Aman Raj

M.S. in Electrical & Computer Engineering • University of California San Diego
http://amanrajdce.github.io • amraj@ucsd.edu • Google Scholar • +1-8583463495

EDUCATION

UNIVERSITY OF CALIFORNIA SAN DIEGO
M.S. in Electrical & Computer Engineering
2018-2020

DELHI TECHNOLOGICAL UNIVERSITY (DCE)
B.Tech in Electronics & Communication Engineering
2012-2016
Aggregate: 82.52%

SPRING MEADOWS PUBLIC SCHOOL
Class XII (CBSE) | 2012
Aggregate : 95.0%, 1^{st} in School
Class X (CBSE) | 2010
CGPA : 9.8/10

AREAS OF INTEREST

Machine Learning
Computer Vision
Data Science

RELEVANT COURSEWORK

Undergraduate:
Advance Engineering Mathematics
Probability & Stochastic Processes
Control Systems
Microprocessor & Interfacing
Embedded Systems
Computer Architecture
Programming Fundamentals
Robotics & Object Tracking
Pattern Recognition
Digital Image Processing
Computer Vision

Coursera:
Neural Networks for Machine Learning *by Geoffrey Hinton*
Algorithms: Design and Analysis *by Tim Roughgarden*
Machine Learning *by Pedro Domingos*

WORK EXPERIENCE

FACEBOOK INC. | Software Engineer (AI)
Ramesh Raskar, Manohar Paluri, Saikat Basu | Aug 2016 – Aug 2018

- Worked on Maps project in **Spatial Computing** group, developed machine learning solutions to automate decisions for road split/merge improving the quality of generated maps. Also, experimented with Convolutional LSTM models to fix connectivity issues in generated road vectors.
- Worked in **Applied Machine Learning (AML)** group focused on understanding contents in images and videos. Designed and implemented a distributed ML model training pipeline in Caffe2 for large-scale training on satellite images which reduced training time from days to hours.
- While working in **Connectivity Lab** on **"Robocodes"** project developed many deep CNN architectures for semantic segmentation for extracting roads from satellite imagery using large amounts of annotated and weakly annotated data. All the codes are open sourced.

SUPPLYAI INC. | Data Scientist
Karthik Sridhar | Dec 2015 – July 2016

- Designed and implemented the predictive intelligence in company's first product Velo, aimed at reducing returns in the supply chain. Built the backend of software using H20.ai with a mix of Scala, Java, Python.
- Skills gained in Data Analysis, Data Munging, Data Visualization, Feature Engineering, Feature Selection, developing data-centric software pipeline.

RIGHT RELEVANCE INC. | Data Science Intern
Vishal Mishra | Dec 2015 – Feb 2016

- I fixed bugs in their existing Apache-Storm based topology to improve mining of URLs from tweets, cleaning it, and then fetching articles from URL.
- Wrote custom article extraction rules for specific URLs for which existing system failed in javascript.

RESEARCH EXPERIENCE

CARNEGIE MELLON UNIVERSITY | Summer Intern
Sebastian Scherer | Jun 2015 – Aug 2015

- **"Multi-Scale Convolutional Architecture for Semantic Segmentation"**
  I worked in **AirLab**, the project was focused on implementing a novel multi-scale Deep Convolutional Neural network for semantic labeling of 2D scenes for indoor and outdoor scene understanding.
- Also worked on transferring this learning for semantic classification of point cloud data to aid perception and path planning in a UAV.

CARNEGIE MELLON UNIVERSITY | Winter Intern
Bhiksha Raj, Rita Singh | Dec 2014

- **Comic Polyglot** in **CMU IPTSE Winter School 2014**, the project aimed at developing an end to end solution for automatic translation of raw manga comics from Japanese into English. I implemented a convolutional neural network-based system that detects text bubbles in comic strips.
- We used a combination of the output of neural network model & MSER algorithm to detect text-regions with subsequent translation with an OCR-engine.

RESEARCH ASSISTANT

DELHI TECHNOLOGICAL UNIVERSITY

Prof. Rajesh Rohilla, Prof. S.Indu | Jun 2013 – May 2016

- "FPGA Accelerated Abandoned Object Detection"
  Worked on developing a standalone system that uses a static background modeling algorithm and identifies any object lying abandoned for a given specified time. I accelerated algorithm's performance by implementing it on Xilinx FPGA board.
- Worked on **HistExtract**, an ICA based algorithm that extracts textual information from historical inscription images–containing high correlation between signal and noise. The aim was to extract, binarize and preserve these inscriptions digitally. This project was sponsored by Department of Science & Technology, Govt. of India.

DELHI TECHNOLOGICAL UNIVERSITY

Prof. N.S. Raghava | Oct 2012 – May 2013

- **Lunabotics Mining Project** focused on developing a lunar rover to participate in NASA Lunabotics Mining Competition 2013. I designed and fabricated various electronic circuits, developed telemetry system for the rover, establishing control and communication among digging, dumping, & locomotion mechanism. The project was supported by a research grant from college.

