NEWSLETTER
ROBERT BOSCH CENTRE FOR DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

Training program in Reinforcement Learning

RBCDSAI IITM

1ST QUARTER, 2020

RBCDSAI conducted a two-week Training program in Reinforcement Learning for 20 Defence Research and Development Organization Scientists. The first week Program was conducted from 11th to 16th November at DRDO office in IITMRP, Chennai. The second week program was conducted from 9th March 2020 to 14th March 2020 at RBCDSAI Seminar Hall.

The sessions were conducted by Prof.Ravindran, Prof.Rahul Marathe, Prof.Nandan Sudarsanam, Dr. Nirav P Bhatt, Prof.Kaushik Mitra and their Teaching Assistants.

The Topics covered during the training program ranging from Probability, Math foundations, Optimization, regression, multi arm bandits, full Reinforcement Learning, Deep Reinforcement Learning and case studies.

Technology Review Board Meeting

RBCDSAI Technology Review Board (TRB) met on 25th March 2020 over a video call and reviewed RBCDSAI Progress. Prof. Ravindran, Head of the centre, updated the on the progress, Programs and activities for the past six months. TRB applauded RBCDSAI and asked to carry on its good work.

Talks given by Visitors and Associate Researchers

Speaker: Dr. Thanh Thi Nguyen
Recent Advances of Deep Reinforcement Learning
25th February 2020 in the Turing hall at CSE Department, IITM

Deep learning has enabled traditional reinforcement learning methods to deal with high-dimensional problems. However, there have been several issues with deep reinforcement learning methods such as the limited exploration capability of learning agents, the ability to integrate human knowledge into learning agents or their extendibility to handle multi-objective problems as well as multi-agent control. In this talk, I will discuss these issues and present my recent studies on deep reinforcement learning to address these issues.

Speaker: Dr. Hemanth Kumar Tanneru
Data Science and Artificial Intelligence – Applications to the Oil and Gas Industry
08th January 2020 in RBCDSAI Seminar Hall, IITM

Industry 4.0 has led to the process industries to set the new targets for digitalization of the processes. Oil and Gas 4.0, the version of Industry 4.0 in the Oil and gas industry has the objectives of digitalization and intelligentization of the operations in the Oil and Gas industry. The data from the Oil and Gas industry falls under the category of big data since it has all the characteristics of big data. With the development of technologies for faster transfer of data and frameworks for the analysis of big data, the Oil and Gas industry started using Data analytics for its three main divisions which are upstream, midstream and downstream in the possible operations.

The talk is divided into two parts. The first part provides a very brief introduction of data science and focuses on introducing typical operations in the Oil and Gas industry. The second part provides an overview of applications of Data Science and AI in Oil and Gas industry applications and focuses on illustrating one detailed example in the applications.

Visitors Hosted by RBCDSAI

RBCDSAI hosted Dr. Thanh Thi Nguyen, Senior Lecturer, School of Information Technology, Deakin University, Victoria, Australia. Dr. Thanh was a Visiting Scholar with the Computer Science Department at Stanford University, California, USA in 2015 and the Edge Computing Lab, John A. Paulson School of Engineering and Applied Sciences, Harvard University, Massachusetts, USA in 2019. He received an Alfred Deakin Postdoctoral Research Fellowship in 2016, an European-Pacific Partnership for ICT Expert Exchange Program Award from European Commission in 2018, and an Australia–India Strategic Research Fund Early- and Mid-Career Fellowship Awarded by The Australian Academy of Science in 2020. He has expertise in various areas, including artificial intelligence, deep learning, deep reinforcement learning, cyber security, IoT, and data science.

As part of Associate Researcher Program RBCDSAI hosted

Dr. Resmi Suresh
Assistant Professor at IIT Guwahati, Department of Chemical Engineering from 17-12-2019 to 01-01-2020

Dr. Hemanth Kumar Tanneru
Assistant Professor at Indian Institute of Petroleum and Energy, Visakhapatnam from 20-12-2019 to 9-01-2020

Dr. Balaji Vasan Srinivasan
from 24-02-2020 to 25-02-2020. He is a Principal Scientist at Adobe Research, Bangalore.

Awards and Accolades

Prof. Balaraman Ravindran had been elected as a Senior Member of Association for the Advancement of Artificial Intelligence (AAAI) in recognition of his long-standing contributions to the field of Artificial Intelligence and membership in AAAI.

