Ajay Krishna Vajjala

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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*

Research Interests

- I am passionate about advancing the field of recommender systems by developing and improving cross-domain and context-aware techniques, utilizing machine learning and deep learning approaches to provide more personalized and effective recommendations.

Experience

- **Graduate Research Assistant** — Fairfax, VA
  George Mason University — *May 2022 - Current*
  - **Domain Distance for Cross-Domain Recommender Systems**
    - Developed novel metrics for cross-domain recommenders using GloVe pre-trained embeddings from natural language processing to quantify similarity between domains.
    - First metric takes a weighted average of domain embeddings to compute similarity, while the second metric uses item-level similarities between domains.
    - Demonstrated through evaluation that state-of-the-art models do not perform significantly better when using more similar domain combinations compared to using less similar domain combinations.
    - Paper submitted to the ACM SIGKDD Conference on Knowledge Discovery and Data Mining, and currently under review.
  - **Conditional Generative Adversarial Networks (cGAN) for Cross-Domain Recommender Systems**
    - Developed a cross-domain recommender system using a conditional GAN in TensorFlow.
    - Generated synthetic target domain item embeddings infused with source domain information.
    - Created a conditional variable for the cGAN by taking a weighted average of source domain item embeddings based on their similarity to the target domain item.
    - Used the generated target domain item embeddings along with previously learned user embeddings to make recommendations in the target domain.
    - Ongoing project focused on effective transfer of knowledge between domains for improved recommendations.
- **NSF National Research Trainee Fellow** — Fairfax, VA
  George Mason University - Center of Adaptive Systems of Brain and Body Interaction — *May 2021 - May 2022*
  - Led an interdisciplinary team in a research project to develop a web application for incarcerated individuals to access reentry and social services information upon release from jail.
  - Managed the development of the web application, which utilizes React for front-end, Node with Express for back-end, and MySQL for the database.
  - Partnered with American Prison Data Systems (APDS) and DC Jail to pilot the application on APDS tablets with a target launch in 2023.
  - Successfully managed the development of the project and collaborated with experts in criminal justice and computer science to ensure high-quality results.

Academic Projects

- **Movie Recommender System**
  - Developed a Recommender System using deep neural networks and utilized TensorFlow for implementation.
  - Learned user and item embeddings and fed the concatenated embeddings as input through multiple deep layers.
  - Achieved a high rating prediction accuracy of roughly 90% on the Movielens dataset.
- **Amazon User Review Sentiment Analysis**
  - Applied Word2Vec, a Natural Language Processing technique, to generate word embeddings for each word in 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 Word2Vec and KNN approach.
- **Single Sign-On Google OAuth 2.0 Implementation**
  - Developed a web app using Google OAuth authentication with React frontend, Express backend with Node, and MongoDB.
  - Verified user JWT tokens with Google OAuth library on backend and created sessions upon login.
  - Enhanced user engagement by providing guest login option and added protected routes for authenticated users.

Skills Summary

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