Course Structure for M.Tech in Computer Science with specialization in Image Processing

First Semester

Course Code	Name of Course	Internal Marks	Ext. Marks	Total Marks	Credits
CSD101	Digital Image Processing	50	50	100	3
CSD102	Computer Graphics	50	50	100	3
CSD103	Advanced Data Structures and Algorithms	50	50	100	3
Electives					
	Elective 1	50	50	100	3
	Elective 2	50	50	100	3
Laboratory					
CSD108L	Image Processing Lab -I	100	0	100	1
CSD109L	Computer Graphics Lab	100	0	100	1
Total Credits					17

Second Semester

Course Code	Name of Course	Internal Marks	Ext. Marks	Total Marks	Credits
CSD201	Seminar	100	0	100	2
CSD202	Random Processes	50	50	100	3
CSD203	Computer Vision	50	50	100	3
CSD204	Pattern Recognition	50	50	100	3
Electives					
	Elective 1	50	50	100	3
	Elective 2	50	50	100	3
Laboratory					
CSD209	Image Processing Lab II	100	0	100	1
CSD210	Image Processing Lab III	100	0	100	1
Total Credits					19

Third Semester

Course Code	Name of Course	Internal Marks	Ext. Marks	Total Marks	Credits
CSD301	Project Progress Evaluation	100	200	300	18

Fourth Semester

Course Code	Name of Course	Internal Marks	Ext. Marks	Total Marks	Credits
CSD302	Project Dissertation Evaluation	100	200	300	18

List of Electives
Semester I

Course Code	Name of Course	Internal Marks	Ext. Marks	Total Marks	Credits
CSD104	Advanced Computer Networks	50	50	100	3
CSD105	Multimedia Systems	50	50	100	3
CSD106	Artificial Neural Networks and Fuzzy Systems	50	50	100	3
CSD107	Data Mining	50	50	100	3

Semester II

Course Code	Name of Course	Internal Marks	Ext. Marks	Total Marks	Credits
CSD205	Natural Language Processing	50	50	100	3
CSD206	Medical Imaging Techniques	50	50	100	3
CSD207	Distributed Computing	50	50	100	3
CSD208	Data Compression	50	50	100	3

CSD101 DIGITAL IMAGE PROCESSING

Module – I

Digital image fundamentals

Introduction: Digital Image- Steps of Digital Image Processing Systems-Elements of Visual Perception - Connectivity and Relations between Pixels. Simple Operations- Arithmetic, Logical, Geometric Operations. Mathematical Preliminaries - 2D Linear Space Invariant Systems - 2D Convolution - Correlation 2D Random Sequence - 2D Spectrum.

Module – II

Image transforms and enhancement

Image Transforms: 2D Orthogonal and Unitary Transforms-Properties and Examples. 2D DFT- FFT – DCT - Hadamard Transform - Haar Transform - Slant Transform - KL Transform -Properties And Examples.Image Enhancement:- Histogram Equalization Technique- Point Processing-Spatial Filtering-In Space And Frequency - Nonlinear Filtering-Use Of Different Masks.

Module – III

Image restoration and construction

Image Restoration: Image Observation And Degradation Model, Circulant And Block Circulant Matrices and Its Application In Degradation Model - Algebraic Approach to Restoration- Inverse By Wiener Filtering - Generalized Inverse-SVD And Interactive Methods - Blind Deconvolution-Image Reconstruction From Projections.

Module – IV

Image compression & segmentation

Image Compression: Redundancy And Compression Models -Loss Less And Lossy.

Loss Less- Variable-Length, Huffman, Arithmetic Coding - Bit-Plane Coding, Loss Less Predictive Coding, Lossy Transform (DCT) Based Coding, JPEG Standard - Sub Band Coding.

Image Segmentation: Edge Detection - Line Detection - Curve Detection - Edge Linking And Boundary Extraction, Boundary Representation, Region Representation And Segmentation, Morphology-Dilation, Erosion, Opening And Closing. Hit And Miss Algorithms Feature Analysis

Module – V

Color and multispectral image processing

Color Image-Processing Fundamentals, RGB Models, HSI Models, Relationship Between Different Models. Multispectral Image Analysis - Color Image Processing Three Dimensional Image Processing-Computerized Axial Tomography-Stereometry-Stereoscopic Image Display-Shaded Surface Display.

