

# First interim report

## Panorama stitching

### **Team:**

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**Topic:** computer vision

**Aim:** merging separate photos into one entire photo

### **- Describe the research area of your project and why it is interesting/important**

The research area of our project is computer vision. We decided to choose panorama stitching, because we are interested in the Linear Algebra application in this field. For us, it is essentially important, as we are using this technology on a daily basis and we want to explore how it works.

### **- Describe the aim of the project and tasks you want to achieve**

The aim of this project is to create an application that will allow us to stitch images together into a single one by using the feature-based stitching techniques. The additional task would be to implement methods for image alignment and cropping in order to get a better result.

### **- Describe possible approaches and available solutions (literature review) and explain which method you'll use and why**

After analyzing the panoramic image stitching techniques, we discovered that there are two general methods, that we can apply:

- The feature-based techniques
- The direct techniques

We have chosen the feature-based approach for our project, because it has such advantages:

- It can accurately match features across images that are taken from different angles or positions
- the features can be matched even if the images have been captured from different distances or orientations
- It helps reduce the impact of noise in the resulting picture

**- Describe the pipeline of the implementation (if any)**

The pipeline of the project will consist of such steps:

1. At first, we need to detect unique features in each image. We have chosen for this task the Harris Corner Detection algorithm.
2. Next, we will match features between pairs of images.
3. Then we will estimate the optimal transformation that aligns images with each other.
4. Our next step will be to project an image onto cylindrical surface, in order to align the perspectives and handle image distortions.
5. The images are then stitched together using the previously calculated transformations. Also, we will use blending techniques to ensure a smooth transition between images

At the end, additionally, we are planning to crop the image in order to remove any black or empty areas that were left after the stitching process.

**- How will you test your implementation? Do you have the necessary data?**

We will test our implementation on image datasets to check its performance in different situations, using both publicly available and custom datasets. In order to have a better understanding of the efficiency of our panorama stitching implementation, we will not only check it visually, but also evaluate homography accuracy.

**- Briefly outline the plan of future research (tasks to perform and time schedule**

The plan for the future performance: developing our panorama stitching application by the second interim report (3 April 2024), then testing the implementation, fix some bugs to gain better result by the final project report (24 April 2024).

**- Are there any challenges that might hamper your work?**

Currently, the only challenge predicted is actually the implementation of the algorithms, particularly the Harris Corner Detection algorithm.