Akella **Ravi Tej**

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

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Interests

Machine Learning, Reinforcement Learning, Meta-Learning, Generative Modeling

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

Publication

Deep Bayesian Quadrature Policy Optimization [Preprint] — ***Under Review***

Authors: **Akella Ravi Tej**, Kamyar Azizzadenesheli, Mohammad Ghavamzadeh, Anima Anandkumar, Yisong Yue

- Proposes a low-variance policy gradient estimator that uses Bayesian quadrature to analytically solve the policy gradient integral.
- Relative to Monte-Carlo estimation, our method offers more accurate policy gradient estimates and their estimation uncertainty.
- Submitted to **Neural Information Processing Systems** (NeurIPS) 2020.

Enhancing Perceptual Loss with Adversarial Feature Matching [Oral Presentation] — ***IJCNN 2020***

Authors: **Akella Ravi Tej**, S. Halder, A. Shandilya, Vinod Pankajakshan

- Proposes a novel training framework that unifies adversarial and perceptual objectives for high-fidelity photorealisitc image generation.
- Leverages additional discriminator supervision to (i) filter the artifacts introduced by perceptual loss and (ii) stabilize adversarial training.
- Presented at **IEEE International Joint Conference on Neural Networks** (IJCNN), 2020.

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

Authors: **Akella Ravi Tej**, R. Teja, Vinod Pankajakshan

- Introduces an SIS scheme that offers (i) perfect threshold secrecy, (ii) optimal share size, and (iii) complete decentralization.
- Presented at **IEEE International Workshop on Information Forensics and Security** (WIFS), 2018.

Research Experience

TensorLab California Institute of Technology (Caltech) — ***Research Internship***

Supervisors: **Prof. Anima Anandkumar**, Caltech, **Dr. Mohammad Ghavamzadeh**, Google Research — *Oct 2018-Present*

- Worked on policy gradient algorithms (reinforcement learning), with a focus on their theory, sample efficiency and safety.
- Primary contributor to *"Deep Bayesian Quadrature Policy Optimization"*, a joint project between Caltech and Google Research.

AI-NLP-ML Lab Indian Institute of Technology (IIT) Patna — ***Research Assistant***

Supervisor: **Prof. Pushpak Bhattacharyya**, Professor & Director, IIT Patna — *Jan 2019-Jan 2020*

- *Meta-Unsupervised Neural Machine Translation*:
  - Leveraged high-resource language data to improve unsupervised machine translation (UNMT) for low-resource languages.
  - Formulated this objective as a meta-learning problem, i.e., a bi-level optimization for learning a good UNMT initialization.
- *Interpretable Multimodal Fusion*:
  - Developed a block-superdiagonal fusion method to directly control intra-modality and inter-modality dynamics of tensor fusion.
  - Demonstrated superior performance over linear fusion for sentiment analysis on CMU-MOSI dataset (YouTube movie reviews).

Signal Processing Lab Indian Institute of Technology (IIT) Roorkee — ***Research Assistant***

Supervisor: **Prof. Vinod Pankajakshan**, Assistant Professor, IIT Roorkee — *Jan 2018-Jan 2019*

- Worked at the intersection of computer vision, machine learning and cryptography.
  - *Enhancing Perceptual Loss with Adversarial Feature Matching* (IEEE-IJCNN 2020 ORAL).
  - *Randomized Kernel-Based Secret Image Sharing (SIS) Scheme* (IEEE-WIFS 2018 Poster).

Industrial Experience

Automatic Generation of Design-Verification Testbench — ***Internship***

Texas Instruments, Bangalore — *May 2017-Jul 2017*

- Built the testbench generation pipeline for auto-testing circuit designs, vastly improving the productivity of Verification Engineers.
- Organization-wide Deployment: Currently used by all the verification teams at *Texas Instruments*.

Open Source

OPEN3D (2700+ stars, 669+ forks, 60+ contributors) [CODE]

- Open source 3D data processing library that is part of the non-profit **Open Source Vision Foundation (OSVF)**.
- Contributed to the TriangleMesh graph module: (i) C++ API, (ii) Python wrapper.

DISENTANGLED LEARNING WITH β-VARIATIONAL AUTO-ENCODERS (Burgess et al., 2018) [CODE]

- Implementation of "β-Variational Autoencoders" *(Burgess et al. 2018)* using TensorFlow.
- Balances the trade-off between learning disentangled representations and reconstruction fidelity using a β-VAE on *dsprites* dataset.

HANDWRITING SYNTHESIS (Graves et al., 2013) [CODE]

- Implementation of "Generating Sequences With Recurrent Neural Networks" *(Graves 2013)* using TensorFlow.
- 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, emulating *Stanford Language Identification Engine (SLIDE)*.

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, C, C++, Java, Shell, MATLAB and Simulink
Technologies TensorFlow, PyTorch, Keras, Git, Linux

Relevant Courses

UNDERGRADUATE COURSES

Mathematics

Linear Algebra MAN 001
Multivariate Analysis MAN 002
Probability and Statistics MAN 006

Computer Science

Fundamentals of Object Oriented Programming CSN 103
Data Structures CSN 102
Design and Analysis of Algorithms CSN 212
Discrete Structures CSN 106
Computer Architecture and Microprocessors CSN 221
Operating Systems CSN 232
Machine Learning CSN 382

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

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