Akella Ravi Tej

B.Tech. Final Year – Electronics and Communication Engineering
Indian Institute of Technology, Roorkee, India
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Interests

Neural Networks and Deep Learning, Natural Language Processing, Computer Vision, Cryptography

Education

Electronics and Communication Engineering   **Indian Institute of Technology, Roorkee, India**
B. Tech., GPA: 8.129/10   *2014-2018*

Experience

Undergraduate Thesis Project...

Single Image Super Resolution Using Perceptual Loss
Supervisor: Dr. Vinod Pankajakshan, Assistant Professor, IIT Roorkee   *Dec 2017-May 2018*
- Trained existing SR networks with perceptual loss function to generate more realistic images.
- Trained an image compression model that stores images in a low-dimensional representation and reconstructs them using different decoders for nonpaying and premium users.
- Uses convolutional autoencoders to provide greater compression ratios and SR network trained on perceptual loss for image upscaling.

Self-supervised Projects...

Voice Style Transfer   Ongoing
- Extending the work of *Gatys et al.* on neural artistic style transfer to audio signals.
- Transfers selected speaker's features like pitch and timbre across speech signals.

Disentangled Learning in β-Variatonal Auto-Encoders
- Baseline: Implementing the β-VAE paper of DeepMind to extract disentangled factors from *dsprites* dataset.
- Balancing the trade-off between disentanglement and reconstruction fidelity by adjusting the hyperparameter β.
- Disentanglement helps with zero-shot inference and faster knowledge transfer to new tasks.

Face Recognition with One-Shot Learning
- Used one-shot learning to build a face recognition system.
- Uses siamese network with triplet loss function.

Art Generation with Neural Style Transfer
- Implementation of *Gatys et al.* paper on neural style transfer.
- Blends low level features of style image with high level features of context image.

Trigger Word Detection
- Detects trigger words from continuous audio stream using LSTM.
- Uses CTC cost for speech recognition.

Debiasing Word Embeddings
- Word embeddings can often represent gender, ethnicity, age and other biases of the text used to train the model. Debiasing is performed on word embeddings to remove observed biases. Based on work by *Bolukbasi et al.*, 2016.

Research Projects and Internships..

Speaker Recognition using Neural Networks
Supervisors: Dr. Ajit K Chaturvedi, Professor & Director, IIT Roorkee
Dr. R Balasubramanian, Associate Professor, IIT Roorkee   *Jan 2018-May 2018*

- Trained a speaker recognition neural network using softmax classifier.
- Trained a speaker embedding neural network using triplet loss funtion.

Development of a compositional proof method for zero-knowledge proofs

Supervisor: Dr. R. Ramanujam, Professor, Institute of Mathematical Sciences Nov 2017-Apr 2018
- Literature survey on zero-knowledge proofs, elliptic curve cryptography and bilinear pairings.
- Use of pi-calculus to verify cryptographic protocols.

Secret Image Sharing Schemes

Supervisor: Dr. Vinod Pankajakshan, Assistant Professor, IIT Roorkee Jul 2017-Jan 2018
- Aim: Generating faster and more secure *(k,n)*-threshold secret image sharing schemes that can be extended to videos.
- Devise novel schemes that are scalable for larger image dimensions.

Motion Vector Encryption on MPEG Video Files

Supervisor: Dr. Vinod Pankajakshan, Assistant Professor, IIT Roorkee Jan 2017-Apr 2017
- Extract and encrypt the motion vectors of an MPEG video file.
- Our modified approach consists of shifting the present motion vectors based on the previously encrypted frame, providing greater immunity from random guessing attacks.

Academic Achievements

- KVPY Scholar (SX Stream-2014)
- Codechef SnackDown-2016 Elimination Round (Rank-315)

Computer skills

Programming Languages: Python, Java, C++

Software Packages: Jupyter Notebook, MATLAB, Eclipse

Undergraduate courses..

CSN 513: Information and Network Security **CSN 102**: Data Structures

CSN 221: Computer Arichitecture and Microprocessors

Minor courses..

CSN 471: Computer Vision **CSN 212**: Design and Analysis of Algorithms

CSN 351: Database Management Systems **CSN 232**: Operating Systems

CSN 106: Discrete Structures

Audit courses..

CSN 382: Machine Learning

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* ⇗

References

Dr. Vinod Pankajakshan	Dr. R Balasubramanian
Assistant Professor	Associate Professor
Department of Electronics and Communication Engg.	Department of Computer Science and Engineering
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