R19

ACADEMICRULESANDREGULATIONS

For

B.Tech.(MINORDEGREE)

in

ARTIFICIALINTELLIGENCEANDMACHINELEARNING

VIGNANABHARATHIINSTITUTEOFTECHNOLOGY

(AUTONOMOUS)

Aushapur(V),Ghatkesar(M),MedchalDist.,Hyderabad, Telangana-501301

B.Tech.,withMinorDegreePrograminAI&ML
R19-Course Structure

Year/Semester	**Theory** (*Whichisnotstudiedinregular B.Tech.course*)	**Laboratory** (3Hours,1.5Credits)	**Total Credits**
III-ISemester	Foundations of Artificial Intelligence (3Hours,3Credits)	Artificial Intelligence Laboratory	4.5
III-IISemester	AIApplications (3Hours,3Credits)	AIApplicationsLaboratory (2Hours,1Credit)	4
IV- ISemester	(EitheronlinethroughMOOCSor off-line Class) Machine Learning **OR** DeepLearning (3Hours,3Credits)	(The corresponding Laboratory)Machine Learning Laboratory **OR** Deep Learning Laboratory	4.5
IV-IISemester	**Anyoneofthefollowing subjects:** 1. RoboticsProcessAutomation 2. NaturalLanguageProcessing 3. Gametheory 4. ComputerVision& Robotics 5. Speech&VideoProcessing 6. Soft Computing	--	3
IV-IISemester	MiniProject	--	2
TotalCredits			**18**

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MACHINELEARNING

B.Tech.IVYearISem. **LTPC**

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Prerequisites:

1. DataStructures
2. Knowledgeonstatisticalmethods

CourseObjectives:

- Thiscourseexplainsmachinelearningtechniquessuchasdecisiontreelearning, Bayesianlearning etc.
- Tounderstandcomputationallearning theory.
- Tostudythepatterncomparison techniques.

CourseOutcomes:

- Understandtheconceptsofcomputational intelligencelikemachinelearning
- Ability to get the skill to apply machine learning techniques to address the real timeproblemsin different areas
- UnderstandtheNeuralNetworksanditsusageinmachinelearningapplication.

UNIT-I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidateelimination, inductive bias**.**

DecisionTreeLearning–Introduction,decisiontreerepresentation,appropriateproblemsfor decisiontree learning, the basic decision tree learning algorithm, hypothesis space search in decisiontree learning,inductivebiasindecisiontreelearning,issues indecisiontreelearning.

UNIT-II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT-III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, MaximumLikelihoodandleastsquarederrorhypotheses,maximumlikelihoodhypotheses

for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis,sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT-IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewardsandactions, temporal difference learning, generalizingfrom examples, relationship to dynamic programming.

UNIT-V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarkson explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2- Using prior knowledge to alter the search objective, usingprior knowledge toaugment search operators.

CombiningInductiveandAnalyticalLearning–Motivation,inductive-analytical approachestolearning, using prior knowledge to initialize the hypothesis.

TEXTBOOK:

1. Machine Learning–TomM.Mitchell, - MGH

REFERENCE BOOK:

2. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor &Francis

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CourseObjective:The objectiveofthislabisto get anoverviewofthevariousmachine learning techniques and can able to demonstrate those using python.

CourseOutcomes: Afterthecompletionofthecoursethestudentcan ableto:

- understandcomplexityofMachineLearningalgorithmsandtheirlimitations;
- understandmodernnotionsindataanalysis-orientedcomputing;
- becapableofconfidentlyapplyingcommonMachineLearningalgorithmsin practiceandimplementing their own;
- BecapableofperformingexperimentsinMachineLearningusingreal-worlddata.

ListofExperiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extractthedatafromdatabaseusing python
3. Implementk-nearestneighboursclassificationusingpython
4. Giventhefollowingdata,whichspecifyclassificationsforninecombinationsofVAR1 and VAR2predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR 1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and lowcredit-worthiness.

