Sabanci University
Computer Engineering Department
CS 419 Digital Image and Video Analysis
2023-2024 Fall

Section	Instructor	Lectures	Office Hours
Single	Erchan Aptoula	Monday 09.40-10.30	Monday 10.30-11.30
		Tuesday 15.40-17.30	
	Teaching assistant		
	Seçilay Kutal	https://sabanciuniv.zoom.us/j/94859507823	Tuesday 12.40-14.30

Week	Subject
1	Digital image acquisition, sampling, quantization, zooming
2	Point processing, histogram processing, gamma correction
3	Binary image analysis: adjacency, neighborhoods, connected components
4	Spatial image enhancement: filtering, smoothing, sharpening
5	Image enhancement in the frequency domain: low-pass, high-pass filters, the convolution theorem
6	Non-linear filtering, grayscale morphological processing
7	Color image processing: color perception, color spaces, basic operations, color filtering
8	**Midterm exam**
9	Content description: color, shape
10	Content description: texture
11	Image segmentation
12	Case study: remote sensing images (multispectral, hyperspectral, SAR, multitemporal)
13	Video and the temporal dimension
14	Case study: night time object tracking and distance estimation

The above schedule is tentative and subject to change.

This course provides a comprehensive introduction into digital image & video processing and analysis. Major topics include image acquisition, linear and non-linear filtering, color, content description and video analysis. Students will learn the basic concepts of image and video processing as well as acquire hands-on experience in solving real-life visual analysis problems.

Textbooks
- Gonzales and Woods, Digital Image Processing, 4th Ed, 2017
- W. Pratt, Digital Image Processing, 4th Ed.
- P. Soille, Morphological Image Analysis, 2004
- R. Szeliski, Computer Vision and Applications, 2010

Prerequisites: Python programming, calculus, linear algebra, elementary probability and statistics.

Evaluation
- **Homework assignments (**2 or 3, **25%):** will require implementing image and video processing solutions in python. They might also involve theoretical questions and proofs.
- **Midterm exam (35%):** will take place in the classroom, with no coding, and will involve mostly design and critical thinking questions.
- **Final exam (40%):** will take place in the classroom, with no coding, and will involve mostly design and critical thinking questions.

Late policy
- Late days will incur a 10% penalty/day.