SNABLE
A SaaS Organization

Data Science & Machine Learning

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Step into the future of Data Science & Machine Learning

With the increased usage of Artificial Intelligence as a Service platform provider, Machine Learning algorithms are now becoming more accessible to users without advanced technical knowledge. Also data science's impact is progressing rapidly in various business functions. The collection and understanding of data is important for strategic planning and decision-making processes. Hence, Data Science and Machine Learning together helps in making data-driven decisions. This has led to an increase in the demand for skilled professionals with Machine Learning knowledge rapidly across the global businesses. This further makes the future of Machine Learning very promising. Moreover, research from MarketsandMarkets predicts that the growth in Machine Learning market size will rise to $8.81 billion by this year-end, 2022.

Scope of Data Science & Machine Learning

Due to the growing demand for AI in different decision making processes, both established businesses as well as startups are offering great job opportunities to professionals having knowledge about Data Science and Machine Learning. This includes jobs like ML Engineers, Data scientists, Data Analysts, etc. The average salary of a Data Scientist in India starts at ₹9 lacs per annum, with a scope to rise further with the gradual addition of skills and experience in the field.

Uniqueness:

A unique combination of Data Science and Machine Learning, our 6-month program is specially designed to help you make data-driven decisions easily as these two fields complement each other. Machine Learning is a subfield of Data Science. While Data Science deals with large data and uses scientific methods and advanced analytical techniques to convert it into valuable information; Machine Learning uses its systems to learn from this valuable data and identify patterns. All this helps to make decisions with minimal human involvement.

Curriculum

Foundations

Module 1

Foundations of Data Science
Python for Data Science

- Numpy
- Pandas
- Data Visualization

- **Stats for Data Science**

- Descriptive Statistics
- Inferential Statistics

Module 2

Making Sense of Unstructured Data

- **Introduction**

- What is unsupervised learning, and why is it challenging?
- Examples of unsupervised learning

- **Clustering**

- What is Clustering?
- When to use Clustering
- K-means Preliminaries
- The K-means algorithm
- How to evaluate Clustering
- Beyond K-means: What really makes a Cluster?
- Beyond K-means: Other notions of distance

Module 5

Deep Learning

- What is Image Classification? Introduce ImageNet and show examples
- Classification using a single linear threshold (perceptron)
- Hierarchical representations
- Fitting parameters using back-propagation
- Non-convex functions
- How interpretable are its features?
- Manipulating Deep Nets (Ostrich Example)
- Transfer Learning
- Other applications I: Speech Recognition
- Other applications II: Natural Language Processing

Module 6

Recommendation Systems

- **Recommendations and Ranking**

- What does a recommendation system do?
- What is the Recommendation Prediction Problem? What data do we have?
- Using population averages
- Using population comparisons and ranking

- **Collaborative Filtering**

- Personalization using collaborative filtering using similar users

- Beyond K-means: Data and pre-processing
- Beyond K-means: Big data and Nonparametric Bayes
- Beyond Clustering

• Spectral Clustering, Components, & Embeddings

- What if we do not have features to describe the data or not all are meaningful?
- Finding the principal components in data and applications
- The magic of Eigenvectors I
- Clustering in Graphs and Networks

- Features from graphs: The magic of Eigenvectors II
- Spectral Clustering
- Modularity Clustering
- Embeddings: New features and their meaning

Module 3

Regression and Prediction Learning Break MasterClass on Regression and Prediction

• Classical Linear and Non-Linear Regression and Extensions

- Linear Regression with one and several variables
- Linear Regression for prediction
- Linear Regression for causal inference
- Logistic and other types of Non-Linear Regression

- Personalization using collaborative filtering using similar items
- Personalization using collaborative filtering using similar users and items

• Personalized Recommendations

- Personalization using comparisons, rankings, and users-items
- Hidden Markov Model/Neural Nets, bipartite graph, and graphical model
- Using side-information
- 20 questions and active learning
- Building a system: algorithmic and system challenges

Module 7

Networking and Graphical Models

• Introduction

- Introduction to networks
- Examples of networks
- Introduction to networks
- Examples of networks
- Representation of networks

• Networks

- Centrality measures: degree, eigenvector, and page-rank
- Closeness and betweenness centrality

• Degree distribution, clustering, and small world

- Network models: Erdos-Renyi, configuration model, preferential attachment
- Stochastic models on networks for the spread of viruses or ideas
- Influence maximization

- **Modern Regression with High-Dimensional Data**

- Making good predictions with high-dimensional data; avoiding overfitting by validation and cross-validation
- Regularization by Lasso, Ridge, and their modifications
- Regression Trees, Random Forest, Boosted Trees

