CSE 5524 (Approved): Computer Vision for Human-Computer Interaction

Course Description

Computer vision algorithms for use in human-computer interactive systems; image formation, image features, segmentation, shape analysis, object tracking, motion calculation, and applications.

Prior Course Number: CSE 634
Transcript Abbreviation: Computer Vision
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad, Graduate
Student Ranks: Senior, Masters, Doctoral
Course Offerings: Autumn
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: CSE 2331 or senior or grad standing
Exclusions: Not open to students with credit for CSE 634
Cross-Listings:

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.0901
Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
BS CSE	BS Computer Science and Engineering
MS CSE	MS Computer Science and Engineering
PhD CSE	PhD Computer Science and Engineering

Course Goals

Master fundamental computer vision algorithms.
Be competent with computer vision application design and evaluation.
Be familiar with Matlab programming environment.
Be exposed to original research and applications in computer vision.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introductory computer vision	2.0							
Image formation	2.0							
Noise removal	2.0							
Edge detection	2.0							
Pyramids	1.0							
Region segmentation	2.0							
2-D shape	2.0							
Template matching	2.0							
Motion	4.0							
Tracking	4.0							
3-D	2.0							
Event analysis	4.0							
Features	2.0							
Stereo	1.0							
Clustering	1.0							
Applications	2.0							
Motion capture	4.0							
Current research	2.0							

Representative Assignments

Various programming assignments in Matlab based on topics in class.
Term project to give students an opportunity to expand on the ideas presented in class and explore interesting computer vision applications.

Grades

Aspect	Percent
Homework assignments	40%
Exam	20%
Project	30%
Participation	10%

Representative Textbooks and Other Course Materials

Title	Author
Computer Vision	Shapiro and Stockman

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
***	b	An ability to design and conduct experiments, as well as to analyze and interpret data.

Course Contribution		College Outcome
**	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

BS CSE Program Outcomes

Course Contribution		Program Outcome
***	a	an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;
***	b	an ability to design and conduct experiments, as well as to analyze and interpret data;
**	c	an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;
	d	an ability to function on multi-disciplinary teams;
**	e	an ability to identify, formulate, and solve engineering problems;
	f	an understanding of professional, ethical, legal, security and social issues and responsibilities;
*	g	an ability to communicate effectively with a range of audiences;
	h	an ability to analyze the local and global impact of computing on individuals, organizations, and society;
*	i	a recognition of the need for, and an ability to engage in life-long learning and continuing professional development;
	j	a knowledge of contemporary issues;
**	k	an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;
**	l	an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
**	m	an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
**	n	an ability to apply design and development principles in the construction of software systems of varying complexity.

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