

Hardik Meisheri

MACHINE LEARNING · DEEP LEARNING · REINFORCEMENT LEARNING · NATURAL LANGUAGE PROCESSING

Mumbai, Maharashtra, India

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“Change in perspective is worth 80 IQ points” - Alan Ray

Summary

I am currently working on Reinforcement Learning (RL) and its application over real-world problems, such as supply chain replenishment, cost to serve, etc. I am also looking to make RL algorithms more robust and sample efficient using predictive knowledge inculcation. I have worked in the Intersection of Natural Language and Deep Learning specifically for sentiment analysis. I have also dabbled in analyzing social media text from a statistical and behavioural perspective. My current research interests revolve around sample efficient RL, RL driven dialogue systems and generalization capabilities of RL agents.

Work Experience

Tata Consultancy Services Ltd. Planning and Control Research Area

Mumbai, Maharashtra

RESEARCHER

May. 2018 - Present

- **Technical Lead** - Team size 3
- **Supply Chain Optimization using Deep Reinforcement Learning** (6 Publications, 3 Patents filed)
 - Proposed architecture which can handle millions of stores and product combinations for computing real time decisions for two echelon SCM
 - Multi-agent framework to handle deterministic lead times among products
 - Integrated with native and ESL based simulator for wide scale adoption in multiple domain
 - Compared against currently SOTA algorithms and heuristics
- **Pommerman**- Multi-agent simulation game (3 Publication)
 - Proposed framework for Imitation followed by RL training paradigm with curriculum learning based on opponent difficulty
 - Achieved similar performance as learning systems with training time reduced by factor of 10
 - Introduction of safety actions to accelerate better learning strategies
 - Theoretical and model explainability analysis
- **Sample Efficient Reinforcement Learning** (1 Publication)
 - Developed a new methodology to augment any on-policy model free RL algorithm to improve its convergence and exploration characteristics
- **Preliminary Phase:** Reinforcement Learning driven dialogue systems, General Value functions, Action Embeddings

Tata Consultancy Services Ltd. Text Mining Research Area

Gurgaon, Haryana

RESEARCHER

Jul. 2016 - May. 2018

- **Sentiment Analysis of use generated noisy texts** (4 Publications)
 - Worked on Emotion intensity challenge (SemEval and WASSA), achieved 2^{nd} , 5^{th} rank among the participants across the world
 - Proposed an architecture inspired from Siamese network to handle OOV words and combine syntactic structure of twitter and English language
 - Developed multi-task learning framework to learn robust representations across the tasks
- **Predicting Stock Market movement based on different categories of news articles** (1 Publication, 1 Tutorial)
 - Introduced LSTM based methods to predict the movement of stocks in positive or negative directions over different time granularity
 - Proposed and extracted PESTEL features from news dataset for inculcating unstructured data with structured prediction
- **Predicting trends and behavioural analysis in social media space such as Twitter and Reddit** (2 Publications)
 - Analysed 2 year worth of data (all the posts and comments on reddit) to understand and characterize different user behaviours
 - Observed Bot like behaviours among users, Late bloomers in content/topics and mayfly-buzz characteristics for certain comments.

Dhirubhai Ambani Institute of Information and Communication Technology

Gandhinagar, Gujarat

TEACHING ASSISTANT

Aug. 2014 - May. 2016

- Designing Lab course structures
- Evaluating the students- Exams, quiz
- Supervising and conducting Labs

Programming Language, Python, R, Matlab

Deep Learning Frameworks, Tensorflow, Keras, Pytorch

Research Areas, Reinforcement Learning, Representation learning, Natural Language Processing, Sentiment Analysis

Research Problems, RL in POMDP, Multi-Task Learning, Dialogue Generation, Sentiment Intensity prediction, Sarcasm Detection, Social Media Analytics

Publications

JOURNAL

May 2021 **Scalable multi-product inventory control with lead time constraints using reinforcement learning**, Neural Computing and Applications *Springer*

BOOK CHAPTERS

Jan 2020 **Characterizing behavioral trends in a community driven discussion platform**, Putting Social Media and Networking Data in Practice for Education, Planning, Prediction and Recommendation *Springer*

CONFERENCES/WORKSHOPS

Feb 2022 **Follow your Nose: Using General Value Functions for Directed Exploration in Reinforcement Learning**, RL4Games workshop, AAAI 2022 *Virtual Event*

Jan 2022 **Identifying efficient curricula for RL in complex environments with a fixed computational budget**, IKDD CODS COMAD 2022 *Virtual Event*

Jul 2021 **FoLaR: Foggy Latent Representations for Reinforcement Learning with Partial Observability**, International Joint Conference on Neural Networks (Oral) *Virtual Event*

Dec 2020 **Sample Efficient Training in Multi-Agent Adversarial Games with Limited Teammate Communication**, Deep Reinforcement Learning Workshop, NeurIPS *Vancouver, Canada*

