USPTO Technical Drawing Search Engine
May 2023 – August 2023

Please read the instructions carefully:

- This is a tentative weekly plan. Any changes in the plan will be notified at least 1 week before.
- Meeting link with Muntabir (mentor): https://odu.zoom.us/j/2634818308 (please do not share with anyone).
- We are dividing this project in milestones. Most likely there will be three milestones.
- After each week, on Monday we will have meeting where you will report your progress. (it is subject to change).
- Students are responsible to set up a meeting with the mentor to resolve any technical issues. They should inform the mentor as quickly as possible.
- Students are responsible to let the mentor know in advanced if they have final exams/quizzes/projects in school which will prevent them to work on this project for a particular week. The mentor will change the plan accordingly.
- There will be a deadline for completing each milestone. There will be two report day after milestone 2 & 3.
- The highlighted text are the important announcement, recommendation, and deadline.

Please find the weekly plans below to complete this project on time.

Week – 1 (May 22 – May 28)

1) Learn GitHub (installation of Git, how to use git commands).
2) Learn Django.

Week – 2 (May 29 – June 4)

3) Report on Monday meeting of your progress on Git and Django
4) System Preparation
    a. Setup and installation of necessary software packages to High Performance Computing clusters (HPC) such as CLIP to Wahab.
    b. Learn Linux basics.
    c. How to perform 'ssh' to servers from windows (e.g., computing servers (Terra), database server (Hawking) and file systems (Giaconni)) and use HPC cluster – mentor will assist.

Week 3 & 4 (June 5 – June 18)

5) Task specific:
   June 5 – June 11
    a. For Alyssa but also this task is recommended to Andrew to Learn:
    b. Topic: Data Preprocessing and Embeddings
        i. Learn what is multi-modal (e.g., Clip model).

ii. Learn how to load the dataset, pre-process the data (e.g., removing punctuations / rescaling the images) using ClipProcessor.
iii. Learn how to perform tokenization using ClipTokenizer.
iv. How to use Clip model to perform Text and Image embeddings
v. Learn how to save embeddings in a binary file (.npy).
vi. Practice on your own using the Wahab Cluster.

June 12 – June 18

c. For Andrew but also this task is recommended to Alyssa to Learn:
d. Topic: Django and Database
    i. Now that you know basics about Django, using Terra Web server to see if you can use Django.
    ii. Learn how to create table in the MySQL database. For example, learn how to use CREATE, UPDATE, INSERT, DELETE using the dataset that the mentor provided.
    iii. How to connect Django with the table in the database (Giaconni) that you created in the previous step to retrieve information to show the search results.
    iv. Learn how to use CSS (cascading style sheets) using Django.
    v. Practice on your own using the Servers.

Week – 5 & 6 (June 19 – July 2)

6) The mentor will be out for conference from June 25 to June 30. So, there will be no meetings on June 26.
7) Students will be working on their first milestone.
8) Milestone – 1
    a. Alyssa: use Clip Model to embed text and images and save the embeddings in binary file (.npy) and store the embeddings in the same metadata file by creating a new column using pandas dataframe.
    b. Andrew: use Django to create the UI, connect it to the database, and show some results in UI.
9) Deadline: Each student should finish their work on Week 6: July 2nd.

Week – 7, 8, 9 & 10 (July 3 – July 30)

- At this stage, we will have vector embeddings. In this week, you should spend time learning how to perform indexing (KNN), similarity search using Cosine Similarity Algorithm, and return a similarity score. (Week 7: July 3 – July 9).
- We will be learning how to perform indexing and analyze the result.
- Both Alyssa and Andrew need to learn as they will co-ordinate with each other on this task.
- Milestone – 2: Creating a Vector Database. (Week 8, 9 & 10: July 10 – July 30)
    - Alyssa will be responsible to write a function which will load the embeddings text and image, use Autofaiss for KNN indexing, and perform Cosine Similarity to generate similarity search: text-to-image and image-to-text.

- Finally, Alyssa will analyze the return output and co-ordinate with Andrew and provide him the return output (e.g., list of images, list of captions, axis, similarity score, etc.) for creating the Vector Database.
- Andrew will be responsible to create a Vector Storage/Database in the MySQL database where the return output of Autofaiss will be stored.
- Report day: Each student will report their progress on Week 9: July 24.
- Deadline: Each student should finish their work on Week 10: July 30th.

Week – 11, 12 & 13 (July 31st – August 20th)

- At this stage, the similarity search should be working properly, and vector database should be established.
- Now, both Alyssa and Andrew will co-ordinate to each other how to show the user query to the search engine.
- Milestone – 3: Search Engine Demo
  - At this stage, Andrew & Alyssa will be responsible for writing a function that will connect the UI to Vector database.
  - Once the user put a query in form of text or image, the UI should query against the Vector database, and return the result.
  - Report day: Student will report their progress on Week 12: August 7.
  - Deadline: Both students should finish building search engine by Week 13: August 20.