References

1 Digital Image Processing, Gonzalez.R.C & Woods. R.E., 3/e, Pearson Education, 2008.

2. Digital Image Processing, Kenneth R Castleman, Pearson Education,1995.
3. Digital Image Procesing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, McGraw Hill Education ,2009. Pvt Ltd, NewDelhi
4. Fundamentals of Digital image Processing, Anil Jain.K, Prentice Hall of India, 1989.
5. Image Processing, Sid Ahmed, McGraw Hill, New York, 1995.

CSD102 COMPUTER GRAPHICS

Module 1.

Introduction to 3D graphics: 3D transformation for right handed coordinate systems- Parallel projections on X-Y plane – Perspective projections- 1, 2, 3 vanishing points – Handling points at infinity – Reconstruction of 3D images – Clipping – 2D Cyrus Beck clipping – 3D Sutherland Cohen clipping

Module 2.

Curves & Surfaces: Conics – Parametric forms for circle, ellipse, and parabola – Bezeir curves – Need for cubic parametric curves – Conditions for smoothly joining curve segments – B-Splines – Uniform, Periodic, Open, Non uniform rational B splines – Quadratic surfaces – Parametric bi-cubic surfaces

Module 3.

Hidden Surface Removal: Hidden Line Removal - Haloed Line Algorithm - Appel's Algorithm. Solid Modeling: Advanced Modeling Techniques - Procedural Models - Fractal Models - Particle Systems, Volume Rendering - Physically Based Modeling - Texture Mapping.

Module 4.

Image Manipulation & Encoding: Basic Concepts in Image Processing - Signal Theory of Images - Mathematical Models of Signals - Operations on Signals - Spatial Domain & Frequency Domain -Discrete Fourier Transform - Filters - Sampling & Colour Quantization - Encoding & Basic Compression Techniques - Run-Length & Entropy Coding. Image Formats.

Module 5.

Introduction to Open GL, Basic structure of Open GL Program, Open GL command syntax, Open GL Rendering pipeline, Open GL related Libraries, simple Open GL Programs.

REFRENCES:

1. Procedural Elements for Computer Graphics - David B. Rogers, Tata Me Graw Hill ,2001.
2. Computer Graphics C version, Donald Hearn, M Pauline Baker, 2/E Pearson Education, 2003
3. Fundamentals of Interactive Computer Graphics – Foly, Van Dam, Feiner, Hughes, AW 1990
4. Theory & Problems of Computer Graphics - Schaum's Outline Series, Me Graw Hill ,2009.
5. Image Processing for Computer Graphics - Jonas Gomes & Luiz Velha, Springer,1997.

6. Digital Image Processing - Rafael C. Gonzalez & Paul Wintz, AW,1987.
7. Open GL Program guide. Dave Shreiner, Mason woo, Jackie Neider, Tom Davis Pearson Edition ,2007

CSD103 ADVANCED DATA STRUCTURES AND ALGORITHMS

Module I

Mathematics Review, background model – Algorithm analysis – running time calculations – General rules – Solutions for the maximum subsequence sum problem – Logarithms in the running time – checking analysis.

Module II

Abstract Data Type (ADT) – List ADT – Array implementation of lists – Linked List – Doubly and circularly linked lists – Stack ADT – Queue ADT – Trees: Binary trees – Binary search trees -B-Trees

Module III

Hashing: Hash function – open Hashing – Closed Hashing – Priority Queues (Heaps): Binary Heap – Applications of priority queues Sorting: Insertion Sort – Shell Sort – Heapsort – Mergesort – Quicksort. Binomial Heaps- Fibonacci Heaps- Disjoint Sets- Union by Rank and Path Compression

Module IV

Graph Algorithms: Topological sort – Shortest Path algorithms – Network Flow Problems – Minimum Spanning tree – Application of DFS. Bipartite Matching.

Module V

Algorithm Design Techniques – Geedy Algorithms: Scheduling problem – Huffman codes – Approximate bin packing – Divide and Conquer : Running time of Divide and Conquer algorithms – Closest – Points problem – The selection problem – Theoretical Improvements for Arithmetic Problems.

