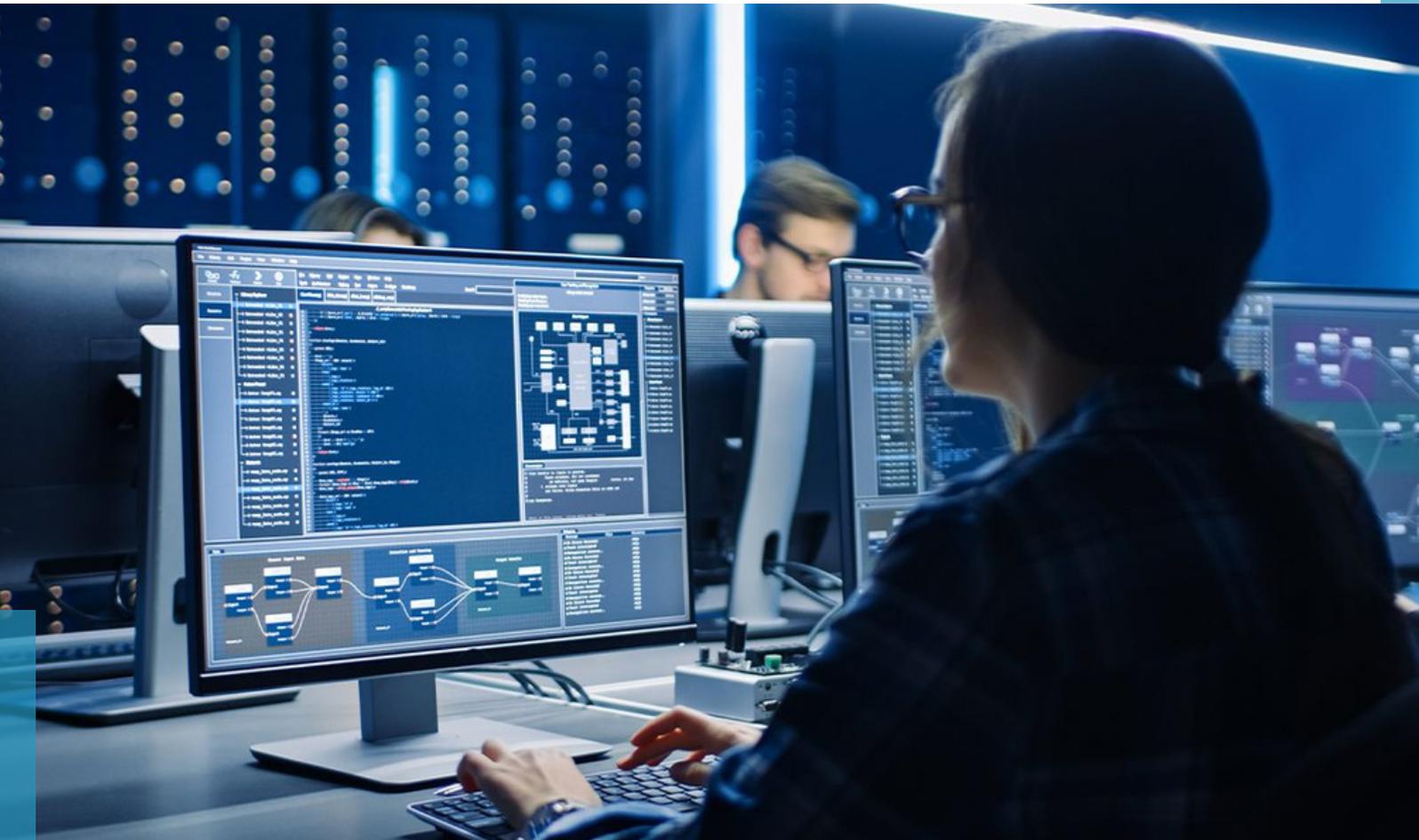




KEY TO YOUR SUCCESS



# DATA SCIENCE & MACHINE LEARNING

IN-DEMAND INDUSTRY SPECIFIC EMERGING TECHNOLOGY



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## ABOUT LET'SPRO ACADEMY

Lets'Pro provides hands-on training on trending technologies and IT certification programs. We help you achieve your educational and career goals. Join hands with us, and you can rest assured that everything you learn will be significant, complete, and meet today's job requirements. LetsPro Academy has emerged to be a strong force in nation-building by also partnering with the government of India, NSDC, NASSCOM, SKILL INDIA, and many such esteemed bodies working at the grass-root level to make India the skill capital of the world.

