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 **Workshop Publication**
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 as a better alternative to point estimate objective functions, which suffer from regression-to-the-mean problem.

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.

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

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

Selected Course Projects

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.

Trigger Word Detection

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

Academic Achievements

- Recipient of **Nehru Memorial Scholarship** for academic 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**
- **Abacus Grand Master** - SIP Academy

Technical skills

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

Frameworks: TensorFlow, PyTorch, Keras

Simulators: MuJoCo Physics Engine

Relevant 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 course by David Silver, Deep RL Bootcamp, Deep Reinforcement Learning(CS 294-112) by Sergey Levine, CNN for Visual Recognition(CS231n) by Andrej Karpathy

Extracurricular Activities

Data Science Group **Member**

- 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**

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

References

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