

IMT4811 Image processing and analysis - 2008-2009

Emnekode:

IMT4811

Emnenavn:

Image processing and analysis

Faglig nivå:

Master (syklus 2)

Studiepoeng:

5

Varighet:

Høst

Språk:

Engelsk

Forventet læringsutbytte:

This course develops an understanding of the fundamental characteristics of digital systems used in imaging, together with general concepts of science, quantitative methods. This course covers basic algorithms for image manipulation, characterization, filtering, segmentation, feature extraction and template matching in direct space and Fourier space. The course provides the opportunity for students to explore a range of practical techniques, by developing their own simple processing functions either in language such as C++ and/or by using library facilities and tools such as Matlab.

On completion of this course the student will be able to:

- Understand (i.e. to describe, analyse and reason about) how monochrome digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation. methods of capturing and reproducing images in digital systems.
- Understand (i.e. to describe, analyse and reason about) how color digital images are represented, manipulated, encoded and processed.
- Make appropriate use of mathematical techniques in colour imaging. Demonstrate the use of tools such as spreadsheets and specialist maths applications to solve problems in colour imaging

Emnets temaer:

1. Digital image acquisition: analogue to digital conversion. Sampling and quantization. Lookup table conversions. Scaling.
2. Digital image formats: representation and description. Image encoding and image compression.
3. Image filtering: linear and non-linear filtering operations. Image convolution. Separable convolutions. Image enhancement. Image restoration.
4. Digital image processing: histogram manipulation. Thresholding. Image segmentation. Clustering techniques. Split and merge algorithms. Region processing. Edges detections. Region adjacency graph.
5. Image transformations: histogram equalization, geometric transformations, affine transformations, polynomial warps.
6. Digital image analysis: noise analysis. Texture analysis. Fourier descriptors. Features extraction. Pattern recognition. Corner detection. Saliency maps. Image interpretation. Motion analysis.
7. Color image analysis : representation, encoding, scalar and vector approaches. Clustering techniques. Color invariants. Color constancy algorithms.
8. Template matching: Similarity and dissimilarity matching metrics. Cross-correlation. Multiresolution algorithms. Graph matching. Image retrieval. 2D object detection, recognition and location.
9. High level image descriptors. Semantic image description. MPEG7.
10. Image analysis applications.

Pedagogiske metoder:

Forelesninger

Lab.øvelser

Vurderingsformer:

Skriftlig eksamen, 3 timer

Øvinger

Vurderingsformer:

Written exam (50%), exercises (50%)

Karakterskala:

Bokstavkarakterer, A (best) - F (ikke bestått)

Sensorordning:

One internal and one external examiner

Utsatt eksamen (tidl. kontinuasjon):

None

Tillatte hjelpemidler:**Tillatte hjelpemidler (gjelder kun skriftlig eksamen):**

None

Ansvarlig avdeling:

Avdeling for informatikk og medieteknikk

Emneansvarlig:

Associate Professor Faouzi alaya Cheikh

Læremidler:

- Digital Image Processing, 3rd Edition (DIP/3e), by Rafael C. Gonzalez and Richard E. Woods, Prentice Hall (2008)
- Digital Image Processing Using MATLAB (DIPUM), by Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins, Prentice Hall (2004).
- Color Image Processing: Methods and Applications (Image Processing), by Rastislav Lukac & Kostantinos N. Plataniotis, CRC (2006)
- The Image Processing Handbook, Fifth Edition (Image Processing Handbook), by John C. Russ, CRC (2006)

Erstatter:

Partial overlap with IMT4401 Digital Image Reproduction

Klar for publisering:

Ja