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# About Course

Machine learning & AI programs can perform tasks without being explicitly programmed to do so. It involves computers learning from data provided so that they carry out certain tasks. For simple tasks assigned to computers, it is possible to program algorithms telling the machine how to execute all steps required to solve the problem at hand, on the computer's part, no learning is needed. For more advanced tasks, it can be challenging for a human to manually create the needed algorithms.

“In practice, it can turn out to be more effective to help the machine develop its own algorithm, rather than having human programmers specify every needed step”

-Ethem Alpaydin



The goal is to turn data  
into information, and information  
into insight.



## Artificial Intelligence & Reinforcement Learning

### Element of Reinforcement Learning |

- Environment
- Agent, State, Action
- Reward and Punishment

### Models, Values and Policies |

- Model based vs Model free
- On Policy vs Off Policy
- Policy based vs Value based
- Greedy policy
- Bellman Equation

### Markov Chains |

- Markov Property/ Markov Chains
- Transition Probability
- Markov Reward Process
- Markov Decision Process
- Optimal Policy/ Value
- Policy Evaluation /Iteration

## Monte Carlo Methods |

- Prediction of Actions
- Importance Sampling
- Discounting
- Pre-rewards

## Temporal Difference |

- Advantages of TD
- Q Learning
- Sarsa
- DQN (Deep Q Learning)

## Robotics and Gym Environment |

- Core APIs
- Spaces
- Wrappers
- Atari
- Custom Environment
- Vectorized Environments

### AutoEncoders |

- Encoder vs Decoder
- Difference with PCA
- KL Divergence
- Variable Auto Encoders

### GANs |

- Generators
- Discriminator
- DCGAN
- Generative Adversarial Text to Image Synthesis
- Style GAN

### Attention Mechanism |

- Soft and Hard Attention
- Local and Global attention
- Monotonic Alignment and Predictive Alignment
- Multi headed Attention
- Transformers

## Artificial Neural Networks In Python |

- Perceptron and relate it with Logistic Regression
- Multiple layer Neural network
- Similarities and Differences with Basic ML
- Forward Propagation
- Back Propagation Algorithm
- Vanishing Gradient and Exploding Gradient

## Activation Functions |

- Non Linearity
- Sigmoid / Tanh Function
- Relu / Leaky Relu / Gelu
- Softmax Function

## Optimizers |

- Gradient Descent
- Stochastic Gradient Descent
- Momentum
- AdaGrad
- RMSProp
- Adam/ Nadam

## Tensorflow / Keras |

- Tensors
- Session, Placeholders and Variables
- Hands on with Tensorflow
- Graphs using Tensorboard
- Why Keras
- Sequential vs Functional
- Model Creation

## Pytorch / Lightning |

- Difference between Tensorflow and Pytorch
- Autograd
- Graphs
- Control Flow and Weight Sharing

## Types of Deep Learning Algorithms |

- Feed Forward Networks
- Fully Connected Networks
- Recurrent Neural Networks
- Convolutional Networks

## Computer Vision |

- OpenCV
- Convolution/ Filters/ Pooling
- Back Propagation in CNN
- Types Of CNN
- FastRCNN, YOLO

## Transfer Learning |

- ImageNet
- Need of Transfer Learning
- Freezing of Layers
- Reusing of Structure

## CNN Based Architectures |

- LeNet/ Alexnet
- VGG 16/ 19
- ResNet 34/101
- Inception and Googlenet

## Recurrent Neural Networks |

- Classical RNN
- Vanishing Gradient
- Exploding Gradient
- LSTM/GRU
- Bidirectional RNN

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# Natural Language Processing |

- Lemmitazation/ Stemming
- Embedding
- Vectorization
- Glove
- Nltk/Spacy

## ML/AIOps and Big Data

### Unix based OS (Ubuntu) |

- Installation
- All Necessary Commands
- Permissions and Ownership
- Tools and Packages

### Containerization |

- Docker Configuration
- Docker Files
- Container Linking
- Kubernetes Architecture
- Kubectl Commands

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### Django Web Framework |

- Url Mapping
- Function / Class based Views
- ORM
- Admin

- AWS Server
- S3 Buckets
- Sagemaker
- Build Train Deploy

- Life Cycle
- Local Repository
- Add / Commit / Push / Pull
- Merge
- Stash

## Advance Machine Learning

- Problems with Large Features
- Why penalty is inducted
- Difference between L1 and L2
- Cost Function

- Logistic regression vs Linear Regression
- Log Odds / Logit / Sigmoid Function
- Optimization and Log Loss
- Maximum Likelihood Estimation

