

Feature Detection Algorithms

Introduction

Feature detection algorithms are a class of computer vision algorithms that can be used in a variety of applications such as 3-D reconstruction of scene and objects, object recognition, mobile robots navigation, panoramic images constructed from multiple views, among many others.

The important characteristic in this class of algorithm is to be invariant on scale, illumination, position and distortion if applied to images taken from the same object or scene from different camera positions.

One of the more robust algorithms in this category is the SIFT (Scale Invariant Feature Transform) algorithm that was published in 2004 by David Lowe, which was patented later, but can be used freely for research.

The assignment

The assignment for this class is to study in depth the paper from Lowe and write a report explaining how this algorithm works. After that, research an application for this algorithm in the Internet and include in the report an explanation in detail how this algorithm is used in the application and analyse the results.

The delivery

The paper from Lowe is available for download in the Moodle. The student should upload in the Moodle the researched paper and the report 1 week after the class date.

Questions can be done by the Moodle before the class date and will be shared to everyone registered in this course.

On the day of the class the professor will be available by Google Meet to answer questions from 9:00h to 11:00h or until there are no more questions from students. If possible, a demo on how to use the algorithm with OpenCV will be presented on the day of the class.

The reports will be evaluated and the grades will compose the student's final score of the course.

Reference

Lowe, D.G. Distinctive Image Features from Scale-Invariant Keypoints. *International Journal of Computer Vision* 60, 91–110 (2004). <https://doi.org/10.1023/B:VISI.0000029664.99615.94>