SUSHRUT THORAT

Contact Information

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Interests

Cognitive Neuroscience & Neural Networks

Education

Masters in Cognitive Sciences (CNS track) *Ongoing*
CIMeC, University of Trento, Rovereto, TN, Italy

B.Tech. in Engineering Physics *August, 2015*
Indian Institute of Technology - Bombay, Mumbai, India
Cumulative Performance Index (CPI) of **7.64** *on a scale of 10.00*

Publications

Arithmetic Computing via Rate Coding in Neural Circuits with Spike-triggered Adaptive Synapses (*paper*)
International Joint Conference on Neural Networks, Killarney, Ireland *June 2015*

Projects

Builidng a User-driven Reverse Dictionary using a Node-Graph Architecture
Collaborator: Varad Choudhari *July 2015 - present*
Am designing a method to take any forward language dictionary and build a reverse dictionary, using n-level word definition correlations. The RD takes any input phrase and outputs a set of words with high correlation to the input. Have incorporated learning into the algorithm to improve performance. Are building a website around the concept, and writing a paper to be submitted at NAACL'16.

Senior Thesis: A Spiking Neural Network as a Quadcopter Flight Controller (*report*)
Guide: Prof. Bipin Rajendran *Spring 2015*
Department of Electrical Engineering, IIT Bombay
Studied the dynamics of a quadcopter. Developed a model-based control scheme for velocity-waypoint navigation in the presence of wind, noisy and delayed IMU data. Built small Spiking Neural Networks with simple spike-triggered adaptive synapses for implementing arithmetic operations. **Wrote a paper explaining these networks, which has been published in the proceedings of IJCNN'15**. Began developing a Spiking Neural Network for Quadcopter Control to analyse the gain in computational power and stability provided by spike-based networks.

Non-Linearity in Neural Systems (*presentation*)
Guide: Prof. Anirban Sain *Autumn 2014*
Course: Non-linear Dynamics, Physics
Studied Korn's review papers *Is there chaos in the brain?*, which presented a summary of the field of chaotic systems and discussed the indications and usefulness of chaos in the human brain. Studied the Hodgkin-Huxley Neuron model, and carried out a non-linear analysis of the same to describe the existence of action potentials, and the system's behavior in a variety of conditions.

The Origin of Consciousness (*report*)
Guide: Prof. Kiran Kondabagil *Spring 2014*
Course: Topics in Evolution, Biosciences
Studied Graziano's paper *Human Consciousness and its relationship to social neuroscience*, which deals with the hypothesis that consciousness emerged as a social necessity to calculate peer mental states (a necessity for altruism). Studied the evolution of the mammalian brain, and discussed a connection between the evolution of the brain and emergence of consciousness.

Junior Thesis: On Quantum Computation (*report*)(*ppt*)
Guides: Profs. Tathagat Avatar Tulsi and Suddhasatta Mahapatra *Autumn 2013*
Department of Physics, IIT Bombay
Read the first two parts of the book Quantum Computation and Quantum Information by Nielsen and Chuang. Wrote a report on, and presented the basics of Quantum Computation viz. Quantum Circuits and Quantum Algorithms, and their applications.

Scholastic Achievements

- Awarded the *KVPY scholarship* (2010), awarded to 150 promising young researchers throughout India, by the *Dept. of Science & Technology, Govt. of India.*
- *Winner* at the *Annual All India Web-Design Contest* (2008) hosted by SJIIT, Pune (India).
- Awarded the *NTSE scholarship* (2007), awarded to 1000 students throughout India with excellent all-round skills, by the *National Centre for Educational Research and Technology, Govt. of India.*

Technical Skills

Programming: C++, Python

Analysis Tools: MATLAB

Web-Design: HTML5, CSS3, PHP, JavaScript