School of Computing
CA326 Year 3 Project Proposal Form

SECTION A

Project Title Custom Web Page Generator

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1. Project Description:

Aims:

- Provide a high degree of freedom for instant visualisation of design

- Provide an easy-to-use website customisation tool for non-programmers

- Create a platform that enables users to share their designs and collaborate on the designs of others.

Functionalities:

Template Creating/Editing

- Provide templates or create from blank

- Provide a range of elements (navbars, buttons, gallery, paragraph with image, form a gallery for users to choose from)

- Users can view and move elements (e.g. drag the elements with mouse pointer/ move with keyboard arrows)

- Users can create a colour palette

    - Colour will be automatically applied to elements

    - There are different colour modes (Light/dark/high contrast mode)

    - User can edit the colour of each element type or a single element

- User can upload and use images in the template

Templates Management

- Users can download the webpage they designed for their own use

- Users can edit the web page they designed anytime (add/move/delete elements, modify paragraph text/images/multimedia elements)

Business

- Users can upload design templates for other users to clone and edit
    - Users can set a price (can be free) for the template
    - Users can pay to clone and edit other users' templates
- Regular users:
    - A maximum of 2 web page design + Pay to unlock more slots
    - Watermark at the footer
- Premium users:
    - A maximum of 10 web page design + Pay to unlock more slots
    - Removable watermark
    - Ad elements provided
    - Premium design templates available

More advanced feature using AI:

We would like to utilize AI to provide auto-generation of colour palettes, or even the whole design of the web page if time allows.

Basic: Color picking from images uploaded by users and auto-generating colour palettes.

Advanced: Analyze the uploaded image, identify the aesthetic type of the image and generate a web page based on the aesthetic.

First step: Color picker

We will build a color picker using Python and the OpenCV library.
https://www.geeksforgeeks.org/color-identification-in-images-using-python-opencv/

Second step: Auto-generation of color palette

We will design an AI algorithm which picks a set of colors from an image. Several color palettes can be generated from the same image using different color scheme patterns, e.g. monochrome, analogous and complementary.

The color palette generation should consider color theory.
https://www.smashingmagazine.com/2010/02/color-theory-for-designer-part-3-creating-your-own-color-palettes/

Third step: Auto-generation of web page design by aesthetics types

We will build an AI which can determine the aesthetic type of an image out of 5 - 10 popular aesthetic types. The aesthetic type retrieved from the image will be reflected on the web page design through styling, such as font style, color palette, element shapes and borders. We will predefine a set of styling for each aesthetic type.
List of aesthetic types: https://aesthetics.fandom.com/wiki/Find_Aesthetic_by_Image

We will require a dataset of images labelled with their aesthetic types. Although we could not find any relevant API yet, it is possible to gather the dataset through searching the aesthetic types on Pinterest.

We will determine the image's aesthetic type by comparing the image with images of different aesthetic types and find the most suitable type.
Similarity is an API which compares two images and obtain an approximation of how much they resemble each other: https://rapidapi.com/jlcdev/api/similarity2/

Each aesthetic type has a set of color tones. We can group the aesthetic types by color by more efficient search. Neural Network data structure can reduce the computational and memory cost, but we still need to do more research on it.
Image Classification Using CNN:

- https://www.analyticsvidhya.com/blog/2020/02/learn-image-classification-cnn-convolutional-neural-networks-3-datasets/
- https://developers.google.com/machine-learning/practica/image-classification/convolutional-neural-networks

2. Division of Work:

- UI Design: Together
- Frontend development: Ho Yan Woo
- Backend development: Anushree Umak
- AI building, training and testing: Together

3. Programming Language(s):

- HTML, CSS
- Javascript
- Python

4. Programming tool(s):

- Visual Studio Code for coding
- Django for backend development
- React Js for frontend development
- Web server for website hosting (e.g. Google Cloud web hosting)

5. Learning Challenges:

- Javascript and React JS

  We learnt Javascript and React JS in our second year, and we attempt to further explore them and create an interactive and flexible web page design tool.

- UI Design

  We are learning UI design guidelines and concepts this year, and we hope to implement the design techniques we learnt to build an user-friendly and intuitive UI.

- AI

  We are learning about AI concepts and Neural Networks this semester and we hope to utilize the new knowledge. We will implement an image analysing AI with the aid of Python OpenCV library and visual recognition API.

- Website hosting

  This is a topic we have been learning about since year 1, so we are confident about how to tackle this. However, this will be our first time dealing with web hosting without a set of instructions given by the teacher. We hope to successfully FTP our page to the school's server in order to host our website.

6. Hardware / Software platform:

- MacOS on Macbook
- Windows 10 on PC

7. Special hardware / software requirements

- No special requirements