Kushal Kedia

kk837@cornell.edu · kushal2000 · Kushal · Website · Twitter · Scholar

Research Interests

Robotics & AI: Model-Based RL, Robot Learning, Human-Robot Interaction, Motion Planning

Academics

Ph.D. in Computer Science **2022 -**
Cornell University

B. Tech in Electronics (Minor: Computer Science) **2018 - 2022**
Indian Institute of Technology (IIT) Kharagpur Grade: 9.53/10

Publications

1. Troy McMahon, Aravind Sivaramakrishnan, **Kushal Kedia**, Edgar Granados, and Kostas E. Bekris. Terrain-aware learned controllers for sampling-based kinodynamic planning over physically simulated terrains. *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022 [PDF]
2. **Kushal Kedia**, Rajat Kumar Jenamani, Aritra Hazra, and P. P. Chakrabarti. Optimal multi-agent path finding for precedence constrained planning tasks. *ArXiv*, abs/2202.10449, 2022 [PDF]
3. Punyajoy Saha, Divyanshu Sheth, **Kushal Kedia**, Binny Mathew, and Animesh Mukherjee. Raft: Rationale adaptor for few-shot abusive language detection. *ArXiv*, abs/2211.17046, 2022 [PDF]

Peer-Reviewed Workshop Papers

1. K. Kedia*, R. Jenamani*, R. Kumar*, and P. Mall*. Robotic Motion Planning Using Learned Critical Sources & Local Sampling. In *MLPC Workshop*, ICRA 2020 [PDF] [Video]
2. K. Kedia and A. Nandy. Offensive Language Identification in Dravidian Languages. In *First Workshop on Speech and Language Technologies for Dravidian Languages*, EACL 2021 [PDF] [Poster]

Research Experiences

PoRTaL Group, Cornell University *Guide: Prof. Sanjiban Choudhury* *Jul '22 - Current*
- Integrated human motion forecasting for collaborative manipulation
- Developing game-theoretic frameworks for joint forecasting and planning

PRACSYS Group, Rutgers University *Guide: Prof. Kostas Bekris* *Mar '21 - Apr '21*
- Improving the efficiency of kinodynamic planning for mobile robots using data-driven techniques
- Tested and contributing to **ML4KP**: A library for integrating machine learning tools with state-of-the-art sampling-based kinodynamic planning algorithms

Microsoft Research Labs India *Mulitlingual NLP Intern* *April '21 - July '21*
- Built a model (XGBoost) to predict the performance of muliltingual transformer models on low-resourced languages as part of Team LITMUS (Linguistically Informed Testing of Multilingual Systems)

Multi-Agent Research Group, IIT Kharagpur *Guide: Prof. Partha P. Chakrabari* *Jan '21 - May '22*
- Designed optimal Multi-Agent Path Finding (MAPF) algorithms for sequential task assignment and collision-free routing in manufacturing applications with inter-task precedence constraints

Hate Alert, IIT Kharagpur *Guide: Prof. Animesh Mukherjee* *Dec '20 - Nov '21*

- Developed explainable models for abusive language detection in social media using rationale prediction networks built on top of transformer models

Kharagpur RoboSoccer Students Group *3-D Simulation Humanoid Team* *Feb '19 - Mar '21*

- Worked on skills like passing & defense on top of **C++** framework to enhance game strategy for Robocup
- Optimized parameters of walk-engine using CMA-ES; increased speed of humanoid from 5m/s to 9.5m/s

Mentorship and Outreach

Head, Technology Robotix Society, IIT Kharagpur

Leading a 3-tier team to execute the annual Robotix fest & conducting workshops; In charge of Makerspace - an open source lab for robotics enthusiasts seeking guidance & components

IEEE Mentor, Winter School of AI & Robotics, IIT Kharagpur

Mentored 100+ students in week-long workshops on Machine Learning & Image Processing

Projects

ML Reproducibility Challenge 2022 *Reinforcement Learning Term Project* *Sep '21 - Nov '21*

- Reproduced the paper *Average-Reward Reinforcement Learning with Trust Region Methods, IJCAI 2021*

Annotator Influence on Hate-Speech Detection *AI & Ethics Term Project* *Jan '21 - Apr '21*

- Analysed the influence of demographic attributes of the annotators on hate speech detection
- Showed that neural networks infer identity of annotators, thus biasing their predictions

Exploiting Code-Switching Patterns in NLP *Guide: Prof. Animesh Mukherjee* *May '20 - Dec '20*

- Formulated 24 handcrafted features based on code switches and language spans in sentences
- Concatenated features with BERT embeddings improving F1 scores by 10% in 3 classification tasks

RRT* Simulator on Turtlesim *Personal Project* *Feb '19 - Mar '19*

- Developed interactive GUI to simulate growth of RRT* avoiding obstacles using **OpenCV**
- Controlled movement from start to goal using a P-controller and animated the path in **ROS** Turtlesim

Technical Skills

Programming Languages: Python | C | C++ | MATLAB

Libraries & Tools: ROS | PyTorch | Keras | Boost-Graph | OpenCV | PyBullet | NetworkX | Unix

Achievements

- **Top 1% among 1400+** undergraduate students in the institute
- Part of **bronze-winning** contingent at the 9th Inter-IIT Tech-Meet
- Among top 10 teams in the world that qualified for **RoboCup Humanoid League, 2021**
- Felicitated by **Chief Minister** of West Bengal for outstanding academic performance in ISC 2018

Extra-Curricular Activities

- Tennis Player under the **National Sports Organisation (NSO)** India