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Selected Publications

J Kundu*, **P K Uppala*** , A Pahuja, Venkatesh Babu. AdaDepth: Unsupervised Content Congruent Adaptation for Depth Estimation, IEEE Conference on Computer Vision and Pattern Recognition **(CVPR), 2018 [SpotLight]**. * Equal Contribution.

P K Uppala, KR Mopuri, Venkatesh Babu. Ask, Acquire and Attack: Data-free UAP generation using Class impressions. (In submission ECCV 18)

Open Source Contributions

- **TensorFlow - CLEVER HANS**

  By Ian Goodfellow and Nicolas Papernot about security and privacy in machine learning. Part of the developers group, adding the state-of-the-art algorithms to the tensorflow library to help researchers test their deep learning models and accelerate the research.

Projects

- **Self Driving Car Simulation using a RL agent.** 2018

  Deep Q network (DQN) agent is trained to drive a simulated car, agent is penalized for going off-track or crashing and rewarded for on-track high speeds. Car speed, game screen, and collision state are collected from emulator, and actions given are pressing right key, left key, brake key, accelerate key.

- **Graph Convolutions for the Semi supervised Classification.** 2018

  Graphs are ubiquitous data structures, recently research community has taken up the challenge of generalizing the well performing CNNs to graph structures, taking inspiration from other works, this project involved implementing variants of the regularization loss for GCNs.

- **Simulated Human stick figure trained to walk using a RL agent.** 2017

  Using the Actor-Critic method, where policy gradient method is trust region policy optimization, and the value function estimate is by generalized advantage estimation, a human stick figure is trained to walk.

- **Chat bot built using tensorflow.** 2017

  Using the sequence to sequence model, one LSTM encoder is used to read the input sequence, this encoded representation is used by LSTM decoder to generate output sequence.

- **Chat bot built using IBM Watson conversation.** 2017

  Leveraging the IBM Cloud services and Watson conversation which is trained on huge amount of data, a chat bot is developed using the custom trained natural language classifier, and integrating with Dialog service to make appropriate decisions.

- **Block chain to have a transaction validation.** 2017

  Transaction pool is created between imaginary people, hash function is created to give fingerprint to transactions, then used a set of state transition rules to create blocks, implemented mechanisms for validating a transaction, block and full chain.

- **Feature visualization for the convolutional neural networks.** 2017

  Previously deep neural networks were considered as black box structures, to alleviate this research community proposed many visualization techniques, to gain further insights, a class level feature visualization is implemented, these class level visualizations showed structures which are present in real data samples remarkably.

- **Depth - aware style transfer.** 2017

  Style transfer using Gram matrices opened a new venue in deep learning, but the 3D perspective of original image is not preserved in stylized images, to overcome this recently depth aware loss is used, to further improve on this, a GAN based discriminator is trained to differentiate between the depth images of original images and depth images of stylized images.

- **Anomaly detection in human movement patterns.** 2016

  Anomaly detected has very important security implications, a neural network based anomaly detection model is trained on the video data.

- **Top view estimation of indoor scenes for robotic navigation.** 2016

  Birds eye view of a room gives a very easy navigation protocols for robots, compared to the first person view, but videos collected using cameras are in first person view, so a neural network based model is trained to get top view from the RGBD image.

- **Hyperspectral image segmentation using semi supervised hierarchical clustering.** 2016

  In biomedical image segmentation often the relationships among different cells is important, so just one label per pixel does not convey the full picture, so hierarchical clustering is used, but the hierarchical clustering is very expensive in memory and in computation, to overcome this a two stage clustering is used, this encapsulates the rich information of hierarchical clustering and computational efficiency of traditional methods.

- **Hyperspectral image segmentation with CNNs using spectral and spatial features.** 2015

  In hyperspectral images the information is encoded in spectral domain and in the spatial domain, to exploit all the available information, a two streamed CNN with joint final fully connected layer is used to predict the segmentation.

- **Face recognition and tracking by using a surveillance video from an UAV.** 2014

  Using the surveillance videos from the UAVs the cascade of various features are extracted, starting with the skin color segmentation, followed by Viola-Jones feature extraction and others, finally a SVM classifier is used to detect the face of the subjects.

