Aditya Aggarwal

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EDUCATION

International Institute of Information Technology   Hyderabad, India
B. Tech (Honors) in Electronics and Communication Engineering **(CGPA: 8.9 / 10)**   2016 - 2020

PUBLICATIONS

- **Quo Vadis, Skeleton Action Recognition?**
  P Gupta, A Thatipelli, **A Aggarwal**, S Maheshwari, N Trivedi, S Das and RK Sarvadevabhatla
  Accepted at International Journal of Computer Vision (July 2021)

- **Reconstruct, Rasterize and Backprop: Dense shape and pose estimation from a single image**
  A Pokale*, **A Aggarwal***, KM Jatavallabhula and KM Krishna
  Accepted at CVPR Workshop on Visual SLAM 2020

- **A principled formulation of integrating objects in Monocular SLAM**
  A Pokale, D Das, **A Aggarwal**, B Bhowmick and KM Krishna
  Accepted at International Conference on Advances in Robotics 2019

  * indicates equal contribution

PATENTS

- **System and method for integrating objects in monocular slam**
  A Pokale, D Das, **A Aggarwal**, B Bhowmick and KM Krishna
  Filed by Tata Consultancy Services Limited

RESEARCH EXPERIENCE

- **Research Intern, *Microsoft Research*** Bangalore, India   February 2021 - Present
  - Mentored by **Dr Mohit Jain** and **Dr Nipun Kwatra** at Technology and Empowerment Group on the intersection of computer vision, image processing. and machine learning in the healthcare domain.
  - Developing end-to-end smartphone based system for creating low-cost diagnostic solution for eye diseases.

- **Undergraduate Researcher, *CVIT Lab*** IIIT Hyderabad   December 2018 - June 2020
  - Worked with **Prof. Ravi Kiran Sarvadevabhatla** on Human Activity Recognition in *In the Wild* videos using 3D body and hand pose.
  - Formulated an average pooled model for skeletal action recognition which achieved a state of the art accuracy of 88.80% (Cross Setup) and 87.22% (Cross Subject) on the NTU-120 dataset.
  - Labelled and created a 3D-pose annotated dataset with open ended action vocabulary **Metaphorics**.

- **Undergraduate Researcher, *Robotics Lab*** IIIT Hyderabad   October 2018 - April 2020
  - Guided by **Prof. Madhava Krishna** on the object-oriented SLAM with a monocular camera.
  - Proposed a novel trajectory estimation pipeline by jointly optimizing for camera trajectory, 3D object shape and 6-DOF pose, to create semantically meaningful maps.
  - Integrated an occupancy network with a differentiable renderer to backpropagate the loss for accurate pose estimation. Benchmarked the pipeline on synthetically rendered dataset in Blender.

- **Project Assistant, *Visual Analytics Lab*** IISc Bangalore   May 2019 - July 2019
  - Worked with **Prof. R. Venkatesh Babu** on 3D Hand Pose and Shape Estimation from RGB images.
  - Implemented an Adversarial Auto encoder to learn the pose embedding space for skeletal hand joints, conditioned via the discriminator in the encoded latent space.

Work Experience

- **Product Engineer,** *Gojek* Bangalore, India   July 2020 - January 2021
    - Worked on the ride hailing platform (with more than 4 million daily orders) as a backend engineer to add on demand features and improve the customer booking experience.
    - Built a scheduler service in Go and Ruby to book rides in the future and integrated it with the database.

- **Open Source Developer,** *Google Summer of Code 2019* Robocomp   April 2019 - August 2019
    - Created a **People Identification System**, able to identify people from very few training images using Incremental and Few Shot Learning techniques.

- **Teaching Assistant,** IIIT Hyderabad   August 2019 - April 2020
    - Conducted tutorials, created and evaluated assignments and mentored students for final projects in the courses: **Computer Vision** (Spring 2020) and **Digital Image Processing** (Fall 2019).

Achievements

- Awarded the **Dean's Merit List** for excellent performance in academics(Top 5 % students).
- Ranked 24th at the **CANSAT 2018** organized by The American Astronautical Society (AAS).
- Presented the autonomous and manual bot for **ABU ROBOCON 2018** at R&D Showcase 2018, IIIT-H.

Service

- Served as a student mentor for the Google Summer of Code for Robocomp in 2020, 2021
- **Reviewer** International Conference on Pattern Recognition (2020), British Machine Vision Conference (2021)
- Served as the Head of Robotics Club at IIIT-H, handling the finances and logistics of all the organized events.

Projects

- **Generative Adversarial Talking Head**: Implemented a DC GAN network in tensorflow which synthesized facial expressions of an arbitrary portrait with action units while maintaining facial geometry, skin color and the background.
- **Mini Dropbox**: Created a distributed file sharing protocol with a server and client using application layer protocol.
- **Sparse Reconstruction of 3D Object**: Made a system for reconstructing sparse set of points in the scene, given only 2 views using RANSAC Algorithm and Algebraic Triangulation. Later extended to reconstruction using multiple views.
- **ABU Robocon 2018**: Built an autonomous and a manual bot which coordinated together to pick, pass and throw a shuttlecock, tied to a thread, through a ring.
- **Power Optimization for Full Adder**: Implemented a Multi Objective Simulated Annealing Algorithm in python to reduce power leakage in a full adder circuit by 50 % keeping the delays in bound.

Technical Skills

- **Languages**: Python, C++, Golang, Ruby, MATLAB
- **Machine Learning**: PyTorch, TensorFlow, OpenCV

Relevant Coursework

- **Artificial Intelligence**: Computer Vision, Optimization Methods, Statistical Methods in AI, Mobile Robotics
- **Mathematics**: Differential Equations, Probability and Random Processes, Linear Algebra, Discrete Structures
- **Systems**: Operating Systems, Advanced Communication Networks, Computer System Organization
- **Algorithms**: Algorithms and Data Structures, C Programming