assigned by the department.

MCSE201: DIGITAL IMAGE PROCESSING

Course Objectives: The objective of this course is to study the concept of digital image processing. The course should also cover the image enhancement in the spatial and frequency domain followed by the image morphological operations such as dilation, erosion, and hit-or-miss transformations. The course also covers image segmentation and image compression.

Course Learning Outcomes :

CO1 Explains theoretical and practical concepts of image acquisition, enhancement, compression and segmentation.
CO2 Introduces the concept of feature extraction of segmented images.
CO3 Provides an overview of various multimedia tools.

Syllabus:

Fundamental Steps in Image Processing: Element of visual perception, a simple image model, sampling and quantization, some basic relationships between pixel, image geometry in 2D, image enhancement in the spatial domain.

Introduction to spatial and frequency methods: Basic gray level transformations, histogram equalization, local enhancement, image subtraction, image averaging, basic spatial, filtering, smoothing spatial filters, sharpening spatial filters.

Introduction to the Fourier transformation: Discrete fourier transformation, fast Fourier transformation, filtering in the frequency domain, correspondence between filtering in the spatial and frequency domain smoothing frequency-domain filters, sharpening frequency-domain filters, homomorphic filtering,

Some basic morphological algorithms: Line detection, edge detection, gradient operator, edge linking and boundary detection, thresholding, region-oriented segmentation, representation schemes like chain codes, polygonal approximations, boundary segments, skeleton of a region.

Representation and Description:

Introduction to Image Compression: JPEG, MPEG, Wavelets

Readings

1. Rafael C. Gonzalez and Richard E.Woods, **Digital Image Processing**, Prentice–Hall of India, 2002

2. William K. Pratt, **Digital Image Processing: PIKS Inside** (3rd ed.), John Wiley & Sons, Inc., 2001

3. Bernd Jahne, **Digital Image Processing**, (5th revised and extended edition), Springer, 2002

4. S. Annadurai and R. Shanmugalakshmi, **Fundamentals of Digital Image Processing**, Pearson Education, 2007

5. M.A. Joshi, **Digital Image Processing: An Algorithmic Approach**, Prentice-Hall of India, 2006

6. B. Chanda and D.D. Majumder, **Digital Image Processing and Analysis**, Prentice-Hall of India, 2007

MCSE202: COMPILER DESIGN

Course Objectives: The course aims to develop the ability to design, develop, and test a functional compiler/ interpreter for a subset of a popular programming language.

Course Learning Outcomes:

On completing this course, the student will be able to:

CO1: describe how different phases of a compiler work.

CO2: implement top-down and bottom-up parsing algorithms.

CO3: use tools like Lex and Yacc to implement syntax-directed translation.

Syllabus:

Unit- I Lexical and Syntactic Analysis: Review of regular languages, design of a lexical analyzer generator, context-free grammars, syntactic analysis: top-down parsing: recursive descent and predictive parsing, LL(k) parsing; bottom-up parsing: LR parsing, handling ambiguous in bottom-up parsers.

Unit-II Syntax directed translation: Top-down and bottom-up approaches, data types, mixed mode expression; subscripted variables, sequencing statement, subroutines and functions: parameters calling, subroutines with side effects.

Unit-III Code generation, machine dependent and machine-independent optimization techniques.

Readings:

1. Alfred V. Aho, Ravi Sethi, D. Jeffrey Ullman, Monica S. Lam, **Principles, Techniques and Tools**, Pearson Education India, 2nd edition,, 2013.
2. A.V. Aho, M. S. Lam, R. Sethi and J. D. Ullman, **Compilers,** Pearson, 2016.
3. Dick Grune, Kees van Reeuwijk, Henri E .Bal, Ceriel J.H. Jacobs, K Langendoen, **Modern Compiler Design,** Springer, 2012.

MCSE 203: NATURAL LANGUAGE PROCESSING [3-0-1]