PUBLICATIONS

- Ilke Demir, Forest Hughes, **Aman Raj**, Kaunil Dhruv, Suryanarayana Murthy, Sanyam Garg, Barrett Doo, Ramesh Raskar. "A Holistic Framework for Addressing the World using Machine Learning". **CVPR 2018** workshops.
- Ilke Demir, Forest Hughes, **Aman Raj**, Kaunil Dhruv, Suryanarayana Murthy, Sanyam Garg, Barrett Doo, Ramesh Raskar. "Generative street addresses from satellite imagery". International Journal of Geo-Information **(ISPRS 2018)**.
- Ilke Demir, Forest Hughes, **Aman Raj**, Kleovoulos Tsourides, Divyaa Ravichandran, Suryanarayana Murthy, Kaunil Dhruv, Sanyam Garg, Jatin Malhotra, Barrett Doo, Grace Kermani, Ramesh Raskar. "Robocodes: Towards Generative Street Addresses from Satellite Imagery". **CVPR 2017** workshop on Earthvision. **(best paper award)**
- R. Rohilla, **Aman Raj**, Saransh Kejriwal, and R. Kapoor. "FPGA Accelerated Abandoned Object Detection". IEEE's International Conference on Computational Techniques in Information and Communication Technologies **(ICCTICT 2016)**.
- **Aman Raj**, Daniel Maturana, and Sebastian Scherer. "Multi-Scale Convolutional Architecture for Semantic Segmentation". Robotics Institute Technical Reports. CMU-RI-TR-15-21, 2015.
- N. Jayanthi, Ayush Tomar, **Aman Raj**, S. Indu, and Santanu Chaudhury. "Digitization of Historic Inscription Images using Cumulants based Simultaneous Blind Source Extraction". In Proceedings of **ICVGIP 2014**. ACM, Article 51, pp. 1-6.
- S. Indu, Ayush Tomar, **Aman Raj**, and Santanu Chaudhury. "Enhancement and Retrieval of Historic Inscription Images." In Computer Vision-**ACCV 2014** Workshops, pp. 529-541. Springer International Publishing, 2014.
- **Aman Raj**, P. Selvan, A. Dixit, Gaurav Bansal, H. Solanki and F. Abbas, "Comic Polyglot", CMU IPTSE Winter School Poster Session, 2014. **(best project award)**

TECHNICAL SKILLS

- Programming Languages:
  Python, C/C++, Java, Scala, Lua, LaTeX, Matlab/Octave, Javascript, Unix Shell Scripting
- Software/Others:
  Caffe/Caffe2, PyTorch, Torch, Chainer, H2O.ai, Lasagne, Theano, OpenCV, Qt, AWS, Git, Apache-Storm, Apache-Spark, MongoDB, Xilinx Vivado HLS, SQL
- Development Boards:
  Xilinx Zynq-7000 FPGA Imaging Kit, Intel Atom Board, BeagleBone Black, Arduino Due, Raspberry Pi

OTHER PROJECTS

(Supervised by Prof. Rajesh Rohilla)

- "Robot Navigation system using Xbox Kinect"
  Built a navigation system for a robot using OpenCV and OpenKinect libraries, that uses disparity map along with pixel intensity calibration to compute the distance of an object/obstacle from the Xbox Kinect. Generated signals are sent to a motor driver circuit that propels the wheel to avoid possible collision with any obstacle.

- "3B Biometrics Security System"
  Developed a system prototype using BeagleBone Black and RGB camera for purpose of authorizing access and remote monitoring in Robotics Lab(DTU). The system uses a combination of real-time face recognition and input password to authorize access and monitors student's activities in the lab, and periodically sends this information to lab-in charge on WhatsApp.

- "Face Detection & Tracking"
  Created a robust algorithm that combines SIFT and CamShift algorithm to detect and track a human face in real time. The tracker correctly tracked face for more than 90 % of frames at 15 FPS on Intel Core i5-2450M processor.

- "Text Extractor Device"
  Developed a hand-held device that takes images from an onboard camera and extracts texts from it using tesseract-OCR engine running on BeagleBone Black and shows the text on-screen with an accuracy of 92%.

AWARDS AND ACCOMPLISHMENTS

- **Best Paper Award** for the research paper "Robocodes: Towards Generative Street Addresses from Satellite Imagery" in **CVPR 2017** workshop on Earthvision.
- **Best Project Award** for the research project "Comic PolyGlot" in CMU IPTSE Winter School 2014.
- **Award of Recognition** for contribution to DCE-DTU Alumni Association as Volunteer coordinator, 2014.
- **CSSS Scholarship** Awarded by CBSE(Govt. of India) to meritorious students for distinctive performance in All India Senior Secondary Examination for undergraduate studies 2012-2016.
- Obtained an **All India Rank 312** in **National Science Talent Search Examination** in 2012.
- **Awarded Silver Certificate** in HDFC Bank Meritus Scholarship, 2009.
- **Academic Excellence Award** for the year 2009-10 and 2011-12 in school for securing first position in final examination.
- Selected for **Inspire Science Camp** organized by Department of Science & Technology, Govt. of India in 2011, merit based selection based on Class-X CGPA.

PROFESSIONAL SERVICE

- Since **2018** reviewing papers for IEEE Transactions on Image Processing.