

# Akella Ravi Tej

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

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## Interests

Reinforcement Learning, Generative Modeling, Meta-Learning, Continual 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 (V: 159, Q: 170, AWA: 4.0)

TOEFL

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

## Publication

**Interpretable Fusion Mechanisms for Multimodal Representation Learning**

Under Review

Authors: **Akella Ravi Tej**, A. Shandilya, H. Chauhan, Asif Ekbal, Pushpak Bhattacharyya

- We propose a multimodal fusion strategy that captures the inter-modality dynamics while working with a tractable number of learnable parameters.
- Block-superdiagonal tensor decomposition is used to capture expressive multilinear interactions across modalities.
- Submitted to *International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2020)*

**More to Perceptual Loss in Super Resolution**

Under Review

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

- Besides visually-pleasing features, perceptual loss also implants high-frequency artifacts in super-resolved images.
- We propose a novel content loss to adaptively filter the unwanted information transferred from perceptual loss.
- Submitted to *IEEE Winter Conference on Applications of Computer Vision (WACV 2020)*

**A Randomized Kernel-Based Secret Image Sharing (SIS) Scheme**

WIFS 2018

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

- 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*

## Experience

Research Experience.....

**Bayesian Trust Region Policy Optimization**

(remote work)

Supervisors: Prof. Anima Anandkumar, Bren Professor, CMS Caltech

Oct 2018-Present

- A Bayesian actor-critic algorithm for sample-efficient learning with guaranteed monotonic policy improvements.
- Uses the uncertainty in policy gradient estimates to compute robust policy update with non-trivial step sizes.

**End-to-End Incremental Learning for Sequence Transduction Tasks**

(research assistant)

Supervisor: Prof. Pushpak Bhattacharya, Professor & Director, IIT Patna

Jul 2019-Present

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

**Multi-hop Question Generation**

(research assistant)

Supervisor: Prof. Pushpak Bhattacharya, Professor & Director, IIT Patna

Apr 2019-Jul 2019

- Most question generation (QG) systems only use a single supporting fact from the context and consequently generate easy questions. We design a QG system whose outputs are conditioned on multiple supporting facts.
- Using self-critical reinforcement learning, we enforce maximal coverage over all the supporting facts in a context.

- 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  $\beta$ -Variational Auto-Encoders** [↗](#) by *Burgess et al.*, (2018)[↗](#)
- Balanced the trade-off between learning disentangled representations and reconstruction fidelity by adjusting the hyperparameter  $\beta$  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

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- 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

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- 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

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**Programming Languages:** Python, Java, C, C++, MATLAB and Simulink  
**Frameworks:** TensorFlow, PyTorch, Keras  
**Simulators:** MuJoCo Physics Engine, Box2D Physics Engine, OpenAI Gym

## Relevant courses

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- 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.