References:

1. Data Structures and Algorithms Analysis in C++ - Mark Allen Weiss:,2/e,Pearson Education Asia , 2002.

2. Data Structures, Algorithms and Applications in C++ - Sahni : McGraw Hill Publication,1998.

3. Introduction to Algorithms, T. H. Cormen, C. E. Leiserson, R. L. Rivest, Prentice Hall , 2004.

4. Computer Algorithms: Introduction to Design and Analysis, S. Basse,Addison Wesley, 1998.

CSD104 ADVANCED COMPUTER NETWORKS

Module I

TCP/IP Protocol suite: Process to process communication TCP services- TCP features-TCP segment-TCP connection-flow control0 error control- congestion control-TCP variants –Tahoe- Reno- Vegas- new – Reno-SACK- UDP IP Protocol: Datagram-fragmentation, IP package, IP Addresses: Classfull addressing subnetting, supernetting, supernet mask, Classless addressing, variable length block, address allocation delivery- forwarding and routing of IO packets: Forwarding techniques-forwarding with classfull addressing, forwarding with classless addressing

Module II

Routing: Structure of a router-stability/ convergence-link0-state vs distance-vector vs link-vector, conventional routing –RIP- IGRP- BGP- OSPF- multi-path and type –of-service routing, quality-of-services routing -routing heuristics for GS, truck reservation, scaling techniques coping with inaccuracies path caching, routing in telephone networks, Internet QoS routing, interaction with reservation -multicast routing with reservation, fast routing/ switching

Module III

Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology-IP packet deliver-Agent advertisement and discovery, Registration, Tunneling and Encapsulation-Optimizations, Reverse tunneling, Ipv6: dynamic host configuration protocol, Ad hoc networks: Routing- Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics.

Module IV

Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast retransmit / fast recovery, Implications on mobility: Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ fast recovery, Transmission / time-out freezing, selective retransmission, Transaction oriented TCP. Wireless application protocol: Architecture, wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language

Module V

Traffic Management: utility function, traffic models, self similarity, traffic classes, service models, class-based allocation controls at different time scales, renegotiation Applications/middleware: multimedia and adaptive applications, voice and video over IP, real time transport protocols, forward error correction, scalable and QoS-aware servers, web proxy coaching. Cellular vs ad-hoc networks

References

1. TCP/IP Protocol Suite, Behrouz A Forusan T, Third Edition, Tata McGraw Hill ,3/e,2003.
2. Mobile communications, Jochen Schiller,2/e, Addison wisely,2003.
3. Wireless Communications and Networks, Wiilliam Stalling Pearson Education,2002.

4. An Engineering Approach to Computer Networking, Keshav, S.,2/e,Addison-Wesley,2001.
5. TCP/IP network administration Craig Hunt ,3/e, O'Reilly
6. TCP/IP Guide A Comprehensive, Illustrated Internet Protocol reference Charles M Kozierok,3/e,Shroff Publications
7. Adhoc wireless networks A Communicatin Theoretic perspective Ozan K Tangus Gane Luise Cengage Learning,1997.

CSD105 MULTIMEDIA SYSTEMS

Module I

Defining the scope of multimedia: Hypertext and Collaborative research-Multimedia and personalized computing, Multimedia on the map, emerging applications, Multimedia applications, Hybrid Devices, Designers perspective, Key challenges ahead, Technical, regulatory, Social issues Multimedia File systems and information models: The case for multimedia information Models: The case for multimedia information systems, The file system support for continuous Media, Data models for multimedia and Hypermedia information, Content- based Retrieval of Unstructured Data

Module II

Digital Audio Representation and processing : Uses of Audio in Computer application Psychoacoustics, Digital representation of sound, transmission of digital sound, Digital Audio signal processing, Digital music making, Speech recognition and generation, digital audio and computers Video Technology Raster Scanning Principles, Sensors for TCV Cameras, colour Fundamentals, Colour Video, Video performance Measurements, Analog video Artifacts, video equipments, World wide television standards

Module III

Digital Video and Image Compression: Video Compression techniques, standardization of algorithm, The JPEG Image Compression Standard, ITU-T Recommendations, The EPEG Motion video Compression Standard, DVU Technology Virtual reality, Virtual reality systems, Real time computer graphics. The cirual world space Perspective projection, Stereo vision, 3D clipping, Colour theory instruction to animation, the dynamics of numbers, updating real-time graphics, shape and object inbetweening, free-form deformation. Simulation of physical systems, mathematical modeling, collisions, projectiles, introduction to dynamics, motion kinetmatics

