

# Venkata Sai Kumar Gottumukkala

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## EDUCATION

### University of California, Riverside

Riverside, CA

*Master of Science in Computer Science; CGPA - 3.81/4.0*

*Sept. 2022 – Mar 2024*

### Manipal Institute of Technology, Manipal

India

*BTech in Electronics & Communication Engineering*

*Aug. 2017 – May 2021*

## PROJECTS

### Web Search Engine

Jan 2024 - Mar 2024

- Developed a web search engine for gym fitness and calisthenics enthusiasts. This search engine is capable of not only retrieving sports information efficiently and accurately, but also clustering relevant topics/articles, which improves the user experience. I have crawled 2GB MB of data using Scrapy and REST API.
- Used PyLucene to construct an optimized index on 500MB relevant data. Now, when a user searches for a topic, I use the built index to find relevant pages linked to the user query and display them based on the BM25 similarity score. Built a dynamic frontend UI using ReactJS to interact with search engine.
- For the second indexing technique, I used BERT to construct embeddings for the relevant 500MB pre-processed data, which I then utilized to create an index based on the embeddings with faiss. Now, whenever a user queries, I construct the query embeddings, compare them to the data embeddings, and obtain the top-10 relevant data based on cosine similarity.

### Spatial Analysis for Hazard-Free Navigation

Oct 2023 - Dec 2023

- Developed and built a web application to discover the safest routes through urban regions, combining real-time crime statistics from dataset of 878,049 data entries with traditional navigation systems.
- Developed and optimized algorithms such as Dijkstra and A\* within a NetworkX framework to determine the safest and quickest paths, thereby eliminating the clustered 200 crime hotspots from routing calculations. OSMnx was used for geographical data modification and route visualization.
- Engineered a user-friendly interface based on the Flask framework, with an interactive map that shows both the recommended safe route and identified crime hotspots.

### Topic Modeling

Apr 2023 - Jun 2023

- Analyzed different topic modeling models for research paper abstracts using the prominent methods: TF-IDF, BERT, LDA, BERT+LDA. The BERTopic model performed well in terms of coherence(0.651) and silhouette scores(0.520), indicating strong semantic similarity among words in the topics, and well-separated topic clusters.
- We observed that BERT+LDA model performed the best in labelling the research papers. Now, this pre-trained model can also be used for all the topic modeling downstream tasks accurately. These models are very useful to for effective storing and retrievals of large file systems.

### Uncertainty and Vision

Apr 2023 - Jun 2023

- Achieved 79.12% model accuracy in image segmentation tasks by adjusting hyper-parameters like learning rate and training epoch. Demonstrated skill in pre-processing images and labels to increase model performance, having a strong background in computer vision and deep learning methodologies.
- Combining dropout, L2 regularization, and temperature scaling improved model dependability and reduced Expected Calibration Errors (ECE) to 0.0468. This suggests a significant reduction in model overconfidence. This highlights the potential to optimize neural network designs for better confidence calibration in predictions.

## SKILLS

**Programming Languages:** Python, C, C++, Java, SQL, JavaScript, HTML, CSS

**Technologies/framework:** Visual Studio Code, Vim, Git, ReactJS, REST APIs, Tableau, Power BI, Numpy, Matplotlib

**Course Work:** Artificial Intelligence (AI), Data Mining Techniques, Database Management Systems, Deep Learning, Fundamentals of Machine Learning, Machine Learning (ML), Information Retrieval, Scientific Computing, Operating Systems, Computer Architecture, Data Structures and Algorithms, Data Analysis Methods.

## OTHER EXPERIENCE

- Designed machine learning approaches using Large Language Models (LLMs), deep learning frameworks, and libraries (PyTorch, TensorFlow). Transfer learning algorithms, effective regularizers, and data augmentation procedures were used to achieve state-of-the-art model accuracies for a variety of NLP and computer vision applications.
- Completed the Deep Learning Specialization course offered by DeepLearning.ai on coursera.