

Final Year Undergraduate
Dept. of Electrical Engineering
Indian Institute of Technology Kanpur

GitHub: <https://github.com/shashikg>

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How Close are Artificial Neural Networks to the Brain?

Sep. '18 – Nov. '18

CS771A - Machine Learning, Prof Piyush Rai, IIT Kanpur

[Pres] [Report]

- Studied different types of **ANN** models to compare their structure and performance to realise their biological resemblance to the processing in the brain
- Trained several neural network models on **MNIST** dataset to play with modelling of **CNN** and **RNN**.
- Tried explaining how a rate-based neuron in conventional NN can be realised as spiking neuron in **SNN**
- Worked on a more biologically plausible Deep Learning model (continued as a separate project)

Real Time Human Facial Emotion Recognition

Nov. '18 – Dec' 18

Self Project

[Video] [Code]

- Extracts human faces (using OpenCV haar-cascade/ dnn based classifier) from a camera stream and classifies them into 7 different moods i.e. Angry, Disgust, Fear, Happy, Sad, Surprise and Neutral
- CNN classifier (with ensemble) was designed, which was trained on the **ICML 2013** dataset of Facial Expression Recognition Challenge on Kaggle to achieve an accuracy of ~**65.34%** on the private test data

Cooperative Localization Using Posterior Linearization Belief Propagation

Sep. '18 – Nov '18

EE602A – Statistical Signal Processing, Prof R. M. Hegde, IIT Kanpur

[Code] [Report]

- Implementation of a research paper, which presents the **PLBP** algorithm for cooperative localization
- Learned about and implemented Statistical Linear Regression using **unscented transform** on a chosen sets of **sigma points** to linearize the proposed non-linear model.
- Implemented the **Belief Propagation** algorithm to infer the marginals for different sensor nodes.

Achieving CRLB in Sensor Network Estimation

Sep. '18 – Nov '18

EE602A – Statistical Signal Processing, Prof R. M. Hegde, IIT Kanpur

[Code]

- Implementation of a research paper, which proposes a general framework to achieve CRLB bounds
- Successfully implemented the proposed method in MATLAB to produce the results

PixhawkArduinomaVLink

Jun. '18

Self-Project

[Code]

- Developed an Open Source Arduino library to communicate between Pixhawk and Arduino
- Used **MAVLink** messaging protocol to create the communication

SL-COM (Sign Language Communication)

Mar. '17

Robotics Club, IIT Kanpur

- Patterns were generated using different **hand gestures** to produce different letters
- Produced letters were sent to a Chat-App, where a text2speech engine produces voices for the words
- Demonstrated the prototype in **Techkriti Innovation Challenge** and was awarded the **3rd prize**

RELEVANT COURSES

Machine Learning and Computer Vision

- Introduction to Machine Learning
- CNN for Visual Recognition (Stanford AI) [#]
- Computer Vision: Foundations and Applications (Stanford AI) [#]

Signal Processing

- Statistical Signal Processing
- Image Processing
- Signals, Systems and Networks
- Digital Signal Processing [o]

Cognitive Science

- Foundation of Cognitive Science
- Psychology of Language
- Psychology of Adjustment
- Computational Cognitive Science
- Neurobiology
- Logic and Cognitive Science [o]

Mathematics and Algorithms

- Data Structures & Algorithms
- Fundamental of Computing [*]
- Basic Statistics, Data Analysis & Inference [o]
- Probability and Statistic
- Linear Algebra and ODE

* - Exceptional Performance

- Online (Audit)

o - Ongoing

TECHNICAL SKILLS

Languages:

C • Python • MATLAB • JavaScript

Software and Tools:

TensorFlow • PyTorch • Keras • OpenCV • NumPy • ROS (Robot OS) • Git • Arduino • HTML/CSS • Jekyll

LECTURE/ TALKS / TUTORIALS	[13-12-2019]	Basic ML and Deep Learning Libraries, Google Colab [BCS @IITK]	[Link]
	[12-12-2019]	Artificial and Biological Neural Networks [BCS @IITK]	[Link]
	[10-12-2019]	Python, Numpy, SciPy, Matplotlib Tutorial [BCS @IITK]	[Link]
	[25-10-2019]	Talk on Role of Brain Science in AI [BCS @IITK]	[Link]
	[29-05-2017]	Introduction and Quick Start to ROS [Robotics Club, IITK]	[Link]

LEADERSHIP & ACTIVITIES	Student Volunteer <i>PRAYAS, IIT Kanpur</i>	<i>Dec. '18 – Jan. '19</i>
	Students Project Coordinator <i>EEA, Dept. of Electrical Engineering, IIT Kanpur</i>	<i>Sep. '18 – Sep. '19</i>
	Technical Head <i>Humanoid IITK Team, IIT Kanpur</i>	<i>May. '18 – Nov '18</i>
	UG Coordinator <i>EEA, Dept. of Electrical Engineering, IIT Kanpur</i>	<i>Aug. '17 – Aug. '18</i>
	Secretary <i>Robotics Club, IIT Kanpur</i>	<i>Apr. '17 – Mar. '18</i>
	Secretary <i>Fine Art Club, IIT Kanpur</i>	<i>Apr. '17 – Mar. '18</i>
	Student Guide <i>Counselling Service, IIT Kanpur</i>	<i>Aug. '17 – Jul. '18</i>
	Student Volunteer <i>NSS, IIT Kanpur</i>	<i>Aug. '16 – May. '17</i>