Module IV

Distributed Multimedia systems: Architectures and issues for Distributed Multimedia systems Synchronization, and QOS Architecture, The role of Standards, A frame work for Multimedia systems Operating systems Support for Continuous Media Applications : Limitation of work station Operating systems, New OS support, Experiments Using Real Time Mach Goals of Multimedia Systems services, Multimedia systems services Architecture, Media stream protocol Multimedia Devices, Presentation Services, and the User Interface. Client control of continuous multimedia, Device control, Temporal coordination and composition, toolkits, hyper applications.

Module V

Multimedia presentation and Authoring: Design paradigms and User interface, barriers to wide spread use, research trends. Multimedia Services over the Public Networks. Requirements. Architecture.

References:

1. Multimedia Systems by Jhon F. Koegel Buford – Pearson Education,2001.
2. John Vince, "Virtual Reality systems", Addison – Wesley, 1995
3. R. Carey and G. Bell, "The Annotated VRML 2.0 reference", Addison Wesley, 1997

CSD106 ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS

Module I

Basic concepts-single layer perceptron-Multi layer perceptron-Adaline-Madaline- Learning rules-Supervised learning-Back propagation networks-Training algorithm, Advanced algorithms-Adaptive network- Radial basis network modular network-Applications

Module II

Introduction- unsupervised learning -Competitive learning networks-Kohonen self organising networks-Learning vector quantisation - Hebbian learning – Hopfield network-Content addressable nature, Binary Hopfield network, Continuous Hopfield network Travelling Salesperson problem - Adaptive resonance theory –Bidirectional Associative Memory-Principle component Analysis

Module III

Introduction – crisp sets an overview – the notion of fuzzy sets – Basic concepts of fuzzy sets – classical logic an overview – Fuzzy logic. Operations on fuzzy sets - fuzzy complement – fuzzy union – fuzzy intersection – combinations of operations – general aggregation operations

Module IV

Crisp and fuzzy relations – binary relations – binary relations on a single set– equivalence and similarity relations – Compatibility or tolerance relations– orderings – Membership functions – methods of generation – defuzzification methods

Module V

Adaptive Neuro Fuzzy based inference systems – classification and regression trees: decision tress, Cart algorithm – Data clustering algorithms: K means clustering, Fuzzy C means clustering, Mountain clustering, Subtractive clustering – rule base structure identification – Neuro fuzzy control: Feedback Control Systems, Expert Control, Inverse Learning, Specialized Learning, Back propagation through Real –Time Recurrent Learning.

Reference Books

1."Neuro Fuzzy and Soft computing", Jang J.S.R.,Sun C.T and Mizutani E – Pearson education, 2004

2"Fundamentals of Neural Networks", Laurene Fauseett, Prentice Hall India, New Delhi,1994.

3"Fuzzy Logic Engineering Applications", Timothy J.Ross, McGrawHill,NewYork,1997.

4“Neural networks,Fuzzy logics,and Genetic algorithms”, S.Rajasekaran and G.A.Vijayalakshmi Pai Prentice Hall of India,2003

5”Fuzzy Sets and Fuzzy Logic”, George J.Klir and Bo Yuan, Prentice Hall Inc., New Jersey,1995

6 “Principles of Soft Computing” S.N.Sivanandam, S.N.Deepa Wiley India Pvt Ltd.

CSD107 DATA MINING

Module I

Introduction:- Datamining- DataMining on what kind of data, Datamining Functionalities, Classification of DataMining Systems, Major Issues on Datamining, Introduction to OLAP,OLAP technology for Data Mining, Data warehousing, Data warehousing to Datamining, Optimizing Data for mining, Data preprocessing**.**

Module II

Data Mining Primitives:- Datamining Querylanguage, Association Rules in largeDatamining , KDD Process, Fuzzy sets and logic, , Classification and Prediction**:-** Information retrieval, Dimensional Modeling of Data, Pattern Matching, Estimation Error- Em,MLE.

Module III

Models based on Summarization:- Bayes Theorem, Chi squared Statistics Regression, Decision Tree. Neural Networks, Genetic Algorithms. **Cluster Analysis**- Outlier, Cluster Vs Classification, Clustering Issues, impact of Outliers on clustering, clustering problems, Clustering Approaches.

