

CSE11124	Pattern Recognition and Soft Computing	L	T	P	C
Version 1.0	Contact Hours 45	3	0	0	3
Pre-requisite/Exposure	---				
Co-requisite	---				

Course Objectives:

- To familiarize concepts of pattern recognition systems
- To introduction fuzzy logic and soft computing principles

Course Outcomes:

CO1: Discuss components of a pattern recognition system

CO2: Explore dimensionality reduction and classification techniques
CO3 : Validate clustering techniques

CO4: Explain concepts of representation learning

CO5: Compare Hard and Soft computing methodologies

Course Description:

Pattern recognition is the automated recognition of patterns and regularities in data. It has applications in statistical data analysis, signal processing, image analysis, information retrieval, bioinformatics, data compression, computer graphics and machine learning. Pattern recognition has its origins in statistics and engineering; some modern approaches to pattern recognition include the use of machine learning, due to the increased availability of big data and a new abundance of processing power. Soft computing is a set of algorithms,[1] including neural networks, fuzzy logic, and genetic algorithms.[2] These algorithms are tolerant of imprecision, uncertainty, partial truth and approximation. It is contrasted with hard computing: algorithms which find provably correct and optimal solutions to problems.

Course Content:

Units	Lecture Hours
Unit-I: Introduction Components of a pattern recognition system, feature selection vs feature extraction, types of learning techniques, descriptive statistics,	9
Unit-II: Dimensionality reduction PCA, SVD, LDA, Classification Techniques K-NN, Decision Trees, Naïve Bayes.	9
Unit-III: Clustering: Similarity and Dissimilarity Measures, Clustering Techniques: K-Means, Hierarchical Clustering, Cluster Validity Indices: Dunn and DB Index	9

Units	Lecture Hours
Unit-IV: Representation Learning with Networks : Perceptron, MLP, Backpropagation, Autoencoders, Variational Neural Autoencoders	9
Unit-V: Soft Computing Principles : Hard Logic vs Logic, Membership Functions, Fuzzy Clustering: FCN, EM Fuzzy Algorithms	9

Examination Scheme:

Components	Mid Term	Class Assessment	End Term
Weightage (%)	20	30	50

Relationship between Course Outcomes (COs) and Program Outcomes (POs):

1 = Weakly Mapped, 2 = Moderately Mapped, 3= Strongly Mapped

Course Code	Course Name	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CSE11	Pattern	CO1112	2	3	3	2	2	2	3	-	3	-	-	2	2	1	3
124	Recogni	4.1															
	tion and	CO1112	1	3	2	3	3	2	3	-	3	-	-	2	3	1	3
	Soft	4.2															
	Computi	CO1112	1	2	3	2	3	2	3	-	1	-	-	2	1	1	3
	ng	4.3															
		CO1112	3	2	2	2	3	2	3	-	2	-	-	1	1	1	2
		4.4															
		CO1112	2	2	2	3	3	2	3	-	1	-	-	1	3	3	1
		4.5															
		CO1112	1.	2.	2.	2.	2.	2.	3.	-	2.	-	-	1.6	2.0	1.4	2.4
		4	8	4	4	4	8	0	0		0						