Digital Image Processing

Course Information:
Code: CE-835
Credit Hours: 3
Class: MS-81(CE)
Instructor: Dr. M. Usman Akram
usmakram@gmail.com
http://biomisa.org/usman/

Course Home Page: http://biomisa.org/usman/digital-image-processing-f14

Class Hours: Wednesday (1730-2030) CRMTS-02
Office Hours: Wednesday (1600-1730)

Semester: Fall 2014

Text:

Reference
- http://www.imageprocessingplace.com/

Prerequisites by Topic:
- Basic knowledge about linear algebra, matrices and complex variables
- Concepts related to signals and systems and digital signal processing
- Know how with MATLAB or any programming language

Course Objective:
1. To develop thorough understanding of digital image processing fundamentals
2. To explore the properties of discrete transforms and their importance with respect to image processing
3. To study various image enhancement techniques in spatial and frequency domains, fundamentals of image compression, introduction to color image processing, wavelets and morphological image processing
4. Combining the concepts of image processing with machine learning to design decision support systems for image processing based applications
5. Learning the use of MATLAB to implement basic image processing algorithms and to build and execute image processing based projects to solve real life problems

Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Sessional Exams</td>
<td>25%</td>
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<tr>
<td>Quizzes (4-6)</td>
<td>10%</td>
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<tr>
<td>Computer and numerical assignments</td>
<td>15%</td>
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<tr>
<td>Final Project</td>
<td>10%</td>
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<tr>
<td>Final Exam</td>
<td>40%</td>
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Quizzes:

Ten-minute surprise quizzes will be given periodically

Computer Assignments & Project:

For computer assignments, sharing of programming tips and discussing general concepts is allowed. Collaborating on program writing is not. A mini project and term-project will be conducted in groups. One to three students can form a group. It is very important to have hands on image processing algorithms. Almost 25% marks are directly related to it in form of computer assignments and projects etc. The project will be monitored throughout the semester on periodic basis and marks will be assigned accordingly.

Topical Outline:

1. Introduction to Image processing
2. Image processing Fundamentals
3. Image Enhancement & Restoration (Spatial & Frequency Domain)
4. Color Image Processing
5. Morphological operations
6. Segmentation
7. Feature extraction (edges, corners, local binary patterns)
8. Texture analysis
9. Image Registration/Matching
10. Image Compression
11. Wavelets
12. Introduction to Machine Learning and basic types of classifiers, Performance parameters for evaluation