

Akella Ravi Tej

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

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Interests

Computer Vision, Deep Learning, Natural Language Processing, Robotics and Reinforcement Learning

Education

Bachelor of Technology (B.Tech)

Indian Institute of Technology, Roorkee, India

Major in Electronics & Communication Engineering

Minor Specialization in Computer Science & Engineering

2014-2018

Publication

A Randomized Kernel-Based Secret Image Sharing Scheme [🔗](#)

IEEE Workshop

Authors: Akella Ravi Tej, Rekula Ravi Teja, Vinod Pankajakshan

Jan 2017-Jul 2017

- Proposes a kernel-based operation that enhances the share secrecy of Thien-Lin's scheme while not compromising on decentralization (no SPOF) and optimal share sizes.
- 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)[↗](#)

- o Balanced the trade-off between learning disentangled representations and reconstruction fidelity by adjusting the hyperparameter β to extract disentangled factors from *dsprites* dataset[↗](#).
- o 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)[↗](#)

- o 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.

Selected Course Projects.....

Face Recognition with One-Shot Learning by *Schroff et al.*, (2015)[↗](#)

- o 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)[↗](#)

- o 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)[↗](#)

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

Trigger Word Detection

- o Used a stacked LSTM network to detect trigger words from a continuous audio stream.

Academic Achievements

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

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 Deep Neural Networks: 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.....

Reinforcement learning: RL course by David Silver, Deep RL Bootcamp, Deep RL(CS 294-112) by Sergey Levine

Computer Vision: CNN for Visual Recognition(CS231n) by Andrej Karpathy

Natural Language Processing: NLP with Deep Learning(CS224n) by Christopher Manning and Richard Socher

Teaching Experience

HashLearn

Tutor

- o Conducted over 200 online sessions and mentored 100+ students in mathematics and physics for Joint Entrance Examination (JEE).
 - Every year, over 1 million students from India appear for JEE-Main exam to seek undergraduate admissions. Many ventures have mushroomed that see education as an avenue for profit, spreading false promises and fostering unhealthy competition.
 - Having been through the struggle and survived the competition, I would like to inspire the joy of learning math and physics in high school students and instill aspirations beyond IIT-JEE.

Extracurricular Activities

Data Science Group

Member

- o 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.

Institute Athletics Team

Member

- o Official member of the National Sports Organization (N.S.O) with proficiency in Athletics.

References

Prof. Vinod Pankajakshan

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Prof. Ajit K. Chaturvedi

Professor in E&CE dept.

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Prof. R Ramanujam

Professor

Theoretical Computer Science(TCS) group

The Institute of Mathematical Sciences

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