Sanjeev Kumar

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Academic Projects

Master Thesis — **CAMP*, Technical University of Munich** — **June 2017 – Feb 2018**

Multiple Action Prediction in Deep Reinforcement Learning (Python, Tensorflow, OpenAI Gym)

- Proposed a new formulation for policy gradient reinforcement learning algorithms in continuous action space problems.
- The method predicts multiple action values at each state which facilitates better exploration during training and the agent converges to a better policy.
- Evaluated and compared the performance of the proposed formulation against other continuous control algorithms (A3C, DDPG, SVG(0)) on various Mujoco environments and TORCS car simulator for driving task.

Inter-Disciplinary Project — **Technical University of Munich** — **Oct 2016 – Mar 2017**

Cell Detection in Lens-free Microscopy Videos (Python, Keras) [1]

- The aim of the project was to detect and localize cells in lens-free microscopy image sequences using deep convolutional neural networks (CNN).
- In this project, we experimented with different deep CNN architectures (FCN, UNet, DetectNet) and achieved best detection score of 95% (F1) with fully convolutional ResNet-50.

Employment

Student Tutor — **Technical University of Munich** — **Oct 2017 – March 2018**

Tracking and Detection in Computer Vision (IN2210) †

- The course is offered every winter semester to master students at TU Munich and is attended by more than 100 students.
- Involved in creating assignments for the course and helped students with the homework.

Machine Learning Engineer‡ — **Logivations Gmbh** — **April 2017 - March 2018**

Multi Label Classification Using Learning by Association (Python, Tensorflow)

- Extended the semi-supervised image classification approach purposed by Haeusser at el. [2] to multi-label classification.
- Achieved test error of 1.7% on the artificially generated multi-label MNIST dataset using 10 supervised samples per class and 5000 total unsupervised samples. The test error without unsupervised samples was around 20%.

Identification Workplace (Python, C++, Keras)

- Applied object detection algorithms (RFCN, Faster RCNN, Yolo etc.) for detecting warehouse objects.
- Designed and implemented a framework to integrate and deploy new models developed on a variety of deep learning frameworks (tensorflow, caffe, pytorch etc.) easily across multiple hardware platforms (Nvidia Jetson, Raspberry Pi etc.).

Barcode Detector and Decoder (Python, Caffe)

- Developed an application which detected and decoded the barcodes of different items placed on a truck coming into the warehouse. The continuous video feed was captured by a PTZ camera and barcodes were decoded by zooming onto the specific location where barcode was detected.
- The detection of barcodes was done using RFCN.

Machine Learning Engineer ‡ — **Terraloupe Gmbh** — **Aug 2016 - April 2017**

Roof Area Estimation (Python, Keras, Shapely)

- Experimented with various deep convolutional network architectures (PSPNet, UNet etc.) for semantic segmentation of roof objects (roof, chimney etc.) from aerial images.
- Implemented computational geometric algorithms (polygon merge, line merge etc.) to generate refined shape boundaries for detected objects. The roof area was calculated from the point cloud of given region and roof object boundaries.

*http://campar.in.tum.de/Chair/ResearchIssueComputerVision
†http://campar.in.tum.de/Chair/TeachingWs17TDCV
‡Work Student

Software Development Engineer **Amazon, India** **Oct 2014 – Oct 2015**

Missed Call Based Expiry (Java, SQS, DynamoDB)

- Developed an application which sends notifications (SMS, email) to customers for older ads live on junglee.com and customers can then delete their ads by giving a missed call on a toll-free number.
- Using this mechanism, the Ad Defect Rate on junglee.com went down by 15%.

Senior Software Developer **Drishti Soft Solutions, India** **June 2012 – Sept 2014**

REST API for Ameyo (Java, Xtend, Jersey)

- Designed REST-based APIs for Ameyo (Drishti's call center software suite). The project involved building a domain specific language (DSL) for API modeling and writing a code generator for generating application artifacts such as java glue code, documentation.
- This API provided a framework for third parties to integrate call center functionalities into their applications.

Stats Manager (Java, H2)

- Designed and implemented a module for generating real-time call center statistics.
- The module listened to call center application events and maintained an in-memory database of stats which could be consumed by API calls or by subscribing to notifications.

Education

Munich, Germany **Technical University of Munich** **Oct 2015 – April 2018**

- M.Sc. in Informatics, GPA: 1.7/1.0
- Graduate Coursework: Machine Learning; Variational Methods; Multiple View Geometry; Deep Learning for Computer Vision; Vision Based Navigation; Virtual Machines; Mining Massive Datasets.

Hamirpur, India **National Institute of Technology** **July 2008 – May 2012**

- B.Tech. in Computer Science and Engineering, CGPA: 7.69/10.0
- Undergraduate Coursework: Object Oriented Programming; Data Structure and Algorithms; Theory of Computation; Operating System; Computer Networks; Computer Architecture.

Technical Skills

- Programming Languages: Python (Advanced), Java (Advanced), C++ (Intermediate), C (Intermediate), Matlab (Intermediate), JavaScript (Basic).
- ML/CV Toolkits: Tensorflow, Caffe, Keras, OpenCV, ROS, SciPy, Rasterio.
- Application Developement: REST, Apache Tomcat, Spring, Hibernate, Xtend, Eclipse Modeling Framework, PostgreSQL, Flask.
- Others: Git, GNU/Linux, LaTeX, Docker, Amazon Web Services.

Additional Experience and Awards

- Awarded with Drishti Excellence Award in October 2013, for gaining domain knowledge quickly and delivering projects on time.
- Won first prize twice (2012 and 2014) in yearly hackathons at Drishti.
- Participated in the annual hackathon at Amazon and won third prize in Junglee Hackathon'15.
- Scored 98.3 percentile in Computer Science Graduate Aptitude Test in Engineering (GATE-2012) among 156000 applicants from all over India.
- Achieved state rank 72 (Himachal Pradesh) in All India Engineering Entrance Exam (AIEEE-2008).
- Served as coordinator of Computer Science and Engineering Department in Nimbus'11 (annual technical festival of NIT Hamirpur) and was responsible for organizing technical events.
- Revived GNU/Linux Users Group (GLUG-NITH) at NIT Hamirpur and organized introductory Linux workshops for first-year students.
- Participated in training process at Drishti and delivered training sessions for employees on topics such as Model Driven Architecture, Service Oriented Architecture and Code Generation.

Languages

- English (Full Professional Proficiency), German (A1 Level), Hindi (Native).

References

[1] Markus Rempfler et al. "Cell Lineage Tracing in Lens-free Microscopy Videos". In: *MICCAI*. 2017.

[2] P. Haeusser, A. Mordvintsev, and D. Cremers. "Learning by Association - A versatile semi-supervised training method for neural networks". In: 2017.