EE P 5OO D: LLMs and ChatGPT || Mini-Project

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Mini Project Guidelines

1. **Team:** Work in pairs of two. Each member of the team contributes to every part/deliverable of the mini-project - But together you can work on finding the best solutions. Please form your team and add it to the spreadsheet here: Team Assignment Spreadsheet
2. **Coding:** Please submit all your python code for each of the deliverables for full credit
3. **Presentation:** Mini-project presentations will happen on last day of course (Nov 19) and each team gets about 6 minutes to present + 2 minutes of questions.
4. **Demo Page:** Your presentation should include a demo webpage corresponding to deliverable 1 and deliverable 3 plus a YouTube video for deliverable 2. Details of the demo expectations are outlined in the sections below.
5. **Due Date:** Your mini-project is due Sunday, Nov 19 at 8 am pst.

MiniProject Outline - Text2Image and Image2Text Demos

Given the interest of our group in working with both text data and image data - We have changed the mini-project to use both the OpenAI text API and also the image2text API. The mini-project will consist of 3 related but separate deliverables which you can work on with your project partner.

1. **Flower Identifier:** The first deliverable is a simple image upload to a page and identify the type of flower.
2. **Flower Chinese Whispers:** The second deliverable involves creating a fun video that shows how `image2text` and `text2image` APIs can have some "lost in translation" changes that can be explored through this exercise.
3. **Flower Hopper:** The third deliverable involves finding a path between an origin flower and destination flower and uses OpenAI APIs along with graph algorithms to hop from one flower to the next.

More details on each of these deliverables and breakdown of steps are shared on the next few slides.

Mini-Project Deliverable Details

Flower Identifier (Deliverable 1)

Design and build a **working webpage** (can be a local page running from your laptop to begin with) where you can upload an image of a flower and a) It identifies the name of the flower b) It shares 3 other species of flowers that are close to the input flower along with its images
To do this - You can work through the following steps:

1. Query ChatGPT for the names of 100 distinct species of flowers and store this in a file
2. Write a function in python that, given an input species of flower - Find it's **k nearest neighbors** from the remaining 99 species of flowers you identified in the previous step
3. Build a webpage that has a search bar that takes in as input an image of a flower and outputs the species of the flower
4. Also outputs the 3 nearest species of flowers to the input flower as an image row on the webpage

Mini-Project Deliverable Details

Flower Chinese Whispers (Deliverable 2)

In this deliverable, you will mimick a `Chinese Whispers game` by using two APIs/modules in sequence and repeating the process a certain number of times. Let's say you begin the game with uploading an image of a flower. An `image2text` module (e.g. image captioning) converts it into a sentence or two. This sentence is next passed into a `text2image` API (e.g. OpenAI's text2image API) to generate a new image. This image is again passed into a `image2text` module and the resulting text is passed again into the `text2image` API and so on... The idea is that every sequence of API application will result in a slightly modified or significantly modified image. These images when visualized in sequence (e.g. as a video) will demonstrate and simulate the `Chinese Whispers` through the APIs.

Mini-Project Deliverable Details

Flower Chinese Whispers (Deliverable 2)

To do this - You can work through the following steps:

1. **Image2Text Module setup:** Set up the module and test out an image2text module (e.g. image captioning module) from Hugging Face. Here's an example.
2. **Text2Image API:** Set up and test OpenAI's Text2Image API.
3. **Starter images:** Identify at least 5 different flower images as starter images for this deliverable.
4. **Chinese Whispers Simulation:** Simulate the chinese whispers game through the process described on the previous slide. Generate enough images (e.g. at least 1000 frames per starter image) so you can convert the simulation it into a video

Mini-Project Deliverables

Flower Chinese Whispers (Deliverable 2)

5. **Video:** Create a video by concatenating all the frames (images) in the sequence identified by the simulation and setting a fps for it.
6. **YouTube Video:** Upload the video to YouTube. Playing the YouTube video will be part of your project presentation on Sunday.

Mini-Project Deliverables

Flower Hopper (Deliverable 3)

Design and build a **working webpage** where you input the names of **flower A** and **flower B** and your **flower hopper module** traces the shortest path from flower A to flower B through the 100 species of flowers you identified in the previous deliverable. Also display the path as a 3x3 image grid on your webpage as the output of the query.
To do this - You can work through the following steps:

1. Build a distance function: `dist(A,B)` which computes the distance between every pair of flowers (in our case 100x100 distances are computed). You can use embeddings to compute the similarity between two flowers and invert it suitably to get the distance.

Mini-Project Deliverables

Flower Hopper (Deliverable 3)

2. Given an input flower A, and input flower B - Find the shortest path between A to B using the Djikstra's Algorithm. You don't have to implement it yourself - Use a python module for djikstra's algorithm instead. Store the flowers visited on the path between A to B - This is the path of the Flower Hopper!
3. Display the path of `flower hops` between flower A to flower B as a 3x3 or kxk image grid (depending on how many hops are needed).