King Saud University
College of Computer and Information Sciences
Department of Computer Science
CSC558  Pattern recognition and  Image Processing

Current Instructor:  Dr Mohamed A Berbar
Course Coordinator: Dr Mohamed A Berbar
Coordinator’s email: m_berbar@ksu.edu.sa

Textbook(s) and/or Other Required Materials:

Primary: Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic..


Course Description (catalog):
Introduction; Image Sensing and Acquisition; Some Basic Gray Level Transformations for Image Enhancement; Image Contrast Enhancement Using Histogram Processing; Image Smoothing Using Spatial Filters; Image Sharpening Using Spatial Filters; Point, Line and Edge Detection; Basic image compression procedures; Basic Global and Adaptive Thresholding for Image Segmentation; Optimal Global and Adaptive Thresholding for Image Segmentation; Region-Based Image Segmentation and Edge-Based Segmentation; Image Restoration in the Presence of Noise-Spatial Filtering; Image Enhancement in Frequency Domain; Objects Representation and Description; introduction to Object Recognition

Prerequisites: Data Structures - CSC 212, and good programming skills

Course Type: Elective

Course Learning Outcomes:
Upon completing CSC558, students should have the following capabilities:

1. Have an appreciation of the fundamentals of Digital image processing including the topics of filtering, transforms and morphology, and image analysis and compression.
2. Describe Image segmentation and pattern recognition
3. Be able to implement basic image processing algorithms
4. Have the skill base necessary to further explore advanced topics of Digital Image Processing.
**Student Outcomes Covered by Course**

a- an ability to apply knowledge of mathematics, computing, science, and engineering appropriate to the discipline
   The students use their skills in programming and mathematics to implement various image processing algorithms.

b- an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
   The student should use the appropriate techniques to do segmentation and recognition

c- a recognition of the need for, and an ability to engage continuing professional development
   Preparing the student to use image processing techniques professionally.

d- An ability to use the current techniques, skills, and tools necessary for computing practice.
   Using the current techniques, skills, and tools necessary for image processing and analysis.

e- an ability to apply design and development principles in the construction of software systems of varying complexity
   The student will design and develop programs to construct an image processing and analysis software to solve problems with various complexity

**Major Topics covered**

1. Digital Image Fundamentals
2. Intensity Transformations and Spatial Filtering
3. Filtering in the frequency domain
4. Color Image processing
5. Morphological image processing
6. Image segmentation
7. Object recognition

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<th>Assessment</th>
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<tbody>
<tr>
<td>1st midterm</td>
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Final exam  1st week of final exams period