COMPUTER ENGINEERING DEPARTMENT

Graduation Project Proposal Form

CMPE 405 /CMSE 405 /BLGM 405

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| Instructor Name: | Prof. Dr. Marifi Güler |
| Project Title: | **Processing images in different formats and sizes** |
| Number of team members: | 1-3 |
| Semester & Year: | 2023-2024 Fall |
| Type of Project (HW/SW): | SW |

# Project proposal should be in accordance with ABET requirements, which are stated as: “The curriculum must include a culminating major engineering design experience that 1) incorporates appropriate engineering standards and multiple constraints, and 2) is based on the knowledge and skills acquired in earlier course work.”

# 1. Project Overview

Describe the project here. What will students do? What will students learn?

The students should develop a software tool that can edit images in different formats. The images must not lose quality, because one of the tasks of the printer is to process the images into posters. To do this, she would like to use content-dependent image distortion as well as a cartoon filter and the possibilities of patch swapping. Your task is to implement this in efficient algorithms for image processing, whereby you should also visualize their functionality for demonstration purposes. At the same time, all functions must be embedded in an attractive user environment. The requirements are initially discussed with the customer, but can be adjusted by the customer in the course of the work process.

**2. Detailed specification of the project**

Give a clear and reasonably complete specification of the project with inputs, outputs, target users, and required functionality.

Print shops need to process images in different formats and sizes efficiently and with high quality. Nowadays, software is used for this that is based on algorithms and, in part, on machine learning. An example of such an algorithm is this paper [3], whose methods are now widely used. Aside from the technical aspects, these software tools should also be easy to use, intuitive and versatile. So you get an order from a printing company to build a tool that meets their specific requirements and is easy to use at the same time.

**Literature**

[1] https://static.pexels.com/photos/705771/pexels-photo-705771.jpeg. Accessed: 12.10.2021.

[2] https://www.pexels.com/photo/top-view-photo-of-boat-near-airplane-1575833. Accessed: 09.10.2019

[3] Shai Avidan und Ariel Shamir. “Seam Carving for Content-Aware Image Resizing”. In: *ACMSIGGRAPH 2007 Papers.* SIGGRAPH ’07. San Diego, California: Association for Computing Machinery, 2007, 10–es. isbn: 9781450378369. doi: 10.1145/1275808.1276390.   
url: https: //www.win.tue.nl/~wstahw/edu/2IV05/seamcarving.pdf.

[4] Jan Kyprianidis and Jürgen Döllner. “Image Abstraction by Structure Adaptive Filtering.” In: Jan. 2008, S. 51–58. doi: 10.2312/LocalChapterEvents/TPCG/TPCG08/051-058. url: http : / / diglib . cgv . tugraz . at / bitstream / handle / 10 . 2312 / LocalChapterEvents .

[5] Shizhe Zhou u. a. “PatchSwapper: A novel real-time single-image editing technique by region swapping”. In: *Computers and Graphics* 73 (2018), S. 80–87. issn: 0097-8493. doi: https: / / doi . org / 10 . 1016 / j . cag . 2018 . 03 . 002. url: https : / / shizhezhou . github . io /projects/PatchSwapper/PatchSwapper.pdf.

# 4. Standards that should be used in the project

# 5. Constraints

# Any constraints that must be observed on the final product or during the development stages.

# 6. Tasks to be completed by students

# Stages and tasks that must be completed by the students in the development of the project.

The software must:

1. accept different image formats (jpg, png, svg, tiff, ...)
2. edit the colours of images as a whole - e.g. grayscale
3. effectively implement content-dependent image warping using dynamic programming [3]
4. support parts of images to be marked graphically to be deleted or resized
5. implement a cartoon filter [4]
6. have an attractive, user-friendly GUI that makes all functions easy (and in real time).
7. be capable of saving the edited images

# 7. Tools Required/Expected to be used in the development of the project

# 8. Resources Required (HW/SW/Data, etc.)

Just Laptops

# Complete list of Project Deliverables Expected at the End of Project Completion

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| --- | --- |
| Deliverable | Description |
| IT support software | Solutions to improve customer relations |
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(add more rows as needed)

# 10. Other related information

Hints and ideas that will help students in the development of the project. These may include pointers to similar projects, resources such as books, web sites etc.