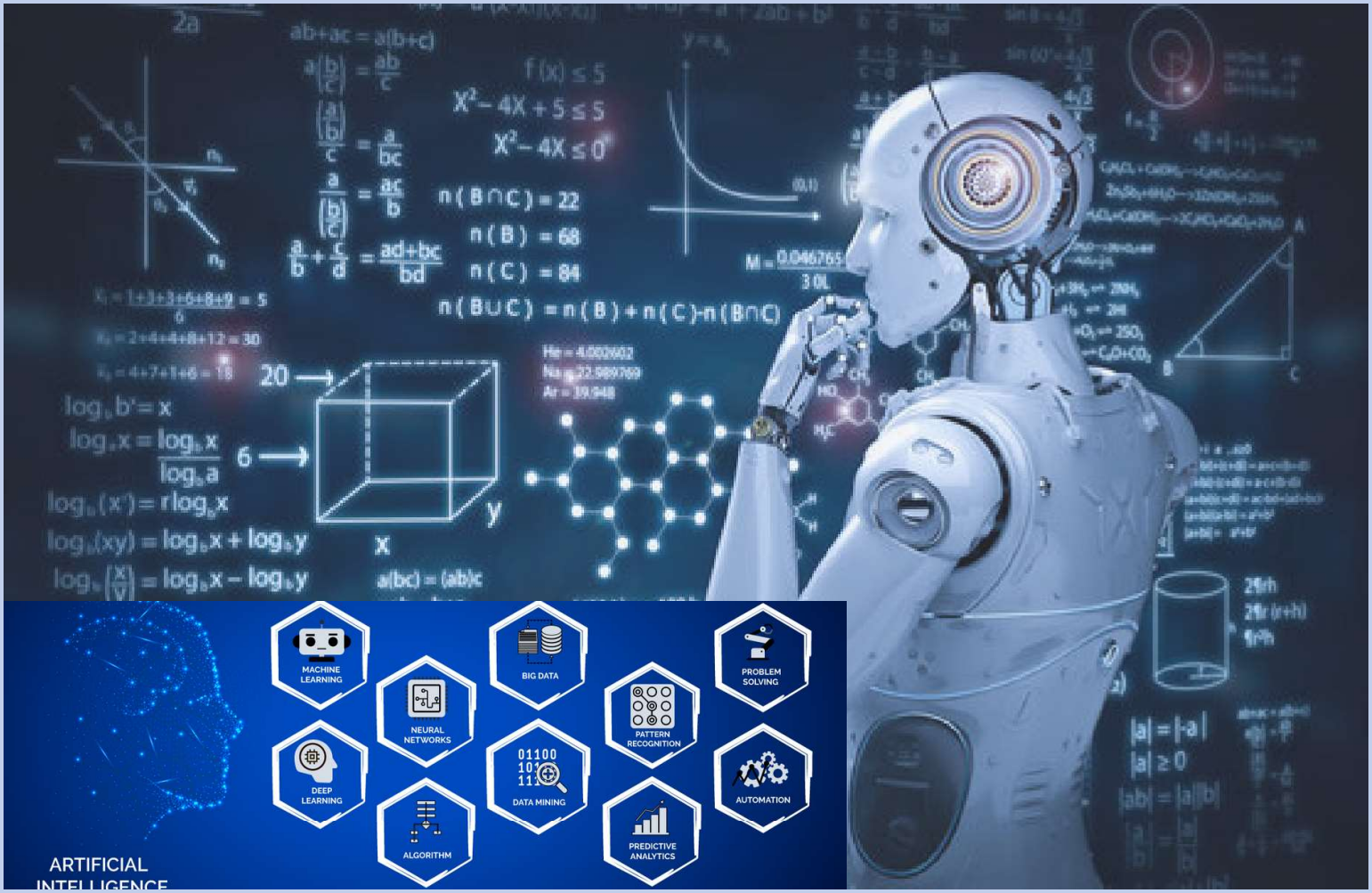
PSG Institute of Technology and Applied Research
Neelambur, Coimbatore - 641 062

Department of Mathematics
&
Department of Computer Science and Engineering

Five Days - Faculty Development Program (FDP)
on
Mathematical Approach to Artificial Intelligence and Machine Learning Algorithms
(23 - 27, July 2024)



About the College

PSG iTech established in 2014 by PSG and Sons' Charities, aims to realize its objective of enhancing youth empowerment through technical education. Our institute caters to various engineering disciplines, focusing on learning, industry engagement of students, innovative and inclusive pedagogy, and ethics. We aim at effective transfer of knowledge, pursuit of truth and moulding the students to become ideal citizens of the country. Within a short span of time, the institution has emerged to be one of the most preferred institutions for the engineering aspirants in Tamil Nadu.

