extraction of Color Information from Images for Generation of Colored-Sketches August 2021

Accepted at ML for Creativity and Design workshop, ***NeurIPS 2021*** *arXiv | GitHub | Demo*

- Applied image processing techniques and **unsupervised learning** to quantize and extract colors in images and render sketches with colored outlines.
- Used **conditional GANs** for image to colored sketch generation with the help of colorspace manipulation.

Semi-Supervised Classification and Segmentation on Aerial Images May 2021

Accepted at Tackling Climate Change with ML workshop, ***NeurIPS 2021*** *arXiv | GitHub | Demo*

- Worked on a dataset of 1450 datapoints with only 25% labels and a **class imbalance of ratio 6:1**.
- Generated pseudo-labels to perform **semi-supervised classification** using ResNet-18 model which fetched test accuracy of **96.70%**, an **increase of 3%** with less than **half the parameters** compared to the FloodNet paper.
- Developed **semi-supervised multi-class segmentation** pipeline for 10 classes by comparing various architectures like UNet, DeepLabV3+ and PSPNet.

ExplainableAI: Variations of Score-CAM Algorithm September 2020

Accepted at Responsible Computer Vision workshop, ***CVPR 2021*** *arXiv | GitHub*

- Developed two novel algorithms– SS-CAM and IS-CAM, by integrating **SmoothGrad** and **IntegratedGrad** algorithms with **Score-CAM** respectively.
- Performed evaluations based on **faithfulness**, **localization**, and **visual comparisons** on the ImageNet dataset for architectures VGG-16, SqueezeNet1.0 and ResNet18. Our algorithms perform better or are on par with the state of the art- AUC insertion: **48.13%**, AUC deletion: **9.92%**, Localization: **43.52%**

Lane Detection Algorithm for Autonomous Vehicles March 2019

Mars Rover Manipal research member, ***globally 8th*** *at University Rover Challenge 2019 GitHub*

- Built an algorithm by combining the **SegNet** and **LSTM** deep learning architectures. Test accuracy: **93.5%**
- Performed image processing techniques using OpenCV to determine radius of curvature and other features of the lane like edge detection, offset calculation etc.

Technical Skills and Certifications

Languages: Python, C, C++, Java, Kotlin, MATLAB, GNU Octave, Linux Shell Scripting
Tools and Libraries: OpenCV, NumPy, SciPy, Pandas, Matplotlib, Scikit-learn, PyTorch, Keras, Tensorflow, Insight Toolkit, Visualization Toolkit, Qt Creator, 3D Slicer, Unity, Visual Studio
Certifications: Deep Learning Specialization (Coursera), Image and Video Processing (Coursera)

Extracurricular

Member of ACM–Women in Computing September 2019 – June 2022
Agile participant of the activities, events and panels of the student club. Provided mentorship to female undergraduates with the aim of creating a community for women in STEM fields.

Writer in Manipal The Talk Network August 2020 – April 2021
Wrote and published a plethora of articles ranging from informative articles on technology to creative pieces on literature in the largest independent media organization in Manipal, Karnataka.

Volunteer at Teach Code for Good, Manipal October 2019 – October 2020
Tutored underprivileged students in a needful school on Computer Science topics and programming languages like Python and C.