Ankita Ghosh

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Education

ETH Zurich September 2022 – Present
MSc in Computer Science (Major in Visual and Interactive Computing)
Relevant Coursework: 3D Vision, Digital Humans, Computer Vision, Computer Graphics, Big Data

Manipal Institute of Technology August 2018 – June 2022
B.Tech in Computer Science and Engineering (Minor in Graphics and Visualization) *CGPA: 9.27/10*
Relevant Coursework: Deep Learning, Digital Image Processing, Augmented and Virtual Reality

Publications

[1] Rakshit Naidu, **Ankita Ghosh**, Yash Maurya, Shamanth R Nayak, Soumya Snigdha Kundu, **IS-CAM: Integrated Score-CAM for axiomatic-based explanations**, *Responsible Computer Vision, CVPR-W 2021* [paper | code]

[2] **Ankita Ghosh***, Sahil Khose*, Abhiraj Tiwari*, **Semi-Supervised Classification and Segmentation on Aerial Images**, *Tackling Climate Change with ML, NeurIPS-W 2021* [paper | code | demo]

[3] V Manushree*, Sameer Saxena*, Parna Chowdhury*, Manisimha Varma*, Harsh Rathod*, **Ankita Ghosh**, Sahil Khose, **Extraction of Color Information from Images for Generation of Colored-Sketches**, *ML for Creativity and Design, NeurIPS-W 2021* [paper | code | demo]

[4] **Ankita Ghosh***, Sahil Khose*, Yogish S. Kamath, Neetha I. R. Kuzhuppilly, Harish Kumar J R, **Fovea Segmentation Using Semi-Supervised Learning**, *INDICON 2023* [paper | code]

[5] **Ankita Ghosh***, Sahil Khose*, Yogish S. Kamath, Neetha I. R. Kuzhuppilly, Harish Kumar J R, **Explainable Classification of Macular Degeneration Using Deep Learning**, *INDICON 2023* [paper | code]

Experience

Student Researcher, Computer Vision and Learning Group, ETH Zurich March 2023 – Present
Supervisor: Prof. Dr. Siyu Tang and Korrawe Karunratanakul | [semester project] *Zurich, Switzerland*

- Working on human motion generation from textual description in a two-person interaction scenario by applying **vision foundational models** and developing a **transformer-based diffusion model** pipeline.
- Extended single-person generative diffusion models to produce motion for two people using a **correlation model** and **contact-based annotations**.

Mitacs Globalink Research Intern, SIRRL, University of Waterloo June 2021 – September 2021
Supervisor: Prof. Dr. Kerstin Dautenhahn and Prof. Dr. Moojan Ghafurian *Ontario, Canada*

- Developed an **emotion recognition system** that can identify and respond with appropriate emotion in real-time by implementing the computational model of **affect control theory**.
- Designed facial expressions for social robot **Furhat** using **facial action coding system**, and developed a novel model that maps emotions to these facial gestures based on **semantic differential values**.

Computer Vision Engineer Intern, Kumudha Health Tech. Pvt. Ltd. November 2019 – November 2020
Supervisor: Dr. Hareesha K S *Manipal, India*

- Rendered 3D anatomical parts in a **virtual reality** headset with the aid of scientific visualization software and game engine, after performing image processing operations like **registration and fusion of medical data**.
- Developed GUI for **real-time operations** like slicing and free-hand snipping on the 3D model.

Relevant Projects

Leveraging Motion Imitation in Reinforcement Learning for Biped Character Spring 2023
Digital Humans Course Project at ETH Zurich [*code* | *report* | *demo*]

- Implemented an **actor-critic algorithm** that performs **task objectives** like direction control, alongside imitating motions in a physically-based environment.
- Synthesized longer motion sequences by using methods like **multi-clip concatenation** and **composite policy**.
- Proposed a **residual policy network** that can leverage pre-trained agents and retarget to new characters.

Semantic-MD: Infusing Monocular Depth with Semantic Signals Spring 2023
3D Vision Course Project at ETH Zurich [*code* | *report* | *poster*]

- Explored different ways of integrating semantic signals to the image input through concatenation and convolutions in the form of **one-hot encoded semantic maps and contours**.
- Performed **multi-task learning** to jointly estimate depth and semantic maps.
- Conducted extensive **ablation studies** with different segmentation architectures and loss functions where depth estimation achieved a decrease of **12.86%** in relative mean error with the aid of semantic information.

Scene Render: Man on Mars Autumn 2022
Computer Graphics Course Project at ETH Zurich [*report*]

- Implemented a **low-level renderer** with **light source functionalities** like environment map emitter and probabilistic progressive photon mapping, and additional post-processing NL-means **denoising**.
- **Enhanced mesh object surfaces** by overlaying image textures, normal mapping, and reproducing Disney's implementation of bidirectional reflectance distribution function.

Deep Learning-based Fundus Image Analysis for Diabetic Retinopathy Grading Spring 2022
B.Tech Thesis at Spectrum Lab, Indian Institute of Science [*report*]

- Trained classification models for **five-level** diabetic retinopathy grading with an additional category for classifying **ungradable images**. Achieved AUC metric score of **88.6%**
- Evaluated the classification models by using **explainable algorithms** that give higher confidence scores for features important during prediction.
- Worked on the detection of **four retinal lesions** by deploying a **pooling-based encoder-decoder** architecture.

Lane Detection Algorithm for Autonomous Vehicles Spring 2019
Mars Rover Manipal student team member, ***globally 8th*** *at University Rover Challenge 2019* [*code*]

- Combined **segmentation model and recurrent neural network in one pipeline** to provide robust road segmentation predictions on video input.
- Performed **image processing techniques** like edge detection, perspective transforms, and polynomial curve fitting to calculate the desired speed and curvature for autonomous driving.

Technical Skills

Languages: Python, C, C++, Java, Kotlin, SQL
Tools and Frameworks: PyTorch, Tensorflow, OpenCV, Blender, Unity, 3D Slicer, mySQL, mongoDB

Extracurricular

- **Co-Founder and Technical Head**, Research Society Manipal: administered a student body of 100+ members promoting inter-disciplinary research, mentored students in the field of AI, and hosted academic events like webinars.
- **Member**, ACM–Women in Computing: official university chapter, provided mentorship to female undergraduates with the aim of creating a community for women in STEM fields.
- **Volunteer**, Teach Code for Good, Manipal: tutored 20 underprivileged students in a needful school on Computer Science topics and programming languages like Python and C.
- **Writer**, Manipal The Talk Network: published a total of 10+ informative articles on technology and creative literary pieces at Manipal's largest independent media organization in India.