Piyush Chawla

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Deep Learning, Machine Learning

Education (The Ohio State University, Columbus OH)

Research: Applied Machine Learning, Interpretability, Natural Language Proc **GPA: 3.98/4.0**
*Master of Science, Computer Science Engineering (**Transferred from Ph.D.**)* **Aug 2018 - Present**

Technical Skills

Programming Python, Pytorch, JavaScript, Java, C, C++, Git, Version Control, Scikit learn, SciPy, Gensim, SQL
Key Courses Machine Learning, NLProc, Data Mining, Optimization, High Performance (Distributed) Deep Learning

Research/Work Experience

PhD Student, The Ohio State University, Columbus, OH **Aug18 - Now**
- GRAVITY Lab (Dr. Prof. Han-Wei Shen)
- Graduate Teaching Assistant

Research Scientist Intern, Bosch Research, Sunnyvale, California **May - Aug 22**
Project: Explainable Graph Similarity for Workflow Graphs
- Developed Explainable AI solution for the problem of Graph Similarity.
- Leveraged Self Supervised Learning (SSL) to learn Graph Matching (Node-level).
- Result: Proposed novel SSL pretext tasks and ML framework to push limits of Graph XAI.
- Result: Filed research patent for the idea.

Research Intern, IBM Almaden, San Jose, California **May - Aug 21**
Project: Log Anomaly Detection
- Generated a large-scale dataset from publicly available GitHub repositories.
- Designed downstream tasks to gauge the quality of the log dataset.
- Trained language models Doc2Vec and RoBERTa for log anomaly detection tasks.
- Result: Plugged-in these language models into IBM's proprietary log anomaly detection pipeline.

Research Assistant, Smart Data Analytics, Bonn-Germany **Dec 17 – July 18**
Bachelor's Thesis: Link prediction in Multi-Lingual Knowledge Graphs (Python, TensorFlow)
- Leveraged interlanguage links (e.g., English-German) in DBpedia knowledge graph to train KG embeddings.
- Implemented the mTransE model to improve link prediction accuracy.
- Result: Developed a model (NLTransE) to add semantic knowledge from word embeddings to KG embeddings.

Intern (Research Scholar), University of Bonn DAAD WISE (1 of 100 all-over India) **May – Jul 17**
Project: Knowledge graph completion using latent vector models (Python, TensorFlow, C++)
- Explored different latent-vector models for KG link prediction. TransE, TransR, TransH, DistMult etc.
- Result: Conducted large-scale experiments on DBpedia Knowledge Base to train KG completion models.

Key Projects

GNN for Merge Tree Similarity in Scientific Data *(Python, Pytorch)* **Fall 2022 - Now**
- Working to develop novel graph neural network strategies for merge tree data.

Pattern Recognition in Academic Publications *(Python, Pytorch, D3, JavaScript)* **Spring 2022**
- Clustering of text document is commonly used in pattern recognition but explaining clusters is a challenge.
- Proposed a novel clustering approach in topic model latent space using Mixture of Gaussians.
- Result: A novel visualization system to discover temporal trends in documents. (Publication Under Review)

Probing Static Word Embeddings for Relational Information *(Python, Pytorch)* **Spring 2021**
- Relation induction has been used to uncover relational information in static word embeddings.
- The existing works focus on linear models and only consider vector offset as the feature.
- We developed MLP based non-linear probes and found that features like vector product and sum contain

significant amounts of information.
- Findings: Publicly available GloVe embeddings contain richer information than Skipgram.
- As an extension, we train models in meta learning setting (MAML, Reptile), improving the few-shot prediction.

Understanding Convolutional Neural Networks for text *(D3, JavaScript, Python, Flask)* **Spring 2020**
- ConvNet visualization (explanation) has been explored for computer vision. However, understanding this class of architecture remains an open problem in the context of natural language (text) applications.
- Result: Developed a novel approach (Token-wise Sentiment Detection) to visualize the contribution (+ve/-ve) of each word in a sentence towards the predicted label (sentiment).
- Result: Discussed adversarial and error analysis strategies for ConvNet-based sentiment-analysis classifiers.

Finished Publications

- Piyush Chawla, S. Hazarika, HW Shen (2020) Token-wise sentiment decomposition for ConvNet: Visualizing a sentiment classifier. PacificVis 2020
- Piyush Chawla, D. Esteves, K. Pujar, J. Lehmann (2019) SimpleLSTM: A Deep-Learning Approach to Simple-Claims Classification. EPIA-2019
- D. Esteves, J. Marcelin, Piyush Chawla, A. Fischer, J. Lehmann (2021) HORUS-NER: A Multimodal Named Entity Recognition Framework for Noisy Data. IDA 2021
- D. Esteves, A. J. Reddy, Piyush Chawla and J. Lehmann (2018) Belittling the Source: Trustworthiness Indicators to Obfuscate Fake News on the Web. EMNLP 2018

Awards and Achievements

- University Fellowship, The Ohio State University - 2018-2019
- Bachelor's Thesis Scholarship, BITS Pilani - 2017-2018
- Thesis Research Scholarship, University of Bonn - 2017-2018
- WISE scholarship, Deutscher Akademischer Austauschdienst (DAAD WISE) - Summer 2017
- Merit scholarship, BITS Pilani

Professional Service

Secondary Reviewer

IEEE TKDE 2019, KDD 2020, IEEE VAST, ACL 2021, ISVC 2021