AKTU B.E./B.Tech ECE Sem 8 syllabus

Machine Learning

Machine Learning

UNIT-I

INTRODUCTION – Well defined learning problems, Designing a Learning
System, Issues in Machine Learning; THE CONCEPT LEARNING TASK -
General-to-specific ordering of hypotheses, Find-S, List then eliminate algorithm, Candidate elimination algorithm, Inductive bias

UNIT-II

DECISION TREE LEARNING - Decision tree learning algorithm- Inductive
bias- Issues in Decision tree learning; ARTIFICIAL NEURAL NETWORKS –
Perceptrons, Gradient descent and the Delta rule, Adaline, Multilayer networks,
Derivation of backpropagation rule Backpropagation AlgorithmConvergence,
Generalization;

UNIT-III

Evaluating Hypotheses: Estimating Hypotheses Accuracy, Basics of sampling
Theory, Comparing Learning Algorithms; Bayesian Learning: Bayes theorem,
Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian
belief networks, EM algorithm;

UNIT-IV

Computational Learning Theory: Sample Complexity for Finite Hypothesis
spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound
Model of Learning; INSTANCE-BASED LEARNING – k-Nearest Neighbour

Learning, Locally Weighted Regression, Radial basis function networks, Case-
based learning

UNIT-V

Genetic Algorithms: an illustrative example, Hypothesis space search, Genetic

Programming, Models of Evolution and Learning; Learning first order rules-
sequential covering algorithms-General to specific beam search-FOIL;

REINFORCEMENT LEARNING - The Learning Task, Q Learning.

Wireless & Mobile Communication

Wireless & Mobile Communication

Evolution of mobile radio communication fundamentals.
General Model of
Wireless Communication Link, Types of Signals, Cellular Infrastructure,
Cellular System Components, Antennas for Cellular Systems, Operation of
Cellular Systems, Channel Assignment, Frequency reuse, Channel Assignment
strategies, Handoff Strategies Cellular Interferences, Sectorization; Wireless
Channel and Radio Communication, Free Space Propagation Model, Channel
Noise and Losses, Fading in Land Mobile Systems, Multipath Fading, Fading
Effects on Signal and Frequency, Shadowing.

Wireless Channel Modeling: AWGN Channel, Rayleigh Channel, Rician
Fading Channel, Nakagami Fading Channel, Ocumura and Hata Path Loss

Model; Channel Modelling: Stochastic, Flat Fading, Wideband Time-Dispersive Channel Modelling.

Theory of Vocoders, Types of Vocoders; Spread Spectrum Modulation,
Pseudo-Noise Codes with Properties and Code Generation Mechanisms, DSSS
and FHSS Systems, Time Hopping and Hybrid Spread Systems; Multicarrier
Modulation Techniques. Zero Inter Symbol Interference Communication
Techniques, Detection Strategies, Diversity Combining Techniques: Selection
Combining, Threshold Combining, Equal Gain Combining, Maximum Ratio Combining; Spatial Diversity and Multiplexing in MIMO Systems, Channel
Estimation.
Equalization Techniques: Transversal Filters, Adaptive Equalizers, Zero
Forcing Equalizers, Decision Feedback Equalizers, and related algorithms.

Multiplexing and Multiple Access: FDMA, TDMA, CDMA, OFDMA, SC-
FDMA, IDMA Schemes and Hybrid Method of Multiple Access Schemes,

RAKE Receiver; Multiple Access for Radio Packet Systems: Pure ALOHA,
Slotted ALOHA, CSMA and their versions; Packet and Pooling Reservation
Based Multiple Access Schemes.

GSM system for mobile Telecommunication, General Packet Radio Service,
Edge Technology; CDMA 2000, Wireless Local Loop, IMT 2000 and UMTS,
Long Term Evolution (LTE), Mobile Satellite Communication, Introduction to

Mobile Adhoc Networks, Li-Fi Communication, Ultra-Wideband Communication, Mobile data networks, Wireless Standards IMT 2000,
Introduction to 4G and concept of NGN.

Satellite & RADAR systems

REC083 SATELLITE & RADAR SYSTEMS

I Elements of Satellite Communication, Orbital mechanics, look angle and orbit determination, launches and lauch vehicle, orbital effects, Introduction to geo- synchronous and geo-stationary satellites.

II Satellite sub-systems: Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system, Introduction to satellite link design, basic transmission theory, system noise temperature and G/T ratio, design of down link and uplink, design of satellite links for specified C/N, satellite data communication protocols.

III Direct broadcast satellite television and radio, satellite navigation and the global positioning systems, GPS position location principle, GPS receivers and codes, Satellite Signal Acquisition, GPS navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation.

IV Introduction to radar, radar block diagram and operation, radar frequencies, Applications of radar, The Radar Equation: Detection of signals in noise , Receiver noise and the signal to noise ratio, Probabilities of detection and false alarm, Integration of Radar Pulses, Radar cross section of targets, Radar cross section fluctuations, Transmitter Power, Pulse Reception Frequency , Antenna Parameters, System Losses.

V Tracking Radar: sequential lobbing, conical scan, mono-pulse Tracking, low angle tracking, tracking in range. MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay Line cancellers, Staggered Pulse Reception Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance.

Text / Reference Books:
1. Merrill I. Skolnik “Introduction to Radar Systems”, Mc Graw- Hill.

2. J.C.Toomay, Paul J. Hannen “Principles of Radar”, PHI Learning.
3. B.Pratt, A.Bostian, “Satellite Communications”, Wiley India.
4. D. Roddy, “Satellite Communications”, McGrawhill Education.