USPTO Technical Drawing Search Engine

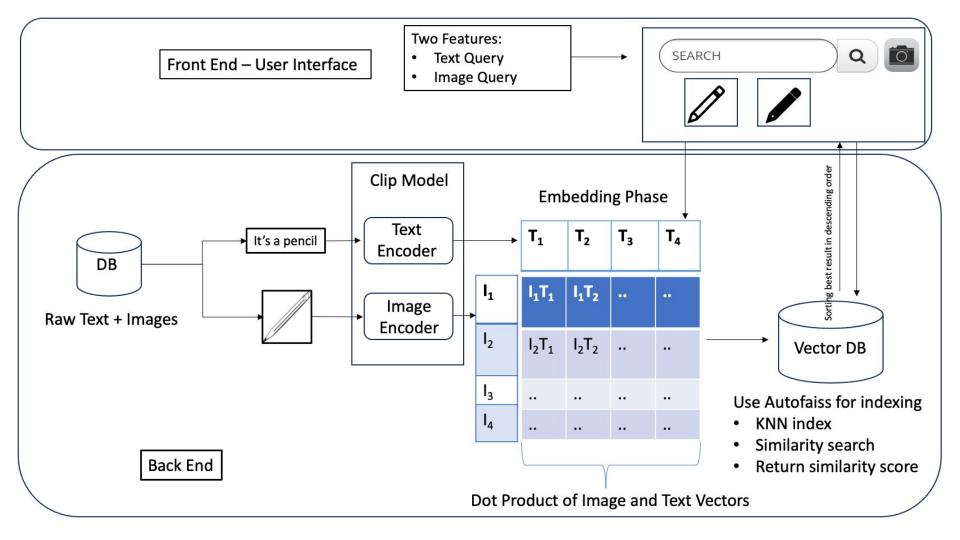
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Introduction

- I am from Dhaka, Bangladesh
- Bachelor of Science in Computer Engineering
 - Graduated from Elizabethtown College, PA, USA 2018
 - On Campus Jobs: (a) Grader (b) Database Assistant (c) International Leadership Assistant
 - Summer Research Data Analytics
- Worked with Resource 9 Group a New York based start-up
 - Application Performance Engineer (Specialized on AppDynamics)
 - Contractor John Deere
- Joined Old Dominion University as a Ph.D. student in Fall 2019.
 - Advisor: Dr. Jian Wu
 - Our research lab is known as LAMP-SYS (Lab for Applied Machine Learning and Natural Language Processing and Systems)
 - We are also collaborating with WSDL lab (Web Science and Digital Libraries, ODU)
 - Two Summer Internships:
 - Research Intern Los Alamos National Laboratory, New Mexico 2020
 - Machine Learning Intern Bihrle Applied Research Inc, VA 2021

Building Search Engine

- Dataset: DeepPatent3 contains 50,000 technical drawings
- We have two tasks
 - Front End is a user interface (UI) that will connect to the database
 - Mostly focusing on the design aspects of the website
 - Connect to database so that it can return search results
 - Features: a **search bar** which will allow users to query through text and image
 - Example: <u>LAION-5B Search Demo</u>
 - We plan to use <u>Diango</u> a python framework to build the UI
 - Back End focuses on the server-side application which you can not see in the UI
 - We will use Deep Learning based model (<u>OpenAl's Clip Model</u>) to embed text and image into vectors
 - Store these vectors in the database (vector database)
 - <u>Autofaiss</u> to create a KNN index for retrieval
 - Returns a best score using a similarity search algorithm (e.g., <u>cosine similarity</u>)
 - Sorting the score in descending order to return the result of the user's query



Tools / Technologies and Frameworks

- Version Control and Code Sharing: <u>GitHub</u>
- Al model: Clip model (pre-trained model for embeddings)
- Indexing tools: Autofaiss
- Framework: Django for front end
- HPC Cluster: Wahab Cluster
 - Jupyter Notebook
- Database: ES, MySQL, MongoDB (options)
- Tutorials:
 - Django W3 Schools: https://www.w3schools.com/django/
 - o Django Official Website: https://docs.djangoproject.com/en/4.2/
 - o Clip Model: https://github.com/openai/CLIP
 - Autofaiss: https://github.com/criteo/autofaiss
 - o GitHub Installation: https://www.pluralsight.com/guides/using-git-and-github-on-windows (however, first open an account into GitHub)