Augmented Reality - VU WS 2022/23

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Task 1 - Camera Pose Estimation (40 points)

Task Description

Implement a camera pose estimator based on natural feature tracking, using one of the two approaches described in the lecture. Implement the RANSAC algorithm as part of your estimation. Use the minimum number of necessary points for the initial estimation in the RANSAC loop.

For this purpose, we use the *OpenCV* library, version 4.6.0. You need to use a planar marker with an image of your choice. With the estimated pose, you have to render a virtual object, e.g., a rectangular cuboid wireframe, on top of the planar marker.

We recommend using C++ for this assignment, but Python is also permitted.

Aruco marker tracking and OpenCV built-in RANSAC is not allowed in this assignment. You can use the OpenCV camera calibration toolkit.

This task is an **individual** assignment.

Submission

Your submission needs to be uploaded to the TeachCenter, and to contain the following components:

Code: This includes your source code without the OpenCV library.

Report: Write a short report including the following information:

- a description of your application. Include your motivation for selecting the algorithm, interest point detectors, feature descriptors, matching approach, etc.
- an image of the chosen planar target and a motivation of the choice of planar target: Why did you chose the particular target? Which kinds of planar targets would perform differently (better/worse), and why?
- report on the FPS that you achieve

You can include images in your report to support your findings. The report needs to be uploaded in a .pdf format.

Video: Include a video to demonstrate the live behaviour of your tracker.

Copy of source code (from your colleagues or from other sources) is forbidden. The assignment are tested for plagiarism.

The **deadline** of this submission is **November 27, 2022 (23:59)**.