- **Optimum decision rule for ML detector in Rayleigh faded channel.** 2013

  Establishing the optimum decision rule for ML detector when the transmitted signal is corrupted by Rayleigh faded channel with AWGN or Log-normal or Rayleigh or Rician interference for MPSK and MQAM modulation schemes.

Products Developed

- **2.4GHZ RF receiver**

  Design of Radio frequency 2.4Ghz receiver, PCB layout with LNA, MIXER and ANTENNA is designed in eagle and fabricated.

- **Game - Digital Flappy Bird**

  Developed a synthesizable code for Flappy bird game in Verilog using Quartus software and burned the program in krypton CPLD Kit using JTAG, game and score are displayed on led matrix whereas the controller for users are on the board itself.

- **Game - Air hockey**

  Developed an LED simulation of the game Air Hockey on an (8*9) LED grid using 8085 microprocessor and logic gates, Dyna-kit, Interfaces like 8255, Interrupts, Masks, Memory registers are used in coordination to design the game.

- **Moving target tracking automobile via shortest path using RFIDS** In collaboration with Texas Instrume

  The tracking is done with the help of RFID tags attached (beforehand) to the proposed targets, automobile would run by an algorithm which takes real time inputs from the tags and uses particle filtering techniques to correctly estimate the shortest path of approach to the target.

Education

- **Indian Institute of Technology Guwahati** Guwahati, India
  B.Tech(Hons.) in Engineering in Electrical and Electronics; GPA: 3.56 (8.91/10.0) *Aug. 2012 – July. 2016*

Experiences

- **Video Analytics Lab** Bengaluru, India.
  Research Associate *July 2017 - Present*
  - **AdaDepth**: Unsupervised domain adaptation strategy for the pixel-wise regression task of monocular depth estimation. **(CVPR18, Spot Light)**
  - **Ask, Acquire and Attack**: Crafting data free image agnostic perturbations, making the adversarial attacks feasible in practical scenarios. **(ECCV18, In Submission)**
  - **Top View Estimation**: Estimating the top-view of indoor scenes from a monocular RGB image, for making the robotic planning and navigation faster.
  - **Depth aware style transfer**: Preserving the 3D perception while transferring the style across images, an adversarial loss between the depth images is used.
  - **Feature visualization in neural networks**: Understanding the features that are responsible for different neuron activations.
- **Computational Intelligence Lab** Bengaluru, India.
  Research Intern *May 2015- July 2015*
  - **Face recognition and tracking in UAV surveillance video** : Fast and accurate preprocessing to account for large data from high resolution cam by using cascade of SAR, Euler number, Eccentricity, BBP, and then a SVM is trained for face/non-face classification.
- **Next Generation Wireless Systems Lab** Bengaluru, India.
  Research Intern *May 2015- August 2015*
  - **ML detector in Rayleigh faded channel**: Optimum decision rule for ML detector when the transmitted signal is corrupted by Rayleigh faded channel with AWGN, Log-normal/Rayleigh/Rician interference for MPSK and MQAM modulation schemes.

Programming Skills

- **Languages**: Python, C++, C, Matlab
- **Deep Learning Libraries**: Tensorflow, Pytorch, Theano

Academic Honors and Awards

- Awarded MCM scholarship for all four years.
- One among the Seven students shortlisted for OPJEMS scholarship interview from IIT Guwahati in 2013.
- Among top 0.13 percent in EAMCET 2012.
- Among top 0.41 percent in the IIT-JEE 2012.
- Among top 0.32 percent in AIEEE 2012.

Positions of Responsibility

- **Elected student representative - DUPC**

  Review and modification of course material by collecting information from top ranked institutions to encourage a global exposure.

- **49th Inter IIT Sports Meet Organization committee**

  Allocation of rooms for guests coming from various IITs for the sport meet. Managing the allotment of messes during the sports meet and maintaining the quality of the food through inspections.

Relevant Courses

CS231N - Stanford
deeplearning.ai(5 courses)

Reinforcement learning	Speech Processing	Probability and Random Processes
Deep Learning for Self-Driving Cars	Sound Structure of Language and Speech Analysis	Detection and Estimation Theory
Entrepreneurship and Economic Development	Computer Vision	Parallel Computing
Image Processing	Pattern Recognition and Machine Learning	Data structures and Algorithms
Communication Networks	Information Theory and Coding	Digital Signal Processing
		Signals Systems and Networks
		Principles of Communication