BLG 453E – Computer Vision (CRN: 14721)

Assoc. Prof. Dr. Yusuf H. Şahin

Syllabus – 2024

Course Description

The aim of the course is to study computer vision, which tries to $make computers see and interpret using the observations in the form of multiple 2D (or 3D) images. In this undergraduate level course, the focus is on mainly 2D image processing fundamentals and basic computer vision concepts. The course will provide the participants with a background in Computer Vision both in practical aspects as being able to implement computer vision algorithms, and their mathematical understanding. A tentative list of topics for the course is included below.

Week	Date	Topic	Exams/HWs
1	3.10.2024	Introduction to Computer Vision and Image Data	
2	10.10.2024	Pointwise Image Processing Image Intensity Transformations, Histograms, Enhancement	
3	17.10.2024	Geometric/Coordinate Transforms I	HW1
4	24.10.2024	Geometric/Coordinate Transforms + Interpolation + Image Warping and Morphing	
5	31.10.2024	Image Neighborhood Operations/Spatial Filtering 1	
6	7.11.2024	Spatial Filtering 2	**Midterm Exam 1**
7	14.11.2024	Edge Detection Operators	HW2
8	21.11.2024	Holiday Week	
9	28.11.2024	Feature Extraction: Corners, Template Matching Parametric Detection of Lines, Circles, Ellipses	
10	5.12.2024	Feature Extraction 2	HW3
11	12.12.2024	Basic Segmentation (Adaptive Thresholding, Clustering, K-Means, Region Growing ')	
12	19.12.2024	-	**Midterm Exam 2**
13	26.12.2024	Visual Motion Estimation/Dynamic Scenes	
14	02.01.2025	Principal Component Analysis and Applications	HW4
15	09.01.2025	Basic Geometric 2D shape analysis (Area, Length, Distance Transform, Shape Context). Wrap-Up	

Grading:
Midterm Exams - In Class. (MT1 10% + MT2 20%)
Homework Assignments 30%
Final Exam 40%

Textbooks:
(Not limited to)
[1] Digital Image Processing, R.C. Gonzalez, R.E. Woods, Pearson Prentice Hall 2008
[2] Computer Vision: A modern Approach, D. Forsyth, J. Ponce
[3] Concise Computer Vision: An Introduction into Theory and Algorithms, Springer, Series: Undergraduate Topics in Computer Science, by Reinhard Klette, 2014
[5] R. Szeliski - Computer Vision Book (2010) can be downloaded from http://szeliski.org/Book/