Module IV

Clustering Algorithms:- Hierarchical algorithm-SingleLink, MSTSingle Link, Complete Link, Average Link, Dendrogram. Partitional Algorithm-MST,Squared Error, K-Means, Nearest Neighbor, PAM, BEA, GA, Categorical algorithm,Large Database.

Module V

Web Mining:- Introduction, Webdata, Web Knowledge Mining Taxonomy, Web Content mining, Web Usage Mining Research, Ontology based web mining Research, Web mining Applications.

References:

1**.** DataMining Concepts and Techniques -Jaiwei Han Micheline Kamber,2/e, Morgan Kaufmann, 2006.

2. Introduction to Data Mining, Adriaan, Addison Wesley Publication,2005.

3. Data Mining Techniques, A.K.Pujari, University Press,2002.

CSD202 RANDOM PROCESSES

Module 1:

Probability theory & random variables :

Probability axioms, conditional probability, discrete and continuous random variables, cumulative distribution function (CDF), probability mass function (PMF), probability density function (PDF), conditional PMF/PDF, expected value, variance, functions of a random variable, expected value of the derived random variable, multiple random variables, joint CDF/PMF/PDF

Module II:

Functions of multiple random variables, multiple functions of multiple random variables, independent/uncorrelated random variables, sums of random variables, moment generating function, random sums of random variables.The sample mean, laws of large numbers, central limit theorem, convergence of sequence of random variables.

Module III :

Introduction to random processes, specification of random processes, *n*th order joint PDFs, independent increments, stationary increments, Markov property, Markov process and martingales, Gaussian process, Poisson process and Brownian motion, Mean and correlation of random processes, stationary, wide sense stationary, ergodic processes, Mean-square continuity, mean-square derivatives.

Module IV : Random processes as inputs to linear time invariant systems: power spectral density, Gaussian processes as inputs to LTI systems, white Gaussian noise.
Discrete-time Markov chains: state and n-step transition probabilities, Chapman-Kolmogorov equations, first passage probabilities, classification of states, limiting state probabilities.

Module V : Series representation of random process: Fourier series, Karhunen-Loeve expansion, Mercer's theorm, sampled band-limited processes, filtering using series representation

References:

1. "*Probability, Random Variables and Stochastic Processes"*, A. Papoulis and S. U. Pillai: 4th edition, 2002, McGraw Hill.
2. "Probability and Random Processes", Geoffrey Grimmett: 3rd edition, 2001, Oxford University Press
3. "Probability and Random Processes", V. Krishnan: 2006, John Wiley & Sons
4. "Probability and Random Processes for Electrical Engineering", Albert Leon Garcia: 1993, Prentice Hall

CSD203 COMPUTER VISION

MODULE 1

Image formation and Image model-Components of a vision system-Cameras-Radiometry-Light in space-Light in surface- sources, shadows and shading, Color-Human color perception-Representation of color- A model for image color-Surface color from image color

MODULE 2

Early vision-Linear Filters and Convolution-Shift variant Linear system- Spatial Frequency and Fourier Transforms-Samoling and Aliasing-Filters as Templates-Normalized co relation and finding patterns-Edge detection-Texture Representation ,Analysis and Application

MODULE 3

Multiple images-The Geometry of multiple views-Stereopsis-Affine structure from motion-
Elements of Affine Geometry-Affine structure and motion from two images-Affine structure and motion from multiple images-From Affine to Euclidean images.

MODULE 4

Middle level vision-Segmentation by clustering-Shot Boundary Detection and Background Subtraction-Image segmentation by clustering pixels-Segmentation by Graph-Theoretic clustering- Segmentation by fitting a model-The Hough Transform-Fitting lines-Fitting curves- Fitting as a probabilistic inference problem-Robustness-Segmentation and fitting using probabilistic methods.

MODULE 5

High level vision-:Geometric methods-Model based vision-Obtaining hypothesis by pose consistency, pose clustering and using Invariants- Verification-smooth surface and their outlines-Aspect graphs- Range data-Range Data segmentation- Range image Registration and model acquisition-Object Recognition.

