ADVANCED DIGITAL IMAGE PROCESSING

(Elective Subject)

<table>
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<tr>
<th>Course Code:</th>
<th>16M1WEC231</th>
<th>Semester:</th>
<th>8th Semester, B. Tech (ECE)/2nd semester M. Tech</th>
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<tbody>
<tr>
<td>Credits:</td>
<td>3</td>
<td>Contact Hours:</td>
<td>L-3, T-0, P-0</td>
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Course Objectives

Major Learning Objectives are:

1. Describe and explain basic principles of digital image processing;
2. Design and implement algorithms that perform basic image processing (e.g., noise removal and image enhancement);
3. Design and implement algorithms for advanced image analysis (e.g., image compression, image segmentation).
4. Assess the performance of image processing algorithms and systems.

Course Outcomes

After Completing this course students will be able to:

1. Analyze general terminology of digital image processing.
2. Examine various types of images, intensity transformations and spatial filtering.
3. Develop Fourier transform for image processing in frequency domain.
4. Evaluate the methodologies for image segmentation, restoration etc.
5. Implement image process and analysis algorithms.
6. Apply image processing algorithms in practical applications.

Course Content

<table>
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<tr>
<th>Unit</th>
<th>Topics</th>
<th>References (chapter number, page no. etc)</th>
<th>Lectures</th>
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</table>
| 1    | Digital image fundamentals
Fundamental steps in DIP, Components of digital image processing system, elements of visual perception, Structure of the human eye, Image formation in the eye, Brightness adaptation and discrimination, light, Image sensing and acquisition, Image formation model, definition and some properties of two dimensional system, Discrete 2D convolution, 2D discrete Fourier transform and its properties, optical and modulation transfer function, Spectral density function. Sampling and quantization of images. Two dimensional | Gonzalez and Woods
Chapter -1
Pg 1 - 29
Chapter -2
Pg 34 - 70 | 7 |
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<tr>
<th>Chapter</th>
<th>Section</th>
<th>Page/Range</th>
<th>Chapters/Section</th>
<th>Book</th>
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<tr>
<td>2</td>
<td>Image Enhancement in spatial domain</td>
<td>Gonzalez and Woods</td>
<td>Chapter -3</td>
<td>Pg 76 - 130</td>
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<td></td>
<td>2</td>
<td>Gonzalez and Woods</td>
<td>Chapter -4</td>
<td>Pg 148 - 193</td>
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<tr>
<td>3</td>
<td>Image Enhancement in frequency domain</td>
<td>Gonzalez and Woods</td>
<td>Chapter -4</td>
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<td>4</td>
<td>Image Restoration</td>
<td>Gonzalez and Woods</td>
<td>Chapter -5</td>
<td>Pg 221 - 261</td>
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<td>5</td>
<td>Image compression</td>
<td>Gonzalez and Woods</td>
<td>Chapter -8</td>
<td>Pg 411 - 456</td>
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<td>6</td>
<td>Image Segmentation</td>
<td>Gonzalez and Woods</td>
<td>Chapter-10</td>
<td>Pg 568 - 615</td>
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**Evaluation Scheme**
1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

**Text Books**


**Reference Books**