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15-112 Term Project: Project Proposal

Problem Statement: With sites like Etsy and Pinterest, there are various platforms for consumers to shop for interior decorations and choose from a multitude of designs. However, with so many products on the market, there are very few systems to help customers choose a single one easily and effectively. The goal of this project is to fill that gap – to create a recommendation system that automatically searches and compares products that the user is interested in and picks the top few based on an image of the user’s room/space they want to fill, their budget, and design features.

Tasks:

1. Create a GUI with the following features:
   1. Display the image.
   2. Button for saving the images with recommendations overlayed.
   3. Button for uploading a new image.
   4. Panel with recommendations for things to buy.
   5. Panel with the following buttons-
      1. User input for budget
      2. User input for sample color schemes by clicking in the image somewhere
      3. User input for keywords
      4. User input for website urls
      5. User input for dimensions on largest “rectangular” part of image.
2. Use OpenCV to identify contours in an image given by the user.
   1. Use 2D features to begin.
   2. If I have time, use 3d reconstruction/SLAM to gain more information about the space.
3. Find empty spaces in the pictures (see algorithm below).
4. Use Webscraping on an Etsy search (or other website, if possible) based on user preferences to get possible options.
5. Recommend the top matches from the search with the user preferences/display an image of the product over the OpenCV image to create a visual clipboard for the user.

Algorithm of the Trickiest Part: I think the trickiest part from the tasks above will be to find empty spaces in an image.

1. How I plan to do this is:
   1. Detect contours in the image (based on OpenCV’s built-in functions)
   2. Find closed contours in the image, and then partition the image into those parts.
   3. Filter the partitions based on features that make them “empty” such as:
      1. Low pixel color variance
      2. Regular shapes
   4. Choose the top # (5?) biggest partitions, and then calculate the size of them based on user input.

External Modules: This project will make use of OpenCV and BeautifulSoup to identify image characteristics and possible products for the customer, respectively. I will also use pillow to display images in tkinter.

Update 1: Because most products online on the websites I’m scraping do not include dimensions in an easily accessible manner, I decided to remove this features from my project.

Update 2: I deleted user input for color schemes (not very relevant/a big benefit for a lot of work) and also deleted user input for url, because that kind of defeats the purpose of scraping the whole web, even though it only scrapes like 5 websites lol. But, I added the feature where a user can click on the picture somewhere and it will add a new product/recommendation for them and they can also remove them, make specific preferences for each recommendation.