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Tarun Dutt

Contact Information

26/C, Electronic City
IIIT Bangalore
Karnataka, 560100

Phone: +91 9743307594
E-mail: Tarun.Dutt@iiitb.org

Education

Integrated Masters in Information Technology, Specialization in Data Science
International Insititute of Information Technology, Bangalore 2019
Cumulative Grade: 3.39/4.00, Specialization: 3.80/4.00,

National Public School, Rajajinagar, Bangalore 2014
12th Standard Board Examination : 94.6%)

Peer Reviewed Conferences, Workshops

T. Dutt, A. Shreekumar, G. N. Srinivasa Prasanna, T. R. Dastidar. Towards Artifact Rejection in Microscopic Urinalysis. *To be presented, Medical Imaging meets NeurIPS workshop, 33rd Conference on Neural Information Processing Systems 2019*

R. Pratap, A. Deshmukh, P. Nair, **T. Dutt**. A Faster Sampling Algorithm for Spherical k-means. *Proceedings of The 10th Asian Conference on Machine Learning, PMLR 95:343-358, 2018*

R. Sanat, **T. Dutt**, C. Anushka, A. Abhilasha, G. N. Srinivasa Prasanna. Optimizing Schedule of Trains in Context of a Large Railway Network. *IEEE Intelligent Transport Systems Conference (ITSC 2018): 1214-1220*

C. Anushka, A. Abhilasha, R. Sanat, **T. Dutt**, G.N. Srinivasa Prasanna. Global Non-probabilistic Validation of Schedules. *INFORMS Annual Meeting, 2018*

Research Experience

Robust Models for Artifact Detection in Microscopic Urinalysis
Research Assistant, Sigtuple August 2018 – Present
Worked towards my thesis to develop and implement robust deep learning models to support the detection of unknown/unseen objects during prediction. Models were tested on a microscopic urine sample image dataset, where multiple artifacts present in the images were identified and rejected at test time, while also correctly classifying clinically significant objects. Techniques from the open set recognition and out-of-distribution detection literature were benchmarked, in addition to localization mechanisms and clustering in feature space.

Markerless Limb Tracking in D. Melanogaster
Research Assistant, National Center for Biological Sciences - TIFR May 2018 – Present
Conducting large scale data-driven tracking and analysis of limb movements in wild type Drosophila Melanogaster using image/signal processing, clustering and time series techniques. Currently developing heuristic algorithms to look at limb movement synchronizations, and combining spatial and temporal information to understand how inter-limb coordination during walking develops.

Analysis of coupled neuron models
Complex Systems and Soft Matter Physics Lab, IIIT Bangalore January 2018 – December 2018
Built and simulated a coupled system of differential equations representing the behaviour between two types of neurons. Conducted detailed mathematical analysis on the stability and spike train patterns of the system.

Optimizing Train Schedules on a Large Railway Network
Computational Sciences Lab, IIIT Bangalore May 2017 – August 2018
Formulated and prototyped a Mixed Integer Linear Programming (MILP) model to schedule new

trains on one of the largest railway networks in the world, while satisfying minimum headway, overtaking and crossover constraints.

Augmenting and Visualizing CT Scan Data for Surgical/Diagnostic Assistance
E-Health Research Center, IIIT Bangalore August 2017 – December 2017
Visualised head CT scan data using volumetric rendering with ray casting. Augmented the virtual 3D model onto video input featuring a patient in real time, to assist doctors during clinical procedures/diagnosis.

Decompiling Images into Presentational Markup
Research Intern, GE Global Research May 2017 – July 2017
Developed a general purpose deep learning system to decompile images of mathematical expressions into LaTeX source code. The model employs a convolutional network for text and layout recognition in tandem with an attention-based neural machine translation system.

Selected Course Projects

Obama Lip Sync Generated natural looking 2D speech animation that synchronizes with audio and is then composited onto a target video clip. The network used an LSTM to learn the mapping from raw audio features to mouth shapes. Pix2pix was used to synthesize mouth texture conditioned on the mouth shape

Augmented Reality for Patients with Aphasia Worked on creating an immersive, therapeutic tool to help patients with Aphasia recover in their home environment using object recognition and augmented reality to prompt verbal responses

Oral, Poster Presentations

- Towards Artifact Rejection in Microscopic Urinalysis
  To be presented at Medical Imaging meets NeurIPS workshop
  33rd Conference on Neural Information Processing Systems December 2019
  Vancouver, BC

- Optimizing Schedule of Trains in Context of a Large Railway Network
  21st IEEE Conference on Intelligent Transportation Systems November 2018
  Maui, Hawaii

- Global Non-probabilistic Validation of Schedules
  INFORMS Annual Meeting November 2018
  Pheonix, AZ

Skill Set

Programming, Libraries: Comfortable in Python, C++, C, Keras, Tensorflow
Relevant Mathematical Background: Advanced coursework on statistical inference, probability, linear algebra and dynamical systems.
Computational Background: Advanced coursework on methods in convex optimization, statistical computing, computer graphics, neural networks and machine learning.

Competitive Summer Schools

- Computational Approaches to Memory and Plasticity Summer School 2018, National Center for Biological Sciences, TIFR

Teaching Assistantship

- Mathematics for Machine Learning Fall 2018
- Learning and Cognitive Systems: An Optimization Perspective Spring 2019

Honours and Awards

Honourable Mention for performance in the ACM ICPC programming contest Asia Chennai First Round in 2015 and 2016.