About the Department

The main objective of the Mathematics Department is to make the students proficient engineers who can command engineering fundamentals including experimental, analytical, computational, and design capabilities. The department has well-qualified and experienced faculty members with specializations in Queueing theory, Operations Research, Cryptography, Analysis, Algebra, Discrete Mathematics, Fluid Dynamics, Fuzzy Mathematics, and Applied Mathematics. The department has 10 Ph.D. faculty members out of eleven. The department is an approved research center by Anna University, Chennai.

About the Programme

The objective of this Programme is to understand the AI algorithms and ML algorithms mathematically. The topics covered in this program shall be useful for the faculty members handling B.E./B. Tech. (AI, ML, and CSE). We hope this platform creates an opportunity for the faculty members and researchers to know the subject with a better understanding of algorithms involved in Artificial Intelligence and Machine Learning.

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Assistant Professor (Sr. Grade)/ CSE

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Assistant Professor /Mathematics

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Resource Persons

1. Dr. S. Swamynathan, Professor and Head,
   Department of Information Science and Technology,
   Anna University, Chennai
2. Dr Masilamani V, Professor
   Department of Computer Science and Engineering,
   Indian Institute of Information Technology,
   Design and Manufacturing, Kancheepuram
3. Dr.V. Umadevi, Professor
   Department of Computer Science and Engineering,
   B.M.S. College of Engineering, Bengaluru.
4. Dr. V. Bhuvaneswari, Professor,
   Department of Computer Applications,
   Bharathiar University, Coimbatore
5. Dr Kaspar S, Associate Professor,
   Department of Mathematics, VIT Vellore
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   Department of Mathematics, PSG iTech
8. Dr. R. Manimegalai, Professor & HOD
   Department of Computer Science and Engineering, PSG iTech
9. Dr. R.S. Sankarasubramanian, Professor
   Department of Mathematics, PSG iTech
10. Dr.P.Chinnaraj, Associate Professor
    Department of Mathematics, PSG iTech
11. Dr. S. Vaishnavi, Assistant Professor (Sr. Grade),
    Department of Computer Science and Engineering, PSG iTech

Contact Details

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Registration Details

Registration fee : Rs. 2000/- (Including GST)
Last date for Registration : 20.07.2024

Mode of Payment

Registration is compulsory for all the delegates. The Registration fee includes lunch and refreshment.

The registration fee is to be paid through Online mode.

Beneficiary name: PSG Centre for Non- Formal & Continuing Education
Bank Acc. No. : 1481267367
IFSC Code : CBIN0280913
Bank Name : Central Bank of India
Bank Branch Address: Peelamedu, Coimbatore - 641 004

On request limited accommodation will be provided in the college hostel on payment basis of Rs.500 per day.

Registration Link : https://forms.gle/CcYfwvEKiigTurxK9

Five Day Faculty Development Programme on

"Mathematical Approach to Artificial Intelligence and Machine Learning Algorithms"

