AP5251 SOFT COMPUTING AND OPTIMIZATION TECHNIQUES

DETAILED SYLLBUS

OBJECTIVES:

- To learn various Soft computing frameworks.
- To familiarizes with the design of various neural networks.
- To understand the concept of fuzzy logic.
- To gain insight onto Neuro Fuzzy modeling and control.
- To gain knowledge in conventional optimization techniques.
- To understand the various evolutionary optimization techniques

UNIT I NEURAL NETWORKS

Machine Learning using Neural Network, Learning algorithms, Supervised Learning Neural Networks – Feed Forward Networks, Radial Basis Function, Unsupervised Learning Neural Networks – Self Organizing map, Adaptive Resonance Architectures, Hopfield network

UNIT II FUZZY LOGIC

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

UNIT III NEURO-FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies.

UNIT IV CONVENTIONAL OPTIMIZATION TECHNIQUES

Introduction to optimization techniques, Statement of an optimization problem, classification, Unconstrained optimization-gradient search method-Gradient of a function, steepest gradient-conjugate gradient, Newton's Method, Marquardt Method, Constrained optimization – sequential linear programming, Interior penalty function method, external penalty function method.

UNIT V EVOLUTIONARY OPTIMIZATION TECHNIQUES

Genetic algorithm - working principle, Basic operators and Terminologies, Building block hypothesis, Travelling Salesman Problem, Particle swam optimization, Ant colony optimization.

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3. James A. Freeman and David M. Skapura, Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Edn., 2003.

4. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, Neuro-Fuzzy and Soft Computing, Prentice Hall of India, 2003.

5. Mitchell Melanie, An Introduction to Genetic Algorithm, Prentice Hall, 1998

6. Simon Haykins, Neural Networks: A Comprehensive Foundation, Prentice Hall International Inc, 1999.

7. Singiresu S. Rao, Engineering optimization Theory and practice, John Wiley & sons, inc, Fourth Edition, 2009

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