Ajay Krishna Vajjala

akrish@gmu.edu | profile.ajaykv.com | linkedin.com/in/ajay-kv | github.com/ajaykv1 | (703) 303-4282

Education

- **PhD in Computer Science** — Aug 2021 - Present
  George Mason University - Advised by Dr. David S. Rosenblum — *Fairfax, VA*
- **B.S. & M.S. in Computer Science** — Aug 2017 - Dec 2021
  George Mason University — *Fairfax, VA*

Publications

- **A. Krishna Vajjala**, D. Meher, S. Pothagoni, Z. Zhu, and D. Rosenblum. "Vietoris-Rips Complex: A New Direction for Cross-Domain Cold-Start Recommendation." In Proceedings of the *SIAM International Conference on Data Mining* (SDM 2024), Houston, TX, U.S. 18th-20th April, 2024. **(In Review)**
- **A. Krishna Vajjala**, Ar. Krishna Vajjala, Z. Zhu, and D. Rosenblum. "Analyzing the Impact of Domain Similarity: A New Perspective in Cross-Domain Recommendation." In Proceedings of the 46th ACM *European Conference on Information Retrieval* (ECIR 2024), Glasgow, Scotland 24th-28th March, 2024. **(In Review)**

Research Experience

- **Graduate Research Assistant** — May 2022 - Present
  George Mason University — *Fairfax, VA*
  - **(*Research Project*) Vietoris-Rips Complex for Cross-Domain Cold-Start Recommendation**
    - Leveraged the *Rips Complex*, from computational geometry, and *deep learning* to transfer user preferences across domains, resulting in new user profiles for personalized recommendations.
    - Achieved a *performance increase of over 20%* in extreme cold-start scenarios, surpassing leading methods.
    - Employed *5-fold cross-validation* for hyperparameter tuning to improve model performance on unseen data.
    - Utilized *Python* and *Tensorflow 2.0* for algorithm development, executing computations on the *Nvidia A100 GPU*.
  - **(*Research Project*) Domain Similarity for Cross-Domain Recommender Systems**
    - Used *Python*, *GloVe pre-trained embeddings*, and *BERT* from *NLP* to develop domain similarity metrics.
    - Developed baseline cross-domain recommendation algorithms using the open-source *Recbole-CDR library* and conducted a comprehensive evaluation across *18 domain combinations* with three leading cross-domain algorithms.
    - Findings indicated recommendation performance wasn't significantly affected by domain combinations, using a *paired t-test*.
    - Accelerated all computations and experiments on the high-performance *Nvidia A100 GPU*.
  - **(*Research Project*) Conditional Generative Adversarial Networks for Cross-Domain Recommender Systems**
    - Used *Python*, *TensorFlow*, and *Nvidia A100 GPU* to develop a cross-domain recommender with a *conditional GAN*.
    - Synthetically generated target domain item embeddings, integrating them with source domain information.
    - Integrated synthesized target domain embeddings with pre-learned user embeddings for personalized recommendations.
    - Implemented various *state-of-the-art cross-domain recommendation algorithms* for comprehensive experimentation, and showed our model achieves a preliminary *5% performance increase* over existing baselines.
- **NSF National Research Trainee Fellow** — May 2021 - May 2022
  George Mason University - Center of Adaptive Systems of Brain and Body Interaction — *Fairfax, VA*
  - **(*Research Project*) Reentry and Corrections**
    - Led an interdisciplinary team to develop a web application for incarcerated individuals to access reentry services information.
    - Managed web application development with *React* (front-end), *Node/Express* (back-end), and *MySQL* (database).
    - Initiated and *led pivotal partnership discussions* with both the Director of DC Jail and the Vice President of American Prison Data Systems (APDS). This collaboration aims to trial the app on APDS tablets, with a *planned 2024 launch*.

Personal Projects

- **GitChat**
  - Developed a *GPT-4* powered tool letting developers ask questions and query their *GitHub repository* for code insights.
  - Built using *Python*, and integrated the *OpenAI API*, *DeepLake Vector Store*, and *Langchain* for enhanced querying.
  - Offered developers a user-friendly command line tool to easily ask, understand, and clarify doubts directly within their codebase.
- **Amazon User Review Sentiment Analysis**
  - Leveraged *BERT pre-trained embeddings*, a transformer-based *NLP* technique, to fetch embeddings for product reviews.
  - Represented each review as an average of its word embeddings and used K-Nearest Neighbors (*KNN*) to predict sentiment.
  - Achieved *80% accuracy* in predicting sentiment of product reviews using the BERT and KNN approach.

Skills Summary

- **Languages:** Python, Java, PySpark, React, Node, Express, SQL
- **Tools:** Tensorflow, Scikit-Learn, RecBole, GIT