References:

1. Computer vision – A modern Approach , David A forsyth & Jean ponce , Prentice Hall ,2002.
2. “Computer vision and Applications” , Bernd Jahne and Horst HauBecker Academic press ,2000.

CSD204 PATTERN RECOGNITION

MODULE 1

Basics of Pattern recognition-Bayesian Decision Theory-Minimum error rate classification

Classifiers, discriminant functions, decision surfaces -The normal density and discriminant-functions for the Normal density-Continuous and discrete valued features-Bayesian Belief Networks

MODULE 2

Methods for parameter estimation-Maximum-Likelihood (ML) estimation-Maximum a posteropri (MAP) estimation-Bayesian estimation-Gaussian mixture model (Both unimodal-and multimodal distribution)-Expectation-maximization method

MODULE 3

Sequential pattern classification-Discrete hidden Markov model-Continuous density hidden Markov models-Non-parametric techniques for density estimation-Parzen-window method

K-Nearest Neighbour method

MODULE 4

Dimension reduction methods-Principal component analysis-Fisher discriminant analysis

Linear discriminant function based classifiers-Perceptron-Minimum Mean Squared Error (MME) method -The Ho-Kashyap method-Non-metric methods for pattern classification

Decision trees-Classification and Regression Tree (CART)

MODULE 5

Regression-Linear models for regression-Polynomial regression-Bayesian regression-Unsupervised learning and clustering-Criterion functions for clustering-Algorithms for clustering:-K-means, -Hierarchical clustering -Cluster validation

References

1. Pattern Classification, R.O.Duda, P.E.Hart and D.G.Stork, John Wiley, 2001
2. Pattern Recognition, S.Theodoridis and K.Koutroumbas, 4th Ed., Academic Press, 2009
3. Pattern Recognition and Machine Learning, C.M.Bishop, Springer, 2006

CSD205 NATURAL LANGUAGE PROCESSING

Module I

Introduction and Overview; Brief Review of Regular Expressions and Automata; Finite State Transducers; Word level Morphology.

Module II

N-gram Models, Statistical estimation and smoothing for language models; Introduction to HMMs ; Parts of Speech Tagging.

Module III

Parsing with CFGs; Lexicalized and Probabilistic Parsing; Language and Complexity.

Module IV

Representation of Meaning; Semantic Analysis; Lexical Semantics; Word Net; Word Sense Disambiguation.

Module V

Discourse understanding; Natural Language Generation; Techniques of Machine Translation; Indian Language Case studies.

REFERENCES:

1. "Speech and Language Processing" Jurafsky and Martin ,2/e,Prentice Hall,2009.
2. Natural Language Understanding. James Allen. The Benajmins/Cummings Publishing Company Inc. ,1988.
3. Foundations of Statistical Natural Language Processing, Christopher D. Manning and Hinrich Schütze. 1999. MIT Press.

CSD206 MEDICAL IMAGING TECHNIQUES

Module I

Ultra Sound In Medicine - Introduction, production of ultra sound - properties principles of image formation, capture and display - principles of A -mode , B-mode and M-mode display - Doppler Ultra sound and Colour flow mapping - Applications of diagnostic ultra sound.

Module II

X-Ray computed tomography - Principles of sectional imaging - scanner configuration - data acquisition system - image formation principles - conversion of x-ray data in to scan image - 2D image reconstruction techniques - Iteration and Fourier methods.Types of CT scanners.

Module III

Magnetic Resonance Imaging - Principles of MRI pulse sequence- image acquisition and reconstruction techniques MRI instrumentation magnets gradient system RF coils - receiver system Functional MRI - Application of MRI .

Module IV

Radio isotope imaging - Rectilinear scanners , Linear scanners - SPECT - PET Gamma Camera Radio nuclides for imaging, Emission Computed Tomography.

Module V

Infra red Imaging - Physics of thermography - Imaging systems - Pyroelectric vidicon camera clinical themography - liquid crystal thermography.

References :

1."The Physics of Medical Imaging", S Webb ,Adam Highler, Bristol,IEEE Press New York,1988.

2. " Principle of Computed Tomography" , A C Kak, IEEE Press New York

3. " Medical Image Formation Preception and Measurement ". G A Hay.

CSD207 DISTRIBUTED COMPUTING

Module I.

