

MOHIT KULKARNI

Sophomore Undergraduate
Department of Mathematics and Statistics
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EDUCATIONAL QUALIFICATIONS

Year	Degree	Institution(Board)	CGPA/%
July'19 – June'23 (expected)	B.S., Mathematics	Indian Institute of Technology, Kanpur	8.7/10.0
2019	SSC – XII	Vidyadham Junior, Aurangabad	87.8%
2017	ICSE – X	Podar International School, Aurangabad	95.6%

INTERESTS

Open Source, Computational Neuroscience, Nonlinear Dynamics, Robotics, Image Processing, Machine Learning

SKILLS

Prog. Language: C, C++, Python, Java, Bash
Utilities: OpenCV, ROS, Brian2, PyTorch, Tensorflow, Gazebo, Makefile, Git, MATLAB, L^AT_EX

ACHIEVEMENTS

- AIR 615, JEE Advanced - 2019, amongst 200,000 candidates
- AIR 637, JEE Main - 2019, amongst 1.2 million candidates
- Awarded INSPIRE scholarship by Department of Science and Technology, Government of India,

RESEARCH EXPERIENCE

Svoboda Lab, Janelia Research Campus

Remote Undergraduate Intern Sep'20 - Present

- Working on learning and plasticity in the Somatosensory cortex.
- Experimented with more biologically plausible learning algorithms such as Feedback Alignment, localised hebbian learning etc.
- Currently Experimenting with recurrent and chaotic models of learning(FORCE etc.)

POSITIONS OF RESPONSIBILITY

Brain and Cognitive Society, IIT Kanpur

Group Leader Apr'21 - Present

- Overall Head for all activities BCS conducts such as Journal Clubs, Summer projects etc

Robotics Club, IIT Kanpur

Secretary April'20 - April'21

Counselling Service, IIT Kanpur

Student Guide November'20 - Present

CAMPS AND WORKSHOPS

Neuromatch Academy 2020

An online school for Computational Neuroscience July'20

Vijyoshi Camp 2019

IISER, Kolkata Dec'19

RELEVANT COURSES

Fundamentals of Computing(ESC101)
Linear Algebra and ODE(MTH201/MTH102)
Probability and Statistics(MSO201)
Bioinformatics(BSE322)

(¹): Ongoing Courses (*): Coursera course

Introduction to Electronics(ESC201)
Set Theory and Mathematical Logic(MTH302)
Fluid Mechanics(ESO204)
Computational Cognitive Science(CS786)¹

Analysis-I(MTH301)
Abstract Algebra(MTH204)
Neurobiology(BSE656)
Deep Learning Specialization*

PROJECTS

The Omniglot Project

Brain and Cognitive Society, IIT Kanpur May'20 - July'20

- This project was aimed at understanding and solving the problem of one-shot learning.
- Implemented SOTA meta-learning models to solve one-shot classification and generative problem.
- Used architectures like GANs, VAEs, LSTMs and bayesian statistics to develop models in PyTorch.

Autonomous Humanoid(AUTOMI)

Team Humanoid, IIT Kanpur Sep'19 - Present

- Involved in the development of a complete, highly optimised software stack for AUTOMI.
- AUTOMI v1 is designed for autonomous navigation in a static environment using techniques like depth estimation, SLAM, object recognition, avoidance, lane detection etc.
- The software stack is based on ROS, with image processing using OpenCV.

Following Sub-Population Signals

Mentor: Prof. James Murray, University of Oregon July'20

- The goal was to reveal more insights about the connection between different brain areas and how the sub-populations communicate, like order of firing of specific neuronal type, and the correlation between order of firing between different brain regions.
- This analysis was performed on Steinmetz dataset, as a part of Neuromatch Academy 2020.
- Techniques such as Granger Causality, PCA, dPCA, Markov Models were used.

PETcat

Robotics Club, IIT Kanpur April'20 - Present

- Aimed at developing a biologically inspired robotic cat.
- Simultaneous Localization and Planning Algorithms like orb-SLAM, gmapping, roVIO were implemented and benchmarked.
- Currently involved in optimization of software stack using storage optimization, multi-threading etc.

TALKS AND MENTORSHIP

Does The Brain Do Backpropagation?

Recording and Slides Journal Club, BCS@IITK Dec'20

Dynamics Of Life

Stamatics IIT Kanpur Mar'21 - Present

- Mentored a group of 30 Freshman and Sophomores in a reading project on Nonlinear Dynamics and Chaos in Nature