mediumskiingdesignsingletwentiesno->highRisk high
golf trading marriedforties yes ->low Risk
lowspeedwaytransportmarriedthirtiesyes->medRisk
mediumfootball bankingsingle thirties yes -> low Risk
high flyingmedia marriedfiftiesyes -> high Risk low
football security single twenties no -> med Risk
mediumgolf media single thirties yes -> med Risk
mediumgolf transport married forties yes -> low Risk

high skiingbanking singlethirties yes -> high Risk
lowgolfunemployedmarriedfortiesyes->highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find theunconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implementlinearregressionusingpython.
7. Implement NaïveBayestheoremtoclassifytheEnglishtext
8. Implementanalgorithmtodemonstratethesignificanceofgeneticalgorithm
9. ImplementthefinitewordsclassificationsystemusingBack-propagationalgorithm

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DEEPLEARNING

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CourseObjectives:

- TointroducethefoundationsofArtificialNeuralNetworks
- ToacquiretheknowledgeonDeep LearningConcepts
- TolearnvarioustypesofArtificialNeuralNetworks
- Togainknowledgetoapplyoptimizationstrategies

CourseOutcomes:

- AbilitytounderstandtheconceptsofNeural Networks
- Abilityto selecttheLearningNetworksinmodelingreal worldsystems
- AbilitytouseanefficientalgorithmforDeep Models
- Abilitytoapplyoptimizationstrategiesforlargescaleapplications

UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets,Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter PropagationNetworks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT-IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping,ParameterTypingandParameterSharing,SparseRepresentations,Bagging

and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT-V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second- Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXTBOOKS:

1. DeepLearning:AnMITPressBookByIanGoodfellowandYoshuaBengioand AaronCourville
2. NeuralNetworksandLearningMachines,SimonHaykin,3rdEdition,Pearson Prentice Hall.

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DEEPLEARNINGLAB

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CourseObjectives:

1. ToBuildtheFoundationof DeepLearning.
2. ToUnderstandHowtoBuildtheNeuralNetwork.
3. Toenablestudentstodevelopsuccessfulmachinelearningconcepts.

CourseOutcomes:

1. UpontheSuccessfulCompletionoftheCourse, theStudentswouldbeableto:
2. LearntheFundamentalPrinciplesofDeepLearning.
3. IdentifytheDeepLearningAlgorithmsforVariousTypesofLearningTasksin various domains.
4. Implement DeepLearningAlgorithmsandSolveReal-world problems.

LISTOFEXPERIMENTS:

1. SettinguptheSpyderIDEEnvironment and ExecutingaPython Program
2. InstallingKeras,TensorflowandPytorchlibrariesandmakinguseofthem
3. ApplyingtheConvolutionNeuralNetworkon computervision problems
4. Imageclassification onMNISTdataset(CNNmodelwith Fullyconnectedlayer)
5. ApplyingtheDeepLearningModelsinthefieldofNaturalLanguage Processing
6. TrainasentimentanalysismodelonIMDBdataset,useRNNlayerswith LSTM/GRU notes
7. ApplyingtheAutoencoder algorithmsforencodingthereal-worlddata
8. ApplyingGenerativeAdversialNetworksforimagegenerationandunsupervised tasks.

TEXTBOOKS:

1. DeepLearningbyIanGoodfellow,YoshuaBengioandAaronCourville,MITPress.
2. TheElementsofStatisticalLearning by T.Hastie,R.Tibshirani,andJ. Friedman, Springer.
3. ProbabilisticGraphicalModels.Koller,andN.Friedman,MITPress.

REFERENCES:

1. Bishop,C.M.,PatternRecognitionandMachineLearning,Springer,2006.
2. Yegnanarayana,B.,ArtificialNeuralNetworksPHILearningPvt. Ltd, 2009.
3. Golub,G.H.,andVanLoan,C.F.,MatrixComputations,JHUPress,2013.

4. SatishKumar,NeuralNetworks:AClassroomApproach,TataMcGrawHill Education, 2004.

EXTENSIVE READING:

1. http://www.deeplearning.net
2. https://www.deeplearningbook.org/
3. https://developers.google.com/machine-learning/crash-course/ml-intro
4. www.cs.toronto.edu/~fritz/absps/imagenet.pdf
5. http://neuralnetworksanddeeplearning.com/

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ROBOTICPROCESSAUTOMATION

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Course Objectives: Aim of the course is to make learners familiar with the concepts of Robotic Process Automation.

Course Outcomes:

1. DescribeRPA,whereitcan beappliedand howit's implemented.
2. Identifyand understandWeb Control Room andClientIntroduction.
3. Understandhowto handlevariousdevices andtheworkload.
4. Understand Botcreators,Webrecordersandtask editors.