Distributed systems _ architecture. Key characteristics _ resource sharing openness _concurrency _ scalability _ fault tolerance _ transparency. Design issues _ naming _ communication _ software structure _ workload allocation _ consistency maintenance. User requirement _ functionality _ Quality of service _ reconfigurability. Review of network protocols. Interprocess communication- building blocks _ client server communication group communication. Interprocess communication in UNIX. Remote procedure calling. Design issues _ interface definition language exception handling. Implementation - interface processing _ communication handling. Binding. Case study _ sun RPC _ Java RMI.

Module II.

Distributed Operating systems- kernel _ processes and threads _ Naming and protection - Communication and Invocation. Distributed file service - design issues _ interfaces _ implementation techniques. Case study sun NFS. Name service SNS and DNS.

Module III.

Time and co-ordination. Synchronizing physical clocks -logical time and logical clocks. Distributed co-ordination _distributed mutual exclusion _ elections. Replication _ basic architectural model _ consistency and request ordering.

Module IV.

Shared data and transactions _ client server _ fault tolerance and recovery _ transactions _ nested transactions. Concurrency control - locks _ optimistic concurrency control _ timestamp ordering. Distributed transactions _ atomic commit protocols _ concurrency control in distributed transactions _ distributed deadlocks _ transactions with replicated data.

Module V.

Recovery and fault tolerances. Transaction recovery _ logging -shadow versions _ fault model for transactions. Fault tolerance _ characteristics. Hierarchical and group masking of faults. Security _ authentication and key distribution _ logic of authentication _ digital signatures.

References

1. "Distributed Systems _ Concepts and Design", George Coulouris, et. al., Third Edition., Addison Wesely, 2002
2. "Communicating Sequential Processes", C.A.R.Hoare, Prentice Hall, 1980
3. "Parallel and Distributed Computation : Numerical Methods", Dimitri P.Bertsekas, John N.Tsitiklis, Prentice Hall International, Inc., 1989
4. "Internetworking with TCP/IP Vol III: Client server Programming and Applications", Douglas Comer and David L.Stevens, Prentice Hall, New York, 1990
5. "Introduction to Distributed Algorithms", Gerard Tel, Cambridge University Press, 1994
6. "Distributed Computer systems", H.S.M.Sedan, Butterworths, London, 1988
7. "Introduction to Distributed and Parallel Computing", Joel M.Crichlow, Prentice Hall, New York, 1988
8. "Introduction to Parallel Processing", M.Sasikumar, et.al., PHI, New Delhi, 2000

CSD208 DATA COMPRESSION

Module-I :

Introduction Compression Techniques - Lossy compression & Lossless compression, modeling and compression Mathematical modeling for Lossless compression- Physical models probability models, Markov Models and composite source models. Mathematical modeling for Lossy compression - physical models, Probability models and linear systems models.

Module - II :

Different Methods of Compression Basic Techniques : Run length encoding, RLE Text compression, RLE image compression and scalar quantization. Statistical Methods : Information theory concepts, Huffman coding, Adaptive Huffman coding, facsimile compression Arithmetic coding and Adaptive, Arithmetic coding and Text compression.

Dictionary methods : String compression, LZ 77, LZSS, LZ78,LZW, Unix compression, GIF image, ARC and PKZIP, Data compression patterns. Wavelet methods : Fourier Image compression, Multi Resolution decomposition and JPEG 2000.

Module-III :

Image Compression Intuitive Methods, Image Transforms, JPEG, Progressive Image compression, Vector quantization, Adaptive Vector Quantization, Block Matching, Block Truncation coding. Context Tree weighting, Block Decomposition, Binary Tree predictive coding, Quad Trees and Finite Automata Methods.

Module -IV :

Video Compression Analog Video, Composite and Components Video, Digital Video, Video compression, MPEG and H.261.

Module - V :

Audio Compression Sound, Digital Audio, The Human Auditory System, μ -Law and A-Law companding, ADPCM Audio compression and MPEPG-1 Audio Layers.

References :

1. "Data compression - The complete Reference", David salomon, Springer Publications (4th Edition),2006.
2. "The Data compression Book", Mark Nelson and Jean-Loup Gailly, Mark Nelson and Jean-Loup Gailly, BPB publications (2nd Edition),1995
3. "Introduction to Data Compression", Khalid Sayood, Harcout India(P) Ltd,2/e ,New Delhi,2002.