# ROHIT GAJAWADA

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## WORK EXPERIENCE

**Computer Vision Center - Universitat Autònoma de Barcelona** *May 2018 - Present*
*Research Internship*
Working with Dr. Antonio Lopez (Advanced Driver Assistance Systems Group) on end to end driving. Focusing on training end to end deep imitation learning agents for autonomous vehicles using the CARLA simulator. Also working on domain adaptation using generative models to transfer models trained in simulation to real world.

**Center for Visual Information Technology - IIIT-Hyderabad** *April 2017 - Present*
*Undergraduate Research Assistant*
Working with Dr. Anoop Namboodiri on deep model compression and binarization, applications of deep learning to biometry and generative adversarial networks for deep representation learning.

**Teaching Assistant - IIIT-Hyderabad** *January 2018 - May 2018*
*Computer Graphics*
Contributed with teaching in tutorial sessions, setting and grading assignments and correcting exam papers.

## PUBLICATIONS

**Hybrid Binary Networks: Optimizing for Accuracy, Efficiency and Memory** accepted in *IEEE Winter Conference on Applications of Computer Vision (***WACV 2018***)*

**Distribution-Aware Binarization of Neural Networks for Sketch Recognition** accepted in *IEEE Winter Conference on Applications of Computer Vision (***WACV 2018***)*

## RESEARCH PROJECTS

**Domain Adaptation of Imitation Learning Agents using GANs:** *May 2018 - Present*
*Computer Vision Center:* *Dr. Antonio Lopez*

- Worked on training deep imitation learning agents on CARLA simulator. After training on simulator, the agents are deployed in real life by using generative adversarial networks (GANs) to perform domain adaptation.
- Developed a setup where images from both domains are embedded into a lower dimensional latent vector using adversarial training and controls are directly learnt from this latent space. Implemented a baseline where the agent is finetuned on fake real world data generated from a UNIT GAN or CycleGAN after originally being trained on CARLA simulator.
- The models are trained using PyTorch and deployed in a challenging real world environment using a setup consisting of a mini monster truck, a Jetson TX2 and a Raspberry Pi.

**Binarization of Deep CNN based networks:** *April 2017 - December 2017*
*Center for Visual Information Technology:* *Dr. Anoop Namboodiri*

- Worked on two projects related to binarization of deep convolutional neural networks (CNNs) which resulted in two accepted papers at WACV 2018. We performed our experiments using PyTorch.
- The first project investigated the question of where to binarize inputs and showed that binarizing inputs to the right areas in the CNN based network contributes significantly to accuracy while not bloating the overall computations performed. Our method is also able to binarize the last layer of the network and achieve remarkable memory saving and speed up. Our method can also be combined with other compression strategies like SqueezeNet to obtain highly efficient models with negligible accuracy penalties.
- The second project introduced a distribution-aware approach to binarizing deep CNN based networks that is able to take the distribution of the network's weights into account and also provided an efficient implementation of the same using dynamic programming. Our method achieves significant improvement over current full binarization approaches for CNNs on two popular sketch datasets.

**Multimodal OCR:** *May 2017 - December 2017*
*Center for Visual Information Technology:* *Dr. Anoop Namboodiri*

- Worked on an end to end trainable multimodal deep learning model in PyTorch to improve word level accuracy where two CNN based networks (one for the text image and one for the stroke data) are used in a window like fashion. Their outputs are combined and passed into a Bidirectional LSTM and a transcription layer.

**Biometric Image Quality Metric:** *September 2017 - December 2017*
*Center for Visual Information Technology:* *Dr. Anoop Namboodiri*

- The project involved trying to devise a new metric that can evaluate the performance of existing metrics in terms of image quality and matching accuracy. We used the NIST SD14 and FVC datasets for our analysis.

## MINI PROJECTS

**Eye Gaze Detection using Attention Modelling:** *November 2017*
Implemented a deep learning model in PyTorch that is able to follow the gaze of a person and identify the object being looked at given an image and the location of a head. The model is able to extract head pose and gaze orientation and select salient objects that are in the predicted line of sight.

**Sketch Based Image Retrieval:** *October 2017*
Implemented a sketch based image retrieval system in MATLAB that maps images to sketches by perceptual edge grouping based on Gestalt principles using a RankSVM, graph cuts and energy filtering .

**One Shot Tracker:** *March 2018*
Implemented a deep learning tracker in Keras that takes the bounding box coordinates of the object to track for only the first image and uses it to track the object throughout the entire video sequence.

**Ultimate 4x4 Tic-Tac-Toe Bot:** *February 2017*
Developed a game bot using minimax algorithm and alpha beta pruning in Python for a competitive two player game called Ultimate Tic Tac Toe that reached the semifinals in a battle of 80 bots.

**BrickBreaker, Bloxorz & 3D Aquarium** *February 2017*
Brickbreaker and Bloxorz are 2D and 3D games respectively implemented from scratch in OpenGL and C++ without using any physics/game engine. 3D Aquarium is an interactive aquarium simulation implemented in WebGL.

**Human driving control for CARLA simulator** *May 2018*
Created a data collection program with PyGame that can use a steering wheel for the CARLA simulator.

**Web-Server** *March 2017*
Implemented a multi-threaded web server in Python that handles HTTP/HTTPS requests using socket programming.

## EDUCATION

**International Institute of Information Technology, Hyderabad** *August 2015 - Present*
*Bachelors of Technology (Honors.)in Computer Science and Engineering* CGPA: 8.22

## TECHNICAL SKILLS

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|---|---|
| **Programming Languages** | Python, C/C++, MATLAB, Bash, HTML/CSS, MySQL, PHP, Javascript |
| **Libraries and Packages** | PyTorch, Tensorflow, Keras, Caffe (basic), Torch, scikit-learn, scikit-image, CUDA (basic), OpenCV, OpenGL, WebGL, PyGame |
| **Miscellaneous** | GNU/Linux, Git, LaTeX, CARLA Simulator, NVIDIA Jetson TX2, Raspberry Pi |

## RELEVANT COURSES

Computer Vision, Optimization Methods, Independent Study on Visual Tracking, Statistical Methods in AI, Digital Image Processing, Artificial Intelligence, Computer Graphics, ITWS I & II, Data Structures & Algorithms, Digital Signal Analysis & Applications, Computer Programming, Software Analysis & Design, Formal Methods, Math I, II & III, Computer Systems Organization, Operating Systems, Computer Networks, Differential Equations, Ethics