UNIT-I

Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases –AutomationAnywhereEnterprisePlatform–Advancedfeaturesandcapabilities– WaystocreateBots.

UNIT-II

Web Control Room and Client Introduction-Features Panel-Dashboard (Home, Bots, Devices,Audit,Workload, Insights) - FeaturesPanel –Activity(ViewTasksinProgress and Scheduled Tasks) – Bots (View Bots Uploaded and Credentials).

UNIT-III

Devices (View Development and Runtime Clients and Device Pools) - Workload (QueuesandSLACalculator)-AuditLog(ViewActivitiesLoggedwhich areassociated with Web CR) - Administration (Configure Settings, Users, Roles, License and Migration)- DemoofExposedAPI's–Conclusion–ClientintroductionandConclusion.

UNIT-IV

BotCreatorIntroduction–Recorders–SmartRecorders–WebRecorders–ScreenRecorders-TaskEditor–Variables-CommandLibrary–LoopCommand–ExcelCommand– Database Command –String Operation Command -XML Command.

UNIT-V

TerminalEmulatorCommand-PDFIntegrationCommand-FTPCommand-PGP

Command-Object Cloning Command - Error Handling Command- Manage WindowsControl Command – Workflow Designer –Report Designer.

TEXTBOOKS:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots with the leading RPA tool–UiPath Kindle Edition.

REFERENCES:

1. RoboticProcessAutomationACompleteGuide-2020EditionKindleEdition.

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NATURALLANGUAGE PROCESSING

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Prerequisites:

- Datastructures, finiteautomataand probabilitytheory

Course Objectives

- Introduce to some of the problems and solutions of NLP and their relation to linguisticsand statistics.

Course Outcomes

- Showsensitivitytolinguisticphenomenaandanabilitytomodelthemwithformal grammars.
- Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, andestimate parameters using supervised and unsupervised training methods.
- Abletodesign,implement,andanalyzeNLPalgorithms
- AbletodesigndifferentlanguagemodelingTechniques.

UNIT– I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models.

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, and Performances of the Approaches.

UNIT-II

Syntax Analysis: Parsing Natural Language, Tree banks: A Data-Driven Approach to Syntax, Representation ofSyntactic Structure, ParsingAlgorithms, Models for AmbiguityResolution in Parsing, Multilingual Issues.

UNIT-III

SemanticParsing: Introduction,SemanticInterpretation,SystemParadigms,WordSense Systems, Software.

UNIT-IV

Predicate-ArgumentStructure,MeaningRepresentationSystems, Software.

UNIT-V

Discourse Processing: Cohesion, Reference Resolution, Discourse Cohesion and Structure

LanguageModeling: Introduction,N-GramModels,LanguageModelEvaluation,Parameter Estimation,LanguageModelAdaptation,TypesofLanguageModels,Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling.

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice– Daniel M. Bikel and Imed Zitouni, Pearson Publication.

2. NaturalLanguageProcessingand InformationRetrieval:TanvierSiddiqui, U.S.Tiwary

REFERENCES:

3. SpeechandNaturalLanguageProcessing-DanielJurafsky&JamesHMartin,Pearson Publications.

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GAMETHEORY

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Course Objectives: The course will explain in depth the standard equilibrium concepts (such as Nash equilibrium, Subgame-Perfect Nash Equilibrium, and others)in Game Theory.

Course Outcomes:

1. Understandthebasicconceptsofgametheoryandsolutions
2. Understanddifferent typesofequilibrium interpretations
3. Understandandanalyze knowledgeandsolutionconcepts
4. Analyze extensivegames withperfect information

UNIT-I

Introduction-Game Theory, Games and Solutions Game Theory and the Theory of Competitive Equilibrium, Rational Behavior, The Steady State and Deductive Interpretations, Bounded Rationality Terminology and Notation. Nash Equilibrium-Strategic Games, Nash Equilibrium Examples Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information.

UNIT-II

Mixed, Correlated, and Evolutionary Equilibrium - Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium, Rationalizability and Iterated Elimination of Dominated Actions -Rationalizability Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions.

UNIT-III

Knowledge and Equilibrium -A Model ofKnowledge Common Knowledge, Can People Agree to Disagree? Knowledge and Solution Concepts, The Electronic Mail Game

UNIT-IV

Extensive Games with Perfect Information-Extensive Games with Perfect Information Sub game Perfect Equilibrium Two Extensions of the Definition of a Game The Interpretation of a Strategy, Two Notable Finite Horizon Games, Iterated Elimination of Weakly Dominated, Strategies Bargaining Games -Bargaining and Game Theory, A Bargaining Game of Alternating Offers Subgame Perfect Equilibrium Variations and Extensions.

