Deep Chakraborty

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Research Interests

My research focuses on high level understanding from images, audio and video using self-supervised learning for improved downstream computer vision tasks such as object detection and scene understanding.

Education

University of Massachusetts Amherst Amherst, MA
Doctor of Philosophy in Computer Science *Sep 2019 - May 2023*

- **Advised by**: Dr. Madalina Fiterau & Dr. Erik Learned-Miller

University of Massachusetts Amherst Amherst, MA
Master of Science in Computer Science; GPA: 3.9 / 4.0 *Sep 2017 - Dec 2020*

- **Courses**: Computer Vision, Deep Learning, Advanced Machine Learning, Probabilistic Graphical Models, Distributed Systems, Software Engineering, Advanced Algorithms, Natural Language Processing

Manipal Institute of Technology Manipal, India
Bachelor of Technology in Electronics & Communication; GPA 8.9 / 10.0 *Aug 2012 – Jul 2016*

- **Courses**: Computer Architecture, Digital System Design, Embedded System Design, Digital Signal Processing, Information Theory & Coding, Soft Computing, Data Structures, Linux & Shell Scripting

Publications

Nonparallel Emotional Speech Conversion
J. Gao, **D. Chakraborty**, H. Tembine, O. Olaleye
Annual Conference of the International Speech Communication Association (**INTERSPEECH 2019**)

Pedestrian Detection in Thermal Images using Saliency Maps
D. Ghose*, S.M. Desai*, S. Bhattacharya*, **D. Chakraborty***, M. Fiterau, T. Rahman
Computer Vision and Pattern Recognition Workshops (**CVPR 2019**)

Unsupervised Hard Example Mining from Videos for Object Detection
S. Jin*, A. Roy Chowdhury*, H. Jiang, A. Singh, A. Prasad, **D. Chakraborty**, E. Learned-Miller
European Conference on Computer Vision (**ECCV 2018**)

Bird Call Identification using Dynamic Kernel based Support Vector Machines and Deep Neural Nets
D. Chakraborty, P. Mukker, P. Rajan, A. D. Dileep
IEEE International Conference on Machine Learning and Applications (**ICMLA 2016**).

Work Experience

University of Massachusetts Amherst Amherst, MA
Research Assistant - Information Fusion Lab, Computer Vision Lab *Jan 2018 - Present*

- (*Sep 2019 - Present*) **Visual Common Sense & Multimodal Deep Learning**: Advisor: Dr. Erik Learned-Miller, Dr. Madalina Fiterau
- (*Jan 2019 - Jun 2019*) **Pedestrian Detection in Thermal Images**: Advisor: Dr. Madalina Fiterau
- (*Jan 2018 - May 2018*) **Improving Object Detection using Unsupervised Hard Example Mining**: Advisor: Dr. Erik Learned-Miller

Apple Inc. Sunnyvale, CA
Machine Learning Intern - Video Computer Vision group *Jun 2020 - Sep 2020*

- **Improving Object Detection**: Advisor: Dr. Angela Blechschmidt

Signify (Philips Lighting) Research Cambridge, MA
Research & Development Intern - Speech Processing & Deep Learning group *May 2018 - Aug 2018*

- **Speech Emotion Conversion using Nonparallel data**: Advisor: Dr. Olaitan Olaleye

- **Speech Emotion and Audio Event Detection**: Created a real-time speech emotion and audio event detection system using CNNs and Bidirectional LSTMs, for controlling lighting in office and home environments.
- **Sensor Segmentation from Images**: Built an end-to-end system for large scale instance segmentation of Philips sensors from low quality google street view images to generate business insights.

Seagate Technology Bangalore, India
Software Engineer - Product Quality Enhancement team, Cloud Systems group *Jul 2016 - Jul 2017*

- **Performance Analysis**: Triaged system logs from live enterprise storage arrays to find and fix bugs in product firmware causing data unavailability/loss. Advised L1/L2/L3 support on best practices for SAN components.

Indian Institute of Technology Mandi, India
Research Intern - Multimedia Analytics & Systems group *May 2015 - Jun 2016*

- **Birdsong Recognition**: Implemented dynamic kernel based SVMs, GMMs and deep NNs and performed comparative study of state-of-the-art models for birdsong recognition. Advisor: Dr. Dileep A.D.

Indian Institute of Information Technology Allahabad, India
Summer Intern - Robotics & Artificial Intelligence lab *May 2014 - Jul 2014*

- **Social Mobile Autonomous Robot Testbed**: Developed a robot to provide a tour of the lab to visitors using basic computer vision algorithms on an embedded Linux platform. Advisor: Dr. Pavan Chakraborty

Teaching Experience

University of Massachusetts Amherst Amherst, MA
Teaching Assistant *Sep 2019 - Dec 2019*

- **COMPSCI 589: Machine Learning**: Instructor: Dr. Madalina Fiterau

Manipal Institute of Technology Manipal, India
Workshop Instructor - Computer Vision using Raspberry Pi (IEEE) *Mar 2015*

Projects

Probabilistic Human Activity Forecasting in the wild: Implemented a gated recurrent neural network with time interval and masking vectors to forecast human activity from irregularly sampled time series sensor data with missing values and labels. Achieved 92% F1 score on test data from unseen users.

Sentiment Style Transfer in Text: Implemented a sequence-to-sequence RNN to convert negative reviews to positive reviews using unpaired training data. Improved accuracy from 63% to 72% using weak supervision from noisy pairs.

Few-shot Face Verification using Maximal Contribution: Created an Improved face verification system by comparing CNN extracted features from few face images using novel pooling strategies to increase confidence.

Semantic Segmentation using Dilated Convolutions: Trained a CNN with a context aggregation module using dilated convolutions, batch-norm and transfer learning to achieve 61% IOU in scene labelling for outdoor scenes.

SVMTorch for user defined Kernels: Modified SVMTorch, a fast C++ library for Support Vector Machines to train directly using user-defined dynamic kernel gram matrices that allow the classification of varying length speech signals.

Volunteer Experience

Girls Inc. Eureka! (Jul 2015): Workshop on Creative Programming With LEDs to motivate high school girls to pursue post-secondary education and careers in STEM fields.

Computer Skills

Languages: Python, C++, Matlab, Shell Script, Java, HTML

Tools & Frameworks: PyTorch, Keras, TensorFlow, OpenCV, RESTful APIs, LaTeX, Git, AWS, Linux