

CETS8AH TOOLS FOR IMAGE PROCESSING AND ANALYSIS

CETS8AH		ECTS Credits: 2		Semester: S8	
Tools for Image Processing and Analysis		Duration: 21 hours			
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Keywords: image processing					
Prerequisites: basic algorithmic, imperative programming, mathematics (math'sup level)					
Goal: understand the mathematical and algorithmic methods that are the basis for automatically processing images					
Program and contents: The contents of this course are based on the engineering requirements for image processing that have been collected. There are numerous fields where images are used and where analyzing them is of great use: analysis of material surfaces, geostatistics, analysis of medical images, monitoring production processes or quality analysis, for example. What are the underlying difficulties (mathematics, algorithms, modeling, etc.) for implementing an automatic analysis of images and how can this be accomplished in a methodical and scientific way? In reality, it is possible to describe an image as the result of a projection and sampling process or discretizations of a continuous three-dimensional reality or it can even be considered as an inherently discrete object. Depending on the approach, images can be analyzed from a signal processing standpoint, or from that of mathematical morphology. All these approaches will be addressed from a theoretical point of view in class and will be implemented in concrete terms on experimental platforms that only require a minimal skill (but that are nonetheless real) in Matlab (or equivalent) programming. The following will be addressed: - Basics in signal processing: image formation, sampling, filtering and restoration. - Index detection, invariance and scale space: methods for extracting pertinent information about an image (edges, point of interest, etc.) independently of the scale of an image and its orientation. These methods are examined theoretically and in practice. - The problem of matching images: image processing, similarity measure, robust correspondence. - Segmentation: - Mathematical morphology: designed around two basic operators (erosion and dilation), this technique is used for both developing a theoretical environment and processing images for form segmentation and identification. - Examples of methods for segmenting into regions - Vision by computer: computer vision applications: applications of these concepts according to reconstruction and pose computation.					
Abilities:					
Levels		Description and operational verbs			
Know					
Understand					
Apply					
Analyze					
Summarize					
Assess					
Evaluation:					
☐ Written test	☒ Continuous Control	☐ Oral report	☐ Project	☐ Written report	