Dr. Harish Guruprasad and RBCDSAI Researcher Saurabh Desai got the best paper award at Winter Conference on Applications of Computer Vision (WACV) 1630-1715 Award Session (Salon A)

Title : Visual Explanations for Deep Convolutional Network via Gradient-free Localization

Abstract: In response to recent criticism of gradient-based visualization techniques, we propose a new methodology to generate visual explanations for deep Convolutional Neural Networks (CNN) - based models. Our approach – Ablation based Class Activation Mapping (Ablation CAM) uses ablation analysis to determine the importance (weights) of individual feature map units w.r.t. class. Further, this is used to produce a coarse localization map highlighting the important regions in the image for predicting the concept. Our objective and subjective evaluations show that this gradient free approach works better than state-of-the-art Grad-CAM technique.

Publications

1.   Sen, S., Ravindran, B. and Raghunathan, A. (2020) "EMPIR: Ensembles of Mixed Precision Deep Networks for Increased Robustness Against Adversarial Attacks". To appear in the Proceedings of the Eighth International Conference on Learning Representations (ICLR 2020).

2.   Mitra, A., Vijayan, P., Parthasarathy, S., and Ravindran, B. (2020) "A Unified Non-Negative Matrix Factorization Framework for Semi-Supervised Learning on Graphs". To appear in the Proceedings of SIAM International Conference on Data Mining (SDM 2020).

3.   Ganapathy, S., Venkataramani, S., Sriraman, G., Ravindran, B., and Raghunathan, A. (2020) "DyVEDeep: Dynamic Variable Effort Deep Neural Networks". To appear in the ACM Transactions of Embedded Computing Systems. ACM Press.

4.   Ghose, A., and Ravindran, B. (2020) "Interpretability with Accurate Small Models". In Frontiers in Artificial Intelligence, section Machine Learning and Artificial Intelligence, Vol 3, February 2020. DOI: 10.3389/frai.2020.00003.

5.   Kamarthi, H., Vijayan, P., Wilder, B., Ravindran, B., and Tambe, M. (2020) "Influence maximization in unknown social networks: Learning Policies for Effective Graph Sampling". To appear in the Proceedings of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2020).

6.   Santara, A., Madan, R., Mitra, P., and Ravindran, B. (2020) "ExTra: Transfer-guided Exploration". To appear in the Proceedings of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2020). (Extended Abstract).

7.   Saurabh desai, Harish Guruprasad Ramaswamy "Ablation-CAM: Visual Explanations for Deep Convolutional Network via Gradient-free Localization". The IEEE Winter Conference on Applications of Computer Vision (WACV), 2020, pp. 983-991

8.   Nandan Sudarsanam, Ramya Chandran Daniel D. Frey (2020) "Conducting Non-adaptive Experiments in a Live Setting: A Bayesian Approach to Determining Optimal Sample Size". Journal of Mechanical Design Volume 142, Issue 3.

9.   Sravan Mylavarapu, Mahtab Sandhu, Priyesh Vijayan, K Madhava Krishna, Balaraman Ravindran, Anoop Namboodiri, (2020) "Towards Accurate Vehicle Behaviour Classification with Multi-Relational Graph Convolutional Networks". To appear in the Proceedings of the 31st IEEE Intelligent Vehicles Symposium (IV 2020).

RBCDSAI funded the following dataset proposals

- Multi-city hyperlocal environmental monitoring using distributed low-cost sensor network. *Principal Investigator: Prof. Raghunathan Rengaswamy*
- Data driven monitoring of water distribution networks.
  Principal Investigator: Prof. Sridharakumar Narasimhan
- Synchronized Multi-scale and Multi-sensor Traffic Data from Indian Urban Roads. *Principal Investigator : Dr .Bhargava Rama Chilikuri*

RBCDSAI Research Travel Scholarship

- Pavan Ravi Shankar, M.S. Scholar and RBCDSAI Researcher has been awarded RBCDSAI Research Travel Scholarships - internship with Prof. Emma Brunskill at the Stanford University, from 1st March 2020 to 31st May 2020.

Collaborations

- Ministry of Statistics and Programme Implementation (MOSPI)- Capacity Building, Research & Development of Technologies, Committee Participation
- 108 Ambulance - consulting services for Data Analytics based performance Evaluation, Location, Dispatch and Routing of 108 Ambulances
- Google AI for Social Good – ARMMAN

Other activities

- The Campus Connect Session of Course on Certificate in Technology and Management (run by IIMB and RBCDSAI, IITM), for Batch 2 students conducted on 07th March 2020. Prof.Ravindran delivered lectures after that RBCDSAI arranged a visit to IITM Research Park for all the students.

- RBCDSAI Researchers attended the CoDS-COMAD 2020 conference held on Hyderabad from 05th -07th January 2020.

Reach Us

RBC DSAI
ROBERT BOSCH CENTRE FOR DATA SCIENCE
AND ARTIFICIAL INTELLIGENCE **IIT MADRAS**
5th floor, Block II, Bhupat and Jyoti Mehta School of Biosciences,
Indian Institute of Technology Madras, Chennai-600036

Scan to visit our website