Akella Ravi Tej

B.Tech. – Electronics & Communication Engineering – Indian Institute of Technology Roorkee

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Interests

Computer Vision, Deep Learning, Generative Modeling, Robotics and Reinforcement Learning

Education

Indian Institute of Technology Roorkee   ***GPA: 8.129/10***
B.Tech in Electronics & Communication Engineering
Minor Specialization in Computer Science & Engineering   *2014-2018*

Exam Scores

Graduate Record Examination   **329/340** *(Verbal: 159, Quant: 170, AWA: 4.0)*
TOEFL   **106/120** *(R: 29, L: 28, S: 22, W: 27)*

Publication

A Randomized Kernel-Based Secret Image Sharing (SIS) Scheme ⧉   **IEEE Workshop**
Authors: Akella Ravi Tej, Rekula Ravi Teja, Vinod Pankajakshan   *Jan 2017-Jul 2017*

- Proposed a novel SIS scheme that offers perfect threshold secrecy, optimal share size, and complete decentralization.
- Accepted for presentation at IEEE International Workshop on Information Forensics and Security (WIFS), 2018 ⧉.

Undergraduate Thesis Project...

Review: Super Resolution as a Supervised Learning Problem   **Working on a manuscript**
Supervisor: Prof. Vinod Pankajakshan   *Jul 2017-May 2018*

- Surveys recent work in the area of single image super resolution (SISR), covering advances in neural network architectures, learning algorithms, objective functions, and how they all overcome the ill-posed nature of SISR.
- Special emphasis on perceptual loss functions for stabler training and generating more realistic-looking images.
- Targeting the 36th International Conference on Machine Learning (ICML), 2019 ⧉.

Experience

Research Projects and Internships...

Bayesian Optimization with Guaranteed Monotonic Policy Improvements
Supervisors(remote): Prof. Anima Anandkumar, Bren Professor, CMS Caltech   *Aug 2018-Present*

- Attempts to combine the benefits of Bayesian approaches ⧉, such as targeted exploration and sample efficiency in gradient estimation, with the guaranteed monotonic policy improvements offered by TRPO method ⧉.
- Joint project by researcher at Caltech and Google DeepMind to extend the work in *Azizzadenesheli et al., (2018)*⧉ to continuous state-action space.

Statistical Modelling of Speech Signals ⧉
Supervisors: Prof. Ajit K Chaturvedi, Professor & Director, IIT Roorkee
        Prof. R Balasubramanian, Associate Professor, IIT Roorkee   *Jan 2018-May 2018*

- Reviewed common feature extractors used in pre-processing raw audio signals for speaker recognition task.
- Experiments were performed with stacked LSTM architecture using the Voice Conversion (VCC) 2016 dataset.
- Compared the performance of convolutional auto-regressive networks (dilated causal convolutions with a finite receptive field) with stacked LSTM networks (theoretically infinite receptive field) for high fidelity speech synthesis and automatic speech recognition tasks.

Underlying Cryptography behind Zero-Knowledge (ZK) Proofs
Supervisor(remote): Dr. R. Ramanujam, Professor, Institute of Mathematical Sciences   *Jul 2017-Jan 2018*

- Examined the mathematical principles behind various advanced cryptographic protocols in the zk-SNARK pipeline.

Paper Implementations..

Language Identification ⧉ by *Mathur et al., (2017)*⧉

○ Character-level LSTM model for language identification based on *Stanford Language Identification Engine(SLIDE)*.

Disentangled Learning with β-Variational Auto-Encoders ⧉ by *Burgess et al., (2018)*⧉

○ Balanced the trade-off between learning disentangled representations and reconstruction fidelity by adjusting the hyperparameter β to extract disentangled factors from *dsprites* dataset⧉.

○ Achieved more robust disentangling at a higher reconstruction fidelity using the modified objective function that performs a controlled increase of encoding capacity.

Handwriting Synthesis ⧉ by *Graves et al., (2013)*⧉

○ Mixture distribution parameterized using an LSTM network (Mixture Density Network) to generate realistic cursive handwriting, demonstrating the ability of recurrent neural networks to capture long-range structure.

Face Recognition with One-Shot Learning by *Schroff et al., (2015)*⧉

○ Used a siamese network with triplet loss function to recognize faces from a single example.

A Neural Algorithm of Artistic Style by *Gatys et al., (2015)*⧉

○ Generated artwork of high perceptual quality by blending low-level features and high-level features of two images.

Debiasing Word Embeddings by *Bolukbasi et al., (2016)*⧉

○ Eliminated common biases in word embeddings such as gender, age, etc., emerging from unbalanced training sets.

Academic Achievements

○ Recipient of **Nehru Memorial Scholarship** for overall excellence in undergraduate.
○ Ranked of 315/13388 teams in **Codechef SnackDown-2016**: Global Competitive Programming Tournament.
○ **KVPY fellowship** (SX Stream-2014) in recognition of aptitude for research.
○ Ranked in top 1% students of the country in **IIT-JEE Advance 2014**.
○ Secured 99.99%tile in **IIT-JEE Mains 2014**.

Technical skills

Programming Languages: Python, Java, C, C++, MATLAB and Simulink

Frameworks: TensorFlow, PyTorch, Keras

Simulators: MuJoCo Physics Engine, Box2D Physics Engine, OpenAI Gym

Relevant courses

Undergraduate Courses..

Linear Algebra: Mathematics-I(MAN 001) and Mathematical Methods(MAN 002)
Statistics: Probability and Statistics(MAN 006)
Machine Learning: Machine Learning(CSN 106)

Online Courses...

Coursera: Deep Learning Specialization by *Andrew NG, deeplearning.ai* ⧉

○ Neural Networks and Deep Learning ⧉, Improving DNNs: Hyperparameter tuning, Regularization and Optimization ⧉, Structuring Machine Learning Projects ⧉, Convolutional Neural Networks ⧉, Sequence Models ⧉

Coursera: Neural Networks for Machine Learning by *Geoffrey Hinton, University of Toronto* ⧉

Coursera: Machine Learning by *Andrew NG, Stanford University* ⧉

Other MOOCs: RL course by David Silver, Deep RL Bootcamp, Deep RL(CS 294-112) by Sergey Levine, CNN for Visual Recognition(CS231n) by Andrej Karpathy, NLP with Deep Learning(CS224n) by Christopher Manning.

Extracurricular Activities

○ Tutor at **HashLearn**: Conducted over 200 online sessions and mentored 100+ students for IIT-JEE.
○ Member of **Data Science Group**, a platform that brings together the students of IIT Roorkee who are passionate in artificial intelligence, machine learning, and data science to share ideas and collaborate.
○ Member of the **Institute Athletics Team** and **National Sports Organization (N.S.O)**, IIT Roorkee.