

AKTU B.E./B.Tech CIVIL 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

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

Algorithm Convergence,

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.

Engineering Hydrology and Ground Water Management

Engineering Hydrology & Groundwater Management

UNIT - I Introduction: hydrologic cycle, water budget equations, world water balance, Precipitation:

Forms of precipitation, measurement. Introduction to characteristics of storm. Abstraction from

Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration-measurement

and estimation; Initial Losses- Interception & Depression storage;

Infiltration- process, capacities

indices, measurement & estimation.

UNIT - II Runoff and Hydrographs: Runoff characteristics of stream, mass curve. Hydrograph,

Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic

and instantaneous unit hydrographs.

UNIT - III Flood: Rational method, empirical formulae, flood

frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

UNIT - IV Groundwater: Introduction, forms of subsurface water, aquifers & its properties, Occurrence of ground water, hydro-geology & aquifers, Ground water movement.

Steady and unsteady flow through confined and unconfined aquifers.

Well Hydraulics: Single &

Multiple well system, partially penetrating wells, Image wells, Mutual interference of wells, well losses, specific capacity.

UNIT - V Water Wells: Introduction to Well construction, completion and Development. Pumping equipment for water wells, maintenance of wells.

Ground Water quality, Contamination of groundwater and its Control, Ground Water Modelling

Techniques and exploration, Artificial discharge and Recharge of Ground Water, Roof-top rainwater harvesting and recharge.

Finite Element Method

UNIT - I Calculus of variation, Introduction to calculus of variations, Introduction to equilibrium

equations in elasticity, Euler's Lagrange's equations, Principal of virtual work, virtual displacements,

Principles of minimum potential energy, boundary-value, initial value problems, Flexibility approach,

Displacement approach, Different problems in structural analysis.

UNIT - II FEM Procedure, Derivation of FEM equations by variation principle polynomials, Concept

of shape functions, Derivation for linear simplex element, Need for integral forms, Interpolation

polynomials in global and local coordinates. Weighted residual

Methods: Concept of weighted

residual method, Derivation of FEM equations by Galerkin's method, Solving cantilever beam

problem by Galerkin's approach, Derivation of shape functions for CST triangular elements, Shape functions for rectangular elements, Shape functions for quadrilateral elements.

UNIT - III Higher-order Elements: Concept of iso-parametric elements, Concept of sub-parametric and super-parametric elements, Concept of Jacobin matrix. Numerical Integration: Numerical Integration, one point formula and two-point formula for 2D formula, Different problems of numerical integration evaluation of element stiffness matrix, Automatic mesh generation schemes,

UNIT - IV Pascal's triangle law for 2D shape functions polynomial, Pascal's triangle law for 3D shape function polynomials, Shape function for beam elements, Hermitian shape functions. Convergence: Convergence criteria, Compatibility requirements, Geometric isotropy invariance, Shape functions for iso-parametric elements, Special characteristics of stiffness matrix, Direct method for deriving shape functions using Lagrange's formula, Plane stress problems.

UNIT - V Analysis of structures: Truss elements, Analysis of truss problems by direct stiffness method. Analysis of frames and different problems, Different axis-symmetric truss problems.