May 2020 **Using Reinforcement Learning for a Large Variable-Dimensional Inventory Management Problem**, Adaptive and Learning Agents Workshop, AAMAS *Auckland, New-Zealand*

Dec 2019 **Accelerating Training in Pommerman with Imitation and Reinforcement Learning**, Deep Reinforcement Learning Workshop, NeurIPS *Vancouver, Canada*

May 2019 **Actor Based Simulation for Closed Loop Control of Supply Chain using Reinforcement Learning**, International Conference on Autonomous Agents and MultiAgent Systems (AAMAS) *Montreal, Canada*

Dec 2018 **Air pollutant severity prediction using Bi-directional LSTM Network**, Workshop on Complex Methods for Data and Web Mining, Web Intelligence *Santiago, Chile*

Dec 2018 **Multi-Document Summarization using Distributed Bag-of-Words Model**, Workshop on Text Analysis and Retrieval, Web Intelligence *Santiago, Chile*

Oct 2018 **Learning representations for sentiment classification using Multi task framework**, Workshop on Computational Approaches to Subjectivity, Sentiment, and Social Media (WASSA), EMNLP *Brussels, Belgium*

Aug 2018 **Analyzing behavioral trends in community driven discussion platforms like Reddit**, International Conference on Advances in Social Networks Analysis and Mining *Barcelona, Spain*

Jun 2018 **Learning Robust Representations using Multi-Attention Architecture**, SemEval-2018, NAACL-HLT *New Orleans, USA*

Nov 2017 **Sentiment extraction from Consumer-generated noisy short texts**, SENTIRE, ICDM *New Orleans, USA*

Sep 2017 **A Deep Learning Approach to Sentiment Intensity Scoring of English Tweets**, Workshop on Computational Approaches to Subjectivity, Sentiment, and Social Media (WASSA), EMNLP *Copenhagen, Denmark*

Aug 2017 **Detecting, Quantifying and Assessing Impact of News Events on Indian Stock Indices**, International Conference on Web Intelligence (WI) *Leipzig, Germany*

Sep 2016 **Multiclass Common Spatial Pattern with Artifacts Removal Methodology for EEG Signals**, International Symposium on Computational and Business Intelligence *Olten, Switzerland*

Education

Dhirubhai Ambani Institute of Information and Communication Technology

M.TECH IN MACHINE INTELLIGENCE

- Mtech Thesis: Brain Computer Interface using Electroencephalogram
- GPA: 8.06/10

Gandhinagar, Gujarat

Aug. 2014 - May. 2016

Gujarat Technological University

B.E IN ELECTRONICS AND COMMUNICATION

- BE Thesis: Smart WheelChair
- GPA: 8.42/10

Rajkot, Gujarat

Jul. 2009 - May. 2013

Talks/Tutorials

Tutorial: Reinforcement Learning for Enterprise

JINDAL GLOBAL BUSINESS SCHOOL

- Tutorial covers, basic concepts of Reinforcement Learning paradigm. It covers the bird's eye view of where and why a certain class of decision making problem can be tackled with RL. In addition, application to industrial optimization and deep dive into supply chain optimization is also presented.

Sonipat, Haryana

Nov. 2020

Talk: Reinforcement Learning for Real World

DATAHACK SUMMIT - ANALYTICS VIDHYA

- What you need to think about, in order to use reinforcement learning in real life. Basic concepts of RL and what makes it suitable for sequential decision making. Brief introduction of the application of RL on real-life problems and not gaming environments.
- Walk through over the code of applying RL over simple use case, such as solving the online 3D bin packing problem (solving for where each upcoming parcel should be placed, for maximum packing efficiency). The major focus would be on designing architecture, training paradigm and structuring experiments.

Bangalore, Karnataka

Nov. 2019

Tutorial: Predictive Analytics using Structured and Unstructured Data

INTERNATIONAL CONFERENCE ON WEB INTELLIGENCE (WI)

- This tutorial covers how business-critical information extracted from unstructured documents can be merged with information flowing in from structured sources. This combined information then can be used within a predictive modelling framework to predict future events or forecast values of critical variables that are business performance indicators.

Leipzig, Germany

Aug. 2017

Honors & Awards

INTERNATIONAL

- 2016 **Best Paper Award**, Paper titled "Multiclass common spatial pattern with artifacts removal methodology for EEG signals", won best paper award at ISCBi conference.

Olten, Switzerland

DOMESTIC

- 2015 **Among Top 11 innovations in India**, Bharatiya Vighyan Samelan, Govt. of Goa
- 2014 **Among Top 24 projects in India**, Economics Times Now

Goa, India

India

Professional Activities

Reviewer

- IEEE access, IEEE International Conference on Multimedia and Expo (ICME), IEEE Transactions on Systems, Man, and Cybernetics: Systems, ACL

ACM DAICT Student Chapter

CHAIR-PERSON

- Organized Summer Schools and Conferences
- Outreach programs for women in rural areas about basic IT knowledge

Gandhinagar, Gujarat

Aug. 2015 - May. 2016