Organized by Departments of Mathematics & Computer Science and Engineering

PSG Institute of Technology and Applied Research, Coimbaore - 641 062

Date: 23-07-2024 to 27-07-2024

Topics to be covered in the FDP - AI & ML Theory

S. No	Algorithm	Description	Mathematical Concepts	Expert's Name & Affiliation
1	A* Search Algorithm	The A* algorithm is used in pathfinding and graph traversal. It searches for the shortest path from a start node to a target node by combining the cost to reach a node and the estimated cost to the target (heuristic).	Graph Theory, Heuristics, Optimization	Dr.Kaspar S Associate Professor Department of Mathematics VIT Vellore
2	Fuzzy Logic Systems	Fuzzy logic systems handle reasoning that is approximate rather than precise. They are used in control systems and pattern recognition where binary true/false logic is insufficient.	Fuzzy Set Theory, Logic	Dr S Swamynathan Professor and Head Department of Information Science and Technology, Anna University Chennai
3	Genetic Algorithms	Genetic algorithms are optimization techniques inspired by natural selection. They use operations like mutation, crossover, and selection to evolve solutions to optimization problems over generations.	Probability, Optimization	Dr. V. Bhuvaneswari Professor Department of Compuer Applications Bharathiar University, Coimbatore
4	Hidden Markov Models (HMMs)	HMMs are statistical models used for time series data where the system being modeled is assumed to be a Markov process with unobservable (hidden) states. They are used in speech recognition, bioinformatics, and more.	Probability, Statistics, Matrix Algebra	Dr. M Senthil Kumar Professor Department of Applied Mathematics and Computational Sciences PSG College of Technology Coimbatore

5	K-Nearest Neighbors (KNN)	KNN is a simple, non-parametric algorithm used for classification and regression. It assigns the class of a data point based on the majority class among its k nearest neighbors, determined by a distance metric.	Distance Metrics (Euclidean distance, Manhattan distance, etc.)	Dr. Umadevi V Professor Department of Computer Science and Engineering B.M.S. College of Engineering Bengaluru
6	Linear Regression	Linear regression models the relationship between a dependent variable and one or more independent variables by fitting a linear equation to the observed data. The method uses concepts like least squares to minimize the difference between observed and predicted values.	Statistics, Linear Algebra	Dr. V. Bhuvaneswari Professor Department of Compuer Applications Bharathiar University, Coimbatore
7	Logic Programming (e.g., Prolog)	Logic programming uses formal logic to express facts and rules about problems within a system. Prolog, for instance, is a language that applies logical inference to derive conclusions from known facts and rules.	Predicate Logic, Boolean Algebra	Dr S Swamynathan Professor and Head Department of Information Science and Technology, Anna University Chennai
8	Markov Decision Processes (MDPs)	MDPs provide a mathematical framework for modeling decision-making where outcomes are partly random and partly under the control of a decision maker. They are used in reinforcement learning to model environments.	Probability, Markov Chains, Dynamic Programming	Dr Masilamani V Professor Department of Computer Science and Engineering Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram
9	Naive Bayes Classifier	Naive Bayes classifiers apply Bayes' theorem with strong (naive) independence assumptions between the features. It calculates the posterior probability of each class and assigns the class with the highest probability to the data point.	Probability Theory, Bayes' Theorem	Dr.Kaspar S Associate Professor Department of Mathematics VIT Vellore

10	Neural Networks (including Deep Learning)	Neural networks are a set of algorithms modeled loosely after the human brain. They consist of layers of nodes (neurons) that process input data and adjust weights based on back propagation using gradient descent to minimize the error in predictions.	Calculus, Linear Algebra, Probability, Optimization	Dr. Umadevi V Professor Department of Computer Science and Engineering B.M.S. College of Engineering Bengaluru
11	Principal Component Analysis (PCA)	PCA is a dimensionality reduction technique that transforms the data into a set of orthogonal (uncorrelated) components. It identifies the directions (principal components) in which the data varies the most.	Linear Algebra, Eigenvalues and Eigenvectors, Statistics	Dr. M Senthil Kumar Professor Department of Applied Mathematics and Computational Sciences PSG College of Technology Coimbatore
12	Support Vector Machines (SVM)	SVMs are used for classification and regression tasks. They work by finding the hyperplane that best separates the data into classes. The optimization process involves maximizing the margin between data points of different classes.	Optimization, Linear Algebra, Calculus	Dr Masilamani V Professor Department of Computer Science and Engineering Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram

Topics to be covered in the FDP - AI & ML Lab Exercise

1	Implementation of Uninformed search algorithms (BFS, DFS)	Dr. A. Sunitha Nandhini, Assistant Professor (Selection Grade), Dr. S. Vaishnavi, Assistant Professor (Senior Grade), Ms. M. Karthigha, Assistant Professor (Selection Grade)
2	Implementation of Informed search algorithms (A*, memory-bounded A*)	
3	Implement naïve Bayes models	
4	Implement Bayesian Networks	
5	Build Regression models	
6	Build decision trees and random forests	
7	Build SVM models	
8	Implement ensembling techniques	
9	Implement clustering algorithms	
10	Implement EM for Bayesian networks	
11	Build simple NN models	
12	Build deep learning NN models	