Kushal Kedia

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Research Interests

Robotics & AI: Motion Planning, Multi-Agent Systems, Deep Learning, Algorithms, Natural Language Understanding

Academics

B. Tech in Electronics & Communication   **2018 - 2022**
Indian Institute of Technology, Kharagpur   9.64/10

Publications

1. K. Kedia, R. Jenamani, R. Kumar, and P. Mall. Robotic Motion Planning Using Learned Critical Sources & Local Sampling. In *Fourth Machine Learning in Planning and Control of Robot Motion 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]

Projects & Experience

Kharagpur RoboSoccer Students Group ⌗ *3-D Simulation Humanoid Team*   *Feb '19 - Current*
- Worked on skills such as passing & defense on top of **C++** framework to enhance in-game strategy for Robocup
- Optimized parameters of robot's walk-engine using **CMA-ES**; increased speed of humanoid from 5m/s to 9.5m/s
- Developing environment using **PyBullet** to train end to end walk-engine for 22 DOF humanoid robots using RLLib

Leveraging Experience for Motion Planning in Complex Environments ⌗   *Dec '19 - July '20*
- Designed efficient planning algorithms that exploit samplers learnt from experience by utilizing local sampling
- Improvement of 30% in success rates was observed in 2-D environments & 7-DOF robotic arm manipulation [1]

Exploiting Code-Switching Patterns in NLP ⌗ *Guide: Prof. Animesh Mukherjee*   *May '20 - Dec '20*
- Formulated 24 handcrafted features based on code switches, language spans & contextual similarity in sentences
- Concatenated features with multilingual BERT embeddings improving F1 scores by 10% in 3 sentiment detection tasks

RRT* Simulator on Turtlesim ⌗ *Personal Project*   *Feb '19 - Mar '19*
- Developed interactive GUI to simulate growth of RRT* and display path avoiding obstacles using **OpenCV**
- Controlled the movement of a turtle from start to goal using P-controller and animated the path in **ROS** Turtlesim

Few-Shot Learning in Hate-Speech Detection ⌗ *Guide: Prof. Animesh Mukherjee*   *Jan '21 - Current*
- Trained BERT & CNN-GRU models on **HateXplain** - rationales annotated dataset - using attention loss
- Macro-F1 score improved to 0.71 on Davidson benchmark dataset by sampling less than 10% of training data

Positions of Responsibility

Head, Technology Robotix Society, IIT Kharagpur
Leading a 3-tier team to execute the annual Robotix fest & conducting workshops; Focal point of robotics on campus

IEEE Mentor, Winter School of AI & Robotics, IIT Kharagpur
Mentored two classes of 50+ first & second year students in week-long workshops on Machine Learning & Image Processing

Technical Skills

Programming Languages: Python | C | C++ | MATLAB
Libraries & Tools: ROS | PyTorch | Keras | Tensorflow | OpenCV | RLLib | Scikit-Learn | PyBullet | NetworkX | Unix

Relevant Coursework

Programming: Algorithms | Computer Vision | Machine Learning | AI & Ethics | Information Retrieval | Data Mining
Others: Probability & Stochastics | Microcontrollers | Network Theory | Signals & Systems | Control Systems

Achievements

- **Top 1% among 1400+** undergraduate students in the institute; **Ranked 5th** in department
- Awarded **KVPY 2018 fellowship** by the Department of Science & Technology, India
- 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