

CP5007 BIO-INSPIRED COMPUTING

DETAILED SYLLABUS

UNIT I INTRODUCTION

Introduction to algorithm - Newton' s method - optimization algorithm - No-Free-Lunch Theorems - Nature-Inspired Metaheuristics -Analysis of Algorithms -Nature Inspires Algorithms -Parameter tuning and parameter control.

UNIT II RANDOM WALK AND ANEALING

Random variables - Isotropic random walks - Levy distribution and flights - Markov chains - step sizes and search efficiency - Modality and intermittent search strategy - importance of randomization- Eagle strategy-Annealing and Boltzmann Distribution - parameters -SA algorithm - Stochastic Tunneling.

UNIT III GENETIC ALOGORITHMS AND DIFFERENTIAL EVOLUTION

Introduction to genetic algorithms and - role of genetic operators - choice of parameters - GA varients - schema theorem - convergence analysis - introduction to differential evolution - varients - choice of parameters - convergence analysis - implementation.

UNIT IV SWARM OPTIMIZATION AND FIREFLY ALGORITHM

Swarm intelligence - PSO algorithm - accelerated PSO - implementation – convergence analysis - binary PSO - The Firefly algorithm - algorithm analysis - implementation – varients Ant colony optimization toward feature selection.

UNIT V APPLICATION IN IMAGE PROCESSING

Bio-Inspired Computation and its Applications in Image Processing: An Overview - FineTuning Enhanced Probabilistic Neural Networks Using Meta-heuristic-driven Optimization - Fine-Tuning Deep Belief Networks using Cuckoo Search - Improved Weighted Thresholded Histogram Equalization Algorithm for Digital Image Contrast Enhancement Using Bat Algorithm - Ground Glass Opacity Nodules Detection and Segmentation using Snake Model - Mobile Object Tracking Using Cuckoo Search

OBJECTIVES:

To Learn bio-inspired theorem and algorithms

To Understand random walk and simulated annealing

To Learn genetic algorithm and differential evolution

To Learn swarm optimization and ant colony for feature selection

To understand bio-inspired application in image processing

REFERENCES:

1. Eiben,A.E.,Smith,James E, "Introduction to Evolutionary Computing", Springer 2015.
2. Helio J.C. Barbosa, "Ant Colony Optimization - Techniques and Applications", Intech 2013
3. Xin-She Yang , Jao Paulo papa, "Bio-Inspired Computing and Applications in Image Processing",Elsevier 2016
4. Xin-She Yang, "Nature Ispired Optimization Algorithm,Elsevier First Edition 2014
5. Yang ,Cui,Xlao,Gandomi,Karamanoglu , "Swarm Intelligence and Bio-Inspired Computing", Elsevier First Edition 2013