UNIT-V

Repeated Games - The Basic Idea Infinitely Repeated Games vs.\ Finitely Repeated Games, Infinitely Repeated Games: Definitions Strategies as Machines Trigger Strategies:NashFolk,TheoremsPunishingforaLimitedLengthofTime:APerfectFolk Theorem for the Limit of Means Criterion Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion, Rewarding Players Who Punish: A Perfect Folk Theorem for the Discounting Criterion The Structure of Subgame Perfect Equilibria Under the Discounting Criterion Finitely Repeated Game.

TEXTBOOKS:

1. AcourseinGameTheory,M.J.OsborneandA.Rubinstein, MITPress
2. GameTheory,RogerMyerson,HarvardUniversity Press
3. GameTheory,D.FudenbergandJ.Tirole,MITPress

REFERENCEBOOKS:

1. TheoryofGamesandEconomicBehavior,J.vonNeumannandO.Morgenstern, NewYork: JohnWiley and Sons.
2. GamesandDecisions,R.D.LuceandH.Raiffa,NewYork:JohnWileyandSons.
3. GameTheory,G.Owen,2ndEdition,NewYork:AcademicPress.

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COMPUTERVISIONANDROBOTICS

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Pre-Requisites:UGlevelCoursein LinearAlgebraandProbability.

Course Objectives:

1. Tounderstandthe FundamentalConcepts related Tosources,shadowsandshading.
2. To understand theGeometryof Multiple Views.

Course Outcomes:

1. Implementfundamentalimageprocessingtechniquesrequiredforcomputer vision.
2. Implementboundarytracking techniques.
3. Applychaincodesandotherregiondescriptors,HoughTransformforline,circle, and ellipse detections.
4. Apply3Dvisiontechniquesand Implementmotionrelatedtechniques.
5. Developapplications usingcomputervision techniques.

UNIT-I

CAMERAS: PinholeCameras.

Radiometry–Measuring Light: Light in Space, Light Surfaces, Important Special Cases.

Sources,Shadows,AndShading: QualitativeRadiometry,SourcesandTheirEffects,Local ShadingModels, Application: Photometric Stereo, Inter reflections: Global ShadingModels.

Color: ThePhysicsofColor,HumanColorPerception,RepresentingColor,AModelfor Image Color, Surface Color from Image Color.

UNIT-II

LinearFilters: LinearFiltersandConvolution,ShiftInvariantLinearSystems,Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates.

EdgeDetection: Noise, EstimatingDerivatives,DetectingEdges.

Texture: RepresentingTexture,Analysis(andSynthesis)UsingOrientedPyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

UNIT-III

TheGeometryofMultipleViews:TwoViews
Stereopsis:Reconstruction,HumanStereposis,BinocularFusion,UsingMoreCameras
SegmentationbyClustering: WhatIsSegmentation?HumanVision:GroupingandGetstalt, Applications:ShotBoundaryDetectionandBackgroundSubtraction,ImageSegmentationby ClusteringPixels,SegmentationbyGraph-TheoreticClustering,

UNIT-IV

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: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice.

Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples

UNIT-V

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations.

Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach toCamera Calibration,TakingRadialDistortionintoAccount, Analytical PhotoGrammetry, An Application: Mobile Robot Localization.

Model-Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

TEXTBOOKS:

1. DavidA.ForsythandJeanPonce:ComputerVision–AModernApproach,PHILearning (Indian Edition), 2009.

REFERENCEBOOKS:

1. E.R.Davies: Computer and Machine Vision–Theory, Algorithms and Practicalities, Elsevier(Academic Press),4th edition,2013.
2. R.C.GonzalezandR.E.Woods"DigitalImageProcessing"AddisonWesley2008.
3. RichardSzeliski"ComputerVision:AlgorithmsandApplications"Springer- Verlag London Limited 2011.

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SPEECHANDVIDEOPROCESSING

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CourseObjectives: Knowledgeon speechand videoprocessing techniques

Course Outcomes:

1. Describe the mechanisms of human speech production systems and methods for speech feature extraction.
2. Understandbasicalgorithms ofspeechanalysis andspeechrecognition.
3. Explainbasictechniquesindigitalvideoprocessing,includingimaging characteristics and sensors.
4. Applymotionestimationand object tracking algorithms on videosequence.

