CHAITANYA KHARYAL

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SHORT RESEARCH STATEMENT

Through evolution and millions of years of testing in demanding and challenging environments, the human brain, and arguably complete human anatomy, has become very complex. So complex that it has become a challenge for humans even to understand our own abilities, let alone enabling computers to match our performance. Yet, this seemingly impossible task is the grand goal of many areas of research like Machine Learning, Deep Learning, Computer Vision, Robotics, and Reinforcement Learning, which is why they intrigue me as much as they do. My long term goal is to contribute to this grand goal of achieving human-level intelligence. By working towards this goal, I wish to understand more about our behaviours and decision making abilities while developing breakthrough intermediary technologies for the short term. I am particularly fascinated by the idea of combining existing classical model-based techniques with data-driven methods to make them more robust to unpredictable real-world scenarios.

EDUCATION

International Institute of Information Technology - Hyderabad, India *2017-2021*

- *B.Tech. Electronics and Communication Engineering*
- ***CGPA:*** *9.04*
- ***Honours:*** *Robotics*
- ***Advisor:*** *Prof. Madhava Krishna*
- ***Awards and Honours:***

1. *Research Award*
2. *Merit List* Monsoon 2020-21
3. *Merit List* Spring 2019-20
4. *Dean's List* Monsoon 2019-20
5. *Dean's List* Spring 2017-18
6. *Dean's List* Monsoon 2017-18

PUBLICATIONS

RP-VIO: Robust Plane-based Visual-Inertial Odometry for Dynamic Environments *IROS'21*

- *Karnik Ram,* ***Chaitanya Kharyal****, Sudarshan S. Harithas, K. Madhava Krishna* Paper / Code

We present a monocular visual-inertial odometry (VIO) system that uses only planar features and their induced homographies, during both initialization and sliding-window estimation, for increased robustness and accuracy in dynamic environments. We evaluate on diverse sequences, including our own highly-dynamic simulated dataset, and show significant improvement over a state-of-the-art monocular VIO algorithm in dynamic environments.

WORK EXPERIENCE

Microsoft, India *June 2021 - Present*

Software Engineer

- Working in Azure Compute team, building a client workload certification pipeline which automatically detects failures, and ensures smooth functioning of the Azure services. This framework will further send failure reports to the corresponding teams and create IcMs for the same.

Robotics Research Center, IIIT - Hyderabad *May 2019 - Present (Part time)*

Researcher

- Currently working on Object Goal Navigation task. We are currently building a new Graph Convolution Network based approach.
- Worked on improving the performance of Visual-Inertial Odometry (V-IO) algorithms in highly dynamic environments. Work accepted in IROS'21.

Matchday.ai *May 2019 - June 2019*

Computer Vision and Machine Learning Intern

- Worked on ML and CV pipeline. Included ground segmentation of football fields, player classification and tracking, integration of different camera views etc.

IIIT-Hyderabad, India

Teaching Assistant

- Embedded systems workshop (Approx 100 students) *Spring 2019*
- Linear Algebra (Approx 200 students) *Monsoon 2019*

RELEVANT COURSEWORK

Statistical Methods in AI, Probabilistic Graphical Models, Topics in Machine Learning (RL), Mobile Robotics, Robotics: Planning and Navigation, Probability and Random Processes, Data Structures, Algorithms and Operating Systems, Digital Image Processing

RELATED PROJECTS

Sparse Reward RL

- A self-lead research project trying to improve the learning of RL algorithms in sparse reward environments using asymmetric self play.
- Uses Pytorch, OpenAI Gym, PyBullet.

Gradient Evolution Code / Blog

- Rediscovering the idea of gradient evolution presented in **The Evolutionary-Gradient-Search Procedure in Theory and Practice** from scratch.
- Uses Python, Numpy, OpenAI-Gym.

Evolution Simulation Code

- A simple simulation which simulates the evolution of simple organisms with simple traits such as speed, size, consciousness etc. using the Evolutionary Algorithm.

AWARDS, HONOURS AND ACCOMPLISHMENTS

- Winner of RL Hackathon by AIcrowd
- Winner of JKPMSSS scholarship