



COMPUTER VISION	
Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Academic discipline	ING-INF/05 (DATA PROCESSING SYSTEMS)
Department	DEPARTMENT OF MATHEMATICS "FELICE CASORATI"
Course	MATHEMATICS
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	1st semester (30/09/2019 - 10/01/2020)
ECTS	6
Lesson hours	60 lesson hours
Language	English
Activity type	WRITTEN AND ORAL TEST
Teacher	ALDEA EMANUEL (titolare) - 1 ECTS CANTONI VIRGINIO - 5 ECTS
Prerequisites	This course is intended for advanced undergraduate students. We assume students have a rudimentary understanding of linear algebra, calculus, and are able to program in some type of structured language.
Learning outcomes	Computer Vision consists of inferring properties of the world based on one or more digital images. Provides background in image processing and image formation. Focus on algorithms for image and video analysis based on color, texture, shading, stereo, and motion.
Course contents	Introduction to Computer Vision Basic definitions. Low-level image analysis methods, including image formation, edge detection, feature detection, and image segmentation. 3D Vision and motion analysis Methods for reconstructing three-dimensional scene information using

	techniques such as depth from stereo, structure from motion, and shape from shading. Motion and video analysis. Object recognition Recognition Processes. Direct Comparison. Alignment methods. Invariant properties methods. Parts decompositions method. Hough transform. Image synthesis Computer graphics topics involving computational photography and image-based rendering. Local rendering, Phong model. Advanced rendering techniques, topics include ray casting, ray tracing, and radiosity.
Teaching methods	Lectures (hours/year in lecture theatre): 45 Practical class (hours/year in lecture theatre): 0 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	V. Cantoni, S. Levialdi, B. Zavidovique. 3C Vision - Cues, Context and Channels. Elsevier, 2011. V. Cantoni. Course slides.
Assessment methods	Students will be asked to read three papers. They will be required to write a report of one of these papers, due before we discuss the paper. Each student is required to complete a laboratory project consisting of a sequence of image analysis steps resulting in image interpretation thus emphasizing hands-on image analysis experience. The exam consists on the discussion of the projects and on the paper report.
Further information	Students will be asked to read three papers. They will be required to write a report of one of these papers, due before we discuss the paper. Each student is required to complete a laboratory project consisting of a sequence of image analysis steps resulting in image interpretation thus emphasizing hands-on image analysis experience. The exam consists on the discussion of the projects and on the paper report.
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