Rocktim Jyoti Das

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Education

Indian Institute of Technology Delhi *2018 - 2022*
B.Tech in Electrical Engineering with Minor in Computer Science and Engineering
GPA: 8.552/10 ; Thesis Advisors: Prof. Sandeep Kumar & Prof. Jaya Deva

Publications

Recent Submissions

* - equal contribution

2. **Exploring Distributional Shifts in Large Language Models for Code Analysis**
   Shushan Arakelyan, **Rocktim Jyoti Das**, Yi Mao, Xiang Ren.
   Under review in ACL ARR April Cycle.
   (reviewer rating 3.5, 3.5 and 2).

1. **DKAF: KB Arbitration for Learning Task-Oriented Dialog Systems with Dialog-KB Inconsistencies**
   Vishal Saley, **Rocktim Jyoti Das**, Dinesh Raghu, Mausam.
   Accepted in ACL Findings, 2023.

Theses

1. **Scalable Training of Graph Neural Network via Graph Coarsening**.
   Rocktim Jyoti Das*, Aditi Khandelwal* and Sandeep Kumar.
   Undergraduate Thesis, Electrical Engineering, IIT Delhi, 2021 - 22.
   *(Received **Rajiv Bambawale Cash Prize Award, 2021-22** for best Btech Thesis.)*

Research Projects

Dialog Dataset for Medical Diagnosis *Dec 2022 - Ongoing*
Advisor: Prof. Mausam, *IIT Delhi, India*

- One of the primary challenges of conversation-based medical diagnosis is the **lack of a high-quality medical conversations dataset** in the public domain, and we are trying to propose a dialog dataset with high-quality expert annotations.
- We plan to propose a baseline model and identify the existing challenges.

Learning end-to-end TOD Systems with Dialogue-Knowledge Inconsistencies *June 2022 - Dec 2022*
Advisor: Prof. Mausam, *IIT Delhi, India*

- Studied how end-to-end task-oriented dialogue (TOD) agents are affected when training dialogues and associated knowledge-base (KB) are collected at different points in time thus are inconsistent.
- Experiments showed that **dialogue-KB inconsistencies** result in degradation in performance for TOD agents.
- Due to the lack of supervised training data, we propose an **RL-based KB correction pipeline** consisting of relation extraction, latent entity linking, and entry removal models that updates the KB based on the dialogue context.

Graph Coarsening with Hashing and Scalable training of Graph Neural Network *Aug 2021 - June 2022*
Advisor: Prof. Sandeep Kumar & Prof. Jaya Deva, *IIT Delhi, India*

- A novel **feature-based Graph Coarsening Algorithm** is proposed with better time complexity.
- Proposed Algorithm is able to **preserve the spectral properties** of the original graph as good as the existing algorithms.
- A framework is designed for **scalable training of Graph Neural Networks** using Graph Coarsening.

Pixel-Contrastive Semi-Supervised Segmentation *May 2021 - July 2021*
Advisor: Prof. Prathosh AP, *IISc, India*

- Developed a model for the **semantic segmentation of images** in a semi-supervised setting to solve the problem of the absence of labeled data which is enhanced by expensive annotation for segmentation.
- Developed a **pixel-level class-wise contrastive loss** to obtain better pixel embeddings.

Course Projects

Google's Chaii- Hindi and Tamil Question Answering Competition *Sept, 2021 - Nov, 2021*
Course Instructor: Prof. Mausam, *IIT Delhi, India*

- Worked on the **Chaii-Hindi and Tamil Question Answering** dataset released by Google Research India.
- Achieved top 5 score in the class (**0.736 percent jaccard score**) on the test dataset using **XLM-Roberta** pretrained model, **Hindi Corpus of MLQA dataset** and **5-fold model ensembling**.

Robot State Estimation *March 2021 - April 2021*
Course Instructor: Prof. Rohan Paul, *IIT Delhi, India*

- Objective was to localize an **aerial vehicle** flying at a constant height in a **simulated environment**.
- Devised algorithm for estimating the position of **multiple agents** as an **extension to Kalman Filtering**.

MDP and Q-learning Agent *April 2021 - May 2021*
Course Instructor: Prof. Rohan Paul, *IIT Delhi, India*

Objective was to find to navigation policy for a mobile robot navigating in a complex grid world to reach a predefined goal position using **Value Iteration**, **Q-learning**, and **SARSA algorithm**.

Work Experience

Data Analytics and Intelligence Research Group, IIT Delhi & IBM Research, India *June, 2022 - June, 2023*
Project Scientist
Advisor: Prof. Mausam
Studying the setting of **recommending first-response services in Medical domain** (doctors, hospitals, first-aids, testing facilities, etc.) to the users through dialogues. The setting is challenging primarily due to the **lack of a high-quality medical conversations dataset** in the public domain, and the agent must perform complex reasoning to pinpoint the source of user discomfort.

Intelligence and Knowledge Discovery (INK) Lab, USC & Microsoft Research *Aug, 2022 - June, 2023*
Machine Learning Research Intern (Remote)
Advisor: Prof. Xiang Ren
Studying the **distributional shift** in Large Language Models for programming languages like **CodeT5** and **Copilot**. For this, we are trying to establish definitions of domains for programming language and conducting experiments to find how effective existing **few-shot learning methods** are for cross-domain generalization.

Video Analytics Laboratory, Indian Institute of Science, Bangalore *Jan - April, 2022*
Research Intern
Advisor: Prof. Ram Venkatesh Babu
Explored **transfer and few-shot learning capability** of state-of-the-art **object detection** and **image segmentation models** for low visibility conditions and tried to improve them.

Teaching Experience

- *Undergraduate Teaching Assistantship:* Electrical Engineering, IIT Delhi
  - Physical Electronics - *Prof. Debanjan Bhowmik* *Fall 2021*
  - Advanced Machine Learning - *Prof. Sandeep Kumar & Prof. Jaydeva* *Spring 2022*
  - Natural Language Processing - *Prof. Mausam* *Fall 2022*
- *Reviewing:* ACL ARR December, 2022

Skills

- **Programming:** C++, MATLAB, Python and LaTeX
- **Framework:** PyTorch, PyTorch Geometric, TensorFlow, Pandas, NumPy

Selected Coursework

Introduction to Machine Learning, Probability and Stochastic Processes, Convex Optimization, Fundamentals of Language Sciences, Natural Language Processing, Planning and Estimation for Autonomous Systems, Analysis and Design of Algorithm, Discrete Mathematics.

References

- Dr. Mausam, Professor, Computer Science and Engineering Department, IIT, Delhi, Email: mausam@cs.washington.edu.
- Dr. Xiang Ren, Assistant Professor, Department of Computer Science, USC, LA, California, Email: xiangren@usc.edu.