Processing Images to Embroidery

Report Name	Project Outline
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Module	CS39440
Degree Scheme	G400 (Computer Science)
Date	February 9th, 2025
Revision	0.3
Status	Release

1. Project description

This project focuses on developing a software program that converts digital images into machine readable embroidery designs. The program will use a read and write library (pyembroidery) [1] for generating embroidery instructions that are compatible and readable for the embroidery machine used in this project. The core objective is to create a user-friendly tool that simplifies the design to embroidery process, making it accessible to users with minimal technical expertise.

Key elements of this project include:

- Providing a user-friendly interface to upload images and preview embroidery files.
- Image processing to optimise image to embroidery conversion.
- Stitch pattern generation using algorithms to mimic embroidery techniques.
- Exporting designs in standard embroider file formats [1]

The end goal of this project is to produce a functional tool that can manage various input formats, support different thread palettes, and output high quality embroidery designs that work on most hobbyist machines.

Expanding on this idea, including the use of the openAI model [2] or github co-pilot model [3] in a separate user interface to generate an image that is described by the user and parse that into the original program for embroidery.

2. Proposed tasks

<u>1.Research and familiarisation + Admin</u>

Familiarisation with the pyembroidery library and its functions.

Research and find useful image processing techniques i.e. edge detection, colour reduction.

Create and update (throughout the project) a series of blogs for supervisor review.

<u>2.Requirements analysis and design</u>

Identify key user requirements for the program (image upload, image processing, stitch customisation, file export).

Design system architecture to model data flow between interfaces from image processing -> stitch generation -> file export.

<u>3.Implementation</u>

Develop an image processing module for converting input images to an embroidery friendly format.

Build a stitch generation model to apply stitching algorithms.

Apply the pyembroidery library to convert to a machine-readable format.

Implement a basic user interface.

<u>4.Testing</u>

Conduct unit testing to ensure functionality.

Ensure that embroidery instructions are logically computable by the machine e.g. layering instructions preventing thread jams.

Perform integration testing to validate the workflow from image upload to embroidery file output.

Collect user feedback to refine processes.

<u>5.Deployment, Documentation, Reporting</u>

Write a user manual explaining the program and troubleshooting.

Document technical details including system architecture, algorithms, and testing.

Prepare a final project report.

3. Project deliverables

Software:
A fully functional tool for converting images to embroidery designs including:
Image processing tools including previews of designs.
Stitch pattern Generation including customisation of thread palettes and stitching.
Exports to supported embroidery machines in preferred file formats.
Documentation:
A full report post project including a user manual that details all the steps taken through each week documenting each major point of progress and referencing all sources of information.

4. Initial annotated bibliography

[1] Tatarize & Embroider-modder, pyembroidery, Github: accessed 28/01/2025, GitHub - EmbroidePy/pyembroidery: pyembroidery library for reading and writing a variety of embroidery formats.

Proposed library for reading and writing to embroidery formats

[2] Open AI for image generation (proposed idea) https://openai.com

[3] Github co-pilot for image generation (proposed idea) https://plugins.jetbrains.com/plugin/17718-github-copilot