Departamento de Eletrónica Telecomunicações e informática da Universidade de Aveiro

Computer Vision

2024/2025 – 1st Semester

Practical Assignment
Development of a Computer Vision Application

Introduction

This work consists in the conceptualization and implementation of a prototype of an application for Computer Vision.

Each group must choose/propose a work theme that performs some Computer Vision task using the OpenCV. The use of tasks/problems resulting from work developed by students in other curricular units is encouraged.

The assignment will include two presentation:

Mid term presentation (28/11) (10 + 5 min max) :

- Analysis of the problem, users, context of use and main questions that the application should solve.
- Justified choice of the Computer Vision techniques selected
- Presentation of the early developments/experiments/implementations.

Final presentation (19/12 - To confirm) (15 + 5 min max)

Final presentation of the developed system. Each group must also deliver to the end of the day the code (link, github, etc…), the presentation used in class and an illustrative video of the developed system.

Groups may propose the use of other libraries or Computer Vision SW but this possibility should be discussed and justified with the lab teachers.

The work must be carried out in a group of 2 elements (max).

Evaluation of the first iteration

In classes on 28/11. Each group should bring a simple presentation (< 10 min) and the conceptual model they propose to discuss with Prof. and colleagues in class.

Final presentation

Each presentation, whose duration should not exceed 20 minutes (15+5 min questions), will be performed by the group members in the class on December 19th or in January (Still to be defined with students). Presenters must use careful language, speak clearly and not exceed time.

For the final presentation, each group will have to deliver the produced code, a demo video (1-2min) and a sober presentation of their work. Do not forget in the report to clearly explain the context, the objectives, the algorithms, etc….

Delivery

Each group must deliver through e-learning the presentation slides, the code developed and the illustrative video by the delivery date.
Use the following rule for file names: TPnnmec1+nmec2, where n is the class number and the nmec1 and nmec2 are the student numbers of the two elements of the group. For example: a group from the TP1 class that has developed the AppXYZ application and is made up of students with nmecs 44444 and 55555 must submit a file with the name: TP1-AppXYZ-44444+55555.

The final presentation must also include the indication of the **percentage of work** of **each student** to the assignment.

Warning

The developed application must be original. In addition to the files distributed in the practical classes, some code or existing libraries may be used (occasionally), but this fact must be clearly referenced in the code/presentation and report.
Works that use a large volume of non-original code, without explicitly referencing it, will be void.
The tools created must be available for use, either through a code repository (github, gitlab) or zip file, indicating any non-original code or library used. Instructions for downloading or using dependencies, APIs or commands necessary for its operation must be explicit in the README file. If the tool has more than one page, also indicate which page(s) generate the visualisations planned in the design phase.

Themes

Students are encouraged to choose and propose topics of their own interest (from work developed in other curricular units, etc…), however, here are some proposals:

	Automatic Exam Correction.	
	Stereogram revealing Software A stereogram is an optical illusion that creates a three-dimensional image from a two-dimensional picture. When viewed correctly, the brain interprets the patterns and colours in the image to perceive depth and shape, often revealing hidden 3D objects. The idea is to create a program that can “decode” stereograms creating 2D Binary images and/or 3D reconstruction of the shape. The program might also allow to enode 3D depth maps into stereograms with different patterns	

	Detection in underwater images Within a project ai IRISLab, detection of fishes, corals, etc… in underwater images.	
	Kinect/orbtec/Intel Real sense based reconstruction system Acquire several images of the environment (room) with Kinect. Merge and process all the images to create a 3D model/mesh with texture information. Evaluate different meshing and registering algorithms	
	3D Reconstruction test and validation with Tiago madeira's PhD solution Study and understand software from Tiago-s PhD software Acquire and process models with BLK	
	Automatic live keystone Projector correction System to correct automatically images from projectors projected on non flat surfaces Possible to use Sony Xperia projector	
	Bounding box dimensions detection Detection of box dimensions based on pointclouds from Visionary-s (data from FFonseca company) Simple example (one box) then multiple box Possible to acquire data with Kinect as well Proponente: David Perreira <dpereira@ffonseca.com> [FFonseca]	
	Rubik cube Solver Program that can capture a sudoku image in a journal and propose a solution directly on the image. Possibility to work live on camera	

	Puzzle Solver Program that can capture puzzle abd give hints to help solve it. Possibility to work live on camera	
	Snooker helper Program that can capture an image of a small snooker game (available at IEETA) and give cues to help players to use the game	
	Marcas fiduciais em PICs	80248 - Fábio Caldas
	Explore other vision problems / Datasets http://homepages.inf.ed.ac.uk/rbf/CVonline/Imagedbase.htm	
	******* Students can propose other assignments in line with their interests, master topic or other topics	

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