Akella **Ravi Tej**

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

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Research Interests

Reinforcement Learning, Sequence Modeling, Lifelong Learning, Meta-Learning

Education

Indian Institute of Technology Roorkee — *GPA: 8.129/10*

Bachelor of Technology in **Electronics & Communication Engineering** — *Jul 2014 - May 2018*

Minor Specialization in Computer Science & Engineering

Exam Scores

Graduate Record Examination — *329/340 (V: 159, Q: 170, AWA: 4.0)*

TOEFL — *106/120 (R: 29, L: 28, S: 22, W: 27)*

Publication

More to Perceptual Loss in Super Resolution [Preview] — *Under Review*

Authors: **Akella Ravi Tej**, S. Halder, A. Shandilya, Vinod Pankajakshan — *Jan 2018-Dec 2018*

- We show that besides visually-pleasing features, perceptual loss also implants high-frequency artifacts in super-resolution images.
- Using the latent features from the discriminator, we adaptively filter the unwanted information introduced by the perceptual loss.
- Submitted to *IEEE Winter Conference on Applications of Computer Vision (WACV 2020)*.

A Randomized Kernel-Based Secret Image Sharing (SIS) Scheme [Paper] — *WIFS 2018*

Authors: **Akella Ravi Tej**, R. Teja, Vinod Pankajakshan — *Jul 2017-Dec 2017*

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

Research Experience

Bayesian Trust Region Policy Optimization [Preview] — *Remote Collaboration*

Supervisors: **Dr. Kamyar Azizzadenesheli**, Caltech & **Dr. Mohammad Ghavamzadeh**, Facebook AI Research — *Oct 2018-Present*

- A Bayesian actor-critic algorithm for sample-efficient learning with guaranteed monotonic policy improvements.
- Uses the uncertainty in policy gradient (PG) estimates to compute robust policy update with non-trivial step sizes.
- We provide fresh insights for the high-variance in Monte-Carlo PG estimates by analyzing the kernel families of its Bayesian equivalents.
- We demonstrate a superior performance relative to prior on-policy algorithms on 7 diverse MuJoCo environments.

End-to-End Incremental Learning for Sequence Classification Tasks — *Research Assistant*

Supervisors: **Prof. Asif Ekbal** & **Prof. Pushpak Bhattacharyya**, AI-NLP-ML Lab, IIT Patna — *Sept 2019-Present*

- Preparing a benchmark for *Lifelong* and *Incremental Learning* of sequence classification tasks.
- Proposed a novel attention distillation loss to preserve the rich contextual information in the attention maps.

Guided Unsupervised Neural Machine Translation — *Research Assistant*

Supervisors: **Prof. Asif Ekbal** & **Prof. Pushpak Bhattacharyya**, AI-NLP-ML Lab, IIT Patna — *Apr 2019-Aug 2019*

- Unsupervised NMT is data-inefficient due to a misalignment in the unsupervised training and the supervised validation objectives.
- We meta-learn an initialization for which the unsupervised and supervised objectives are aligned for the first k updates.
- Our approach only requires a small amount of parallel data from the source languages and no parallel data from target languages.

Statistical Modelling of Speech Signals [Code] — *Research Project*

Supervisor: **Prof. R Balasubramanian**, Machine Vision Lab, IIT Roorkee — *Jan 2018-May 2018*

- Trained a speech recognition system with a stacked LSTM architecture on the Voice Conversion (VCC) 2016 dataset.
- Surveyed generative models for high fidelity speech synthesis: (i) convolutional auto-regressive networks, (ii) stacked LSTM networks.

Motion Vector Encryption for MPEG Files [Code] — *Research Project*

Supervisor: **Prof. Vinod Pankajakshan**, Signals & Systems Lab, IIT Roorkee — *Jan 2017-May 2017*

- By just altering the motion vectors of an MPEG file, we were able to form a strong perceptual encryption.
- We further demonstrate that even a one-bit change across all the motion vector can result in imperceptibility.

Industrial Experience

Automatic Generation of Design-Verification Testbench *Internship*

Texas Instruments, Bangalore *May 2017-Jul 2017*

- Automated the testbench generation pipeline for unit-testing a circuit design in extreme conditions, reducing significant human effort.
- Now, my project is deployed at an organizational scale and is being used by all the analog-based verification teams at Texas Instruments.
- I received a pre-placement offer to work as a full-time engineer at Texas Instruments, Bangalore.

Paper Implementations

Self-Motivated Projects

Disentangled Learning with β-Variational Auto-Encoders (Burgess et al., 2018) [Code]

- Balanced the trade-off between learning disentangled representations and reconstruction fidelity using a β-VAE on *dsprites* dataset.

Handwriting Synthesis (Graves et al., 2013) [Code]

- Generated realistic cursive handwriting with long-range structure using a Mixture Density Network (GMM parameterized by LSTMs).

Language Identification (Mathur et al., 2017) [Code]

- Designed a character-level LSTM model for language identification to emulate *Stanford Language Identification Engine(SLIDE)*.

Selected Course Projects

Face Recognition with One-Shot Learning (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 (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 (Bolukbasi et al., 2016)

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

Honors & Awards

- 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**.

Academic Services

Machine Learning and the Physical Sciences (ML4PS 2019) *Subreviewer*

Workshop at the 33rd Conference on Neural Information Processing Systems (NeurIPS)

AAAI Conference on Artificial Intelligence (AAAI-20) *Subreviewer*

Technical Skills

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 MAN 001, MAN 002

Machine Learning CSN 382

Probability and Statistics MAN 006

Design and Ananlysis of Algorithms CSN 212

Online Courses

Coursera Deep Learning (5 course) Specialization by *Andrew NG, deeplearning.ai* [Certificate]

Coursera Neural Networks for Machine Learning by *Geoffrey Hinton, University of Toronto* [Certificate]

Coursera Machine Learning by *Andrew NG, Stanford University* [Certificate]

References