- **The Use of Modern Regression for Causal Inference**

- Randomized control trials
- Observational studies with confounding

Module 4

Classification and Hypothesis Testing

- What are anomalies? What is fraud? What are spams?
- Binary Classification: False Positive/ Negative, Precision/Recall, F1-Score
- Logistic and Probit Regression: Statistical Binary Classification
- Hypothesis Testing: Ratio Test and Neyman-Pearson p-values: Confidence Support Vector Machine: Non-statistical Classifier
- Perceptron: Simple Classifier with elegant interpretation

- **Graphical Models**

- Undirected graphical models
- Ising and Gaussian models
- Learning graphical models from data
- Directed graphical models
- V-structures, “explaining away,” and learning directed graphical models
- Inference in graphical models: marginals and message passing
- Hidden Markov Model (HMM) Kalman Filter

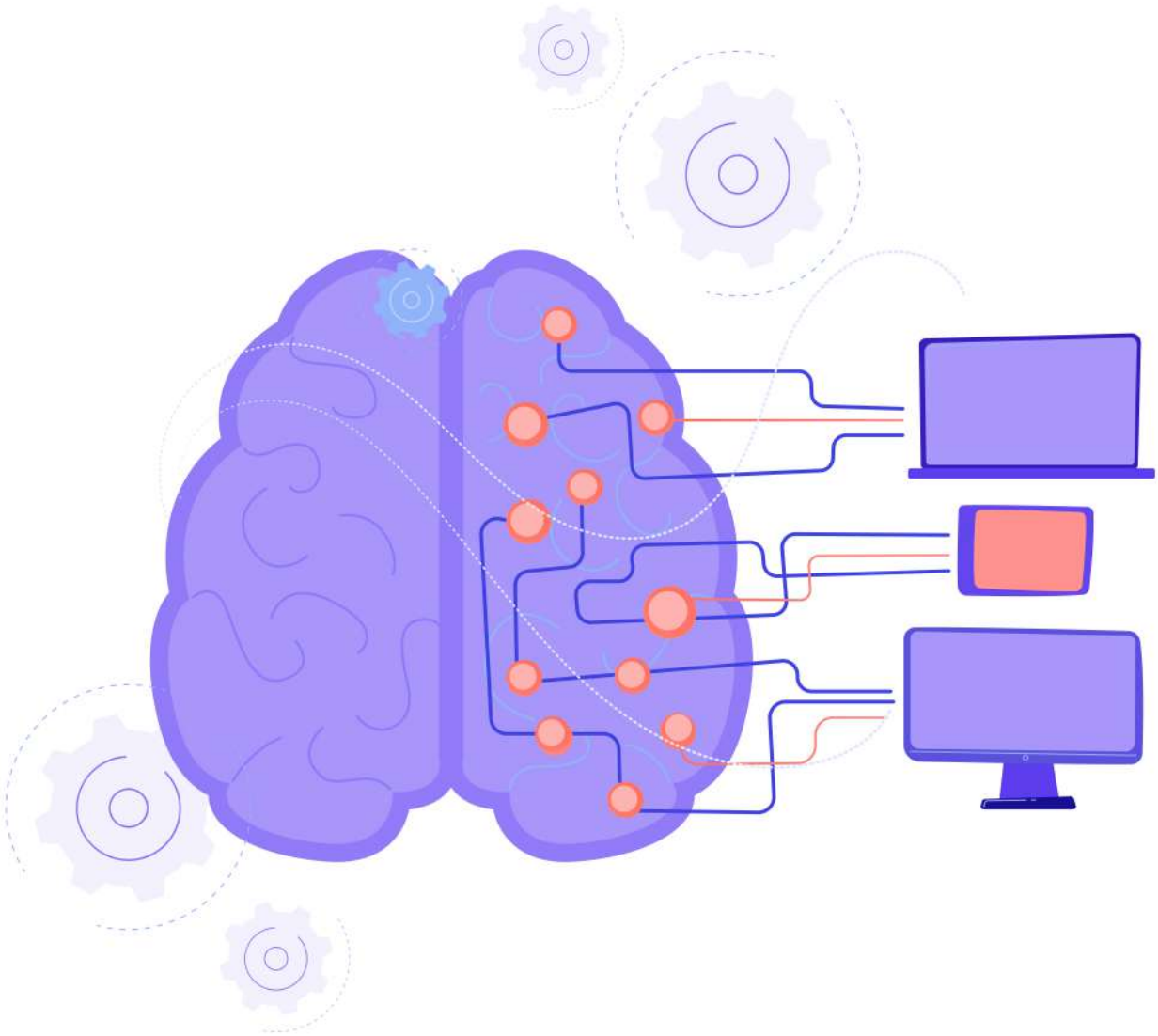
Module 8

Predictive Analytics

- Predictive Modeling for Temporal Data
- Prediction engineering

- **Feature Engineering**

- Introduction
- Feature types
- Deep Feature Synthesis: primitives and algorithms
- Deep Feature Synthesis: stacking



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