UNIT-I:

Speech processing concepts: The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform forspeech recognition, convolution,linearandnonlinearfilterbanks, spectral estimation of speech using DFT. Linear Prediction analysis of speech.

UNIT-II:

Speech recognition: Real and Complex Cepstrum, application of cepstral analysis to speech signal, feature extraction for speech, static and dynamic feature for speech recognition, robustness issues, discrimination in the feature space, feature selection, MFCC, LPCC, Distance measures, vector quantization models. Gaussian Mixturemodel, HMM.

UNIT-III:

Basics of Video Processing: Video formation, perception and representation: Principle of color video, video cameras, video display, pinhole model, CAHV model, Camera motion, Shape model, motionmodel,Scenemodel,two-dimensionalmotionmodels.Three-Dimensional Rigid Motion, Approximation of projective mapping.

UNIT-IV:

MotionestimationTechniques: Opticalflow,motionrepresentation,motionestimation criteria, optimization methods, pixel-based motion estimation, Block matching algorithm,gradientBased,Intensitymatching,featurematching,frequencydomain

motion estimation, Depth from motion. Motion analysis applications: Video Summarization, video surveillance.

UNIT-V:

Object tracking and segmentation: 2D and 3D video tracking, blob tracking, kernel basedcountertracking,featurematching,filteringMosaicing,videosegmentation, mean shift based, active shape model, video shot boundarydetection. Interframe compression, Motion compensation

TEXTBOOKS:

1. FundamentalsofSpeechrecognition–L.RabinerandB.Juang,PrenticeHallsignal processing series.
2. DigitalVideoprocessing,AMuratTekalp,Prentice Hall.
3. Discrete-time speech signal processing: principles and practice, Thomas F.Quatieri, Coth.
4. Video Processing and Communications, YaoWang,J.Osternann and QinZhang, Pearson Education.

REFERENCEBOOKS:

1. "SpeechandAudioSignalProcessing", B.GoldandN.Morgan,Wiley.
2. "Digitalimagesequenceprocessing,Compression, andanalysis",ToddR.Reed, CRC Press
3. "HandbookofImageand Video processing",AlBovik,Academicpress,second

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SOFTCOMPUTING

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Course objectives:

1. To make the student to understand the role of imprecision and uncertainty in real worldscenarios.
2. Toexplain therole ofSoftComputingin addressingtheimprecision and uncertainty.
3. ToexplaintheprincipalcomponentsofsoftcomputingthatincludeFuzzySetsandFuzzy Logic, Artificial Neural Networks, Genetic Algorithms and Rough Sets.
4. TolearntheDesignandImplementationofSoftComputingmethodologies.
5. Toexplainthedesignofhybridsystemswhichiscombinationofoneormoresoft computing methodologies mentioned.

Course outcomes:

1. Abilityto representUncertainty/imprecisiondata.
2. Abilityto select a suitable method ofSoft Computingto solve aparticularproblem.
3. Abilityto buildhybrid systems usingSoft Computing techniques.

UNITI

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNITII

Backpropagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization - Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory - Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike NeuronModels.

UNITIII

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNITIV

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators - Convergence of Genetic Algorithm.

UNITV

HybridSystems-NeuralNetworks,FuzzyLogicandGenetic -GABasedWeightDetermination- LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP-Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

TEXT BOOKS:

1. S.N.Sivanandam,S.N.Deepa,"PrinciplesofSoftComputing",WileyIndiaPvt.Ltd., 2nd Edition, 2011.
2. S.Rajasekaran, G.A.Vijayalakshmi Pai,"Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.

REFERENCES

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun,Eiji Mizutani, ―Neuro-Fuzzy and Soft Computing‖, Prentice-Hall of India, 2002.
2. KwangH.Lee,―FirstcourseonFuzzyTheoryandApplications‖,Springer, 2005.
3. GeorgeJ.KlirandBoYuan,―FuzzySetsandFuzzyLogic-TheoryandApplications‖, Prentice Hall, 1996.
4. James A. Freeman and David M. Skapura, ―Neural Networks Algorithms, Applications, and Programming Techniques‖, Addison Wesley, 2003.