# Support Vector Machine (SVM) |

- Support Vectors and Hyperplanes
- Hard margin vs Soft margin
- Kernel Trick in non-Linear SVM
- SVM Parameter Tuning
- Optimization
- Hinge Loss and Combined Loss

# Time Series |

- Lag Values
- AutoRegression/ AutoCorrelation
- Stationarity
- ACF vs PACF Plots
- Smoothing Time Series
- Dicky Fuller Test
- AR/ MA/ ARIMA/ SARIMA

# Cross-Validation Techniques |

- Holdout Validation
- K-fold cross Validation
- Stratified Kfold
- Cross\_val\_score
- GridSearchCV
- RandomizedSearchCV

## Regression Based evaluation

- MSE/ MAE
- R2/Adjusted R2

## Classification Based evaluation

- Confusion Matrix
- Precision/ Sensitivity/ Specificity/ F1 Score
- AUC/ ROC
- AIC and BIC

# Ensembling |

- Random Forest
- AdaBoost
- Gradient Boosting
- XGBoost
- Blending/ Stacking

# Unsupervised Learning |

- Clustering
- Anomaly Detection
- Association Rules
- Dimensional Reduction

- KMeans
- Heirarchical
- DBScan
- Spectral Clustering
- GMM

## Dimensionality Reduction |

- Eigen Values and Eigen Vectors
- Principal Component
- PCA
- Advance Dimension Reduction Techniques

## Machine Learning

## Introduction to Machine Learning |

- Difference Between AI, ML and DL
- Applications of Machine Learning
- Categorization of Machine Learning
- Supervised / Unsupervised / Semi Supervised
- Parametric vs Non Parametric
- Geometric/ Rule Based/ Gaussian
- Flow Operation (Pipelining)
- Sklearn Usage

## EDA and DataWrangling |

- Null Values Imputation
- Outlier Detection
- Encoding
- Label Encoder
- Ordinal Encoding
- One Hot Encoding

## Scaling and Preprocessing |

- Scaling
- Binarizer
- MinMaxScaling
- Normalizer (L1 and L2)
- StandardScaler
- Imbalance Dataset
- Univariate/ Bivariate/ Multivariate Analysis

## Feature Selection and Extraction |

- Filter Methods
- Wrapper Methods
- Embedding
- Dimensional Reduction

# Modelling and Pipelining |

- Data Cleaning
- Train/ Test Split
- Basic Modeling
- Bias and Variance
- Evaluation Metrics
- cross validation
- Criteria to Select Models
- Ensembling

# Regression Analysis |

- Assumptions
- Introduction to Linear Regression
- Predictions using Dot product
- Multiple Linear Regression
- Cost Function (Sum of Square Error)
- Gradient Descent based approach

# Polynomial Regression |

- Introduction to Polynomial Regression
- When to use Polynomial regression
- Evaluation based on RMSE/  $R^2$

## Decision Tree |

- Introduction to Decision tree
- Decision Tree Classification / Regression
- Types of Decision Tree techniques (ID3 / CART)
- Optimization and Pruning

## K Nearest Neighbours |

- Introduction to KNN algorithm
- KNN Classifier vs Regresser
- How to select the best K

## Naive Bayes |

- Conditional Probability and Bayes Theorem
- Naive Bayes
- Bernoulli / Multinomial
- Gaussian Implementation

## Business Analytics and Intelligence

## Statistics |

- Measures of Central Tendency
- Distributions
- PDF/ CDF
- Central Limit Theorem

# Hypothesis Testing |

- Parametric and non parametric Tests
- Z test/ T test
- Chi2 test
- p-Value
- F test
- One way ANOVA, Two Way ANOVA
- MANOVA

# Power BI |

- Visualization
- Dashboard
- DAX
- Measures
- M Language
- Power Query

# R Language |

- R Studio
- Basic Data Structures in R
- Vectors and DataFrames
- Distributions
- Regression Analysis
- Classification

# Python and Libraries

## Basic Language |

- **Strings and Basic Data Structures**
- **Strings**
- **List and Tuples**
- **Sets and Dictionaries**
- **Control Statements**
- **Conditions**
- **While and For Loop**
- **Adv Loops**
- **Functions**
- **Basic Functions**
- **Nested Functions**
- **Recursive Functions**

## Advance Concepts |

- **Object Oriented Programming**
- **Basics of OOPS**
- **Inheritance**
- **Polymorphism**
- **Composition**

## Data Structures |

- **Linked Lists**
- **Trees**
- **Stacks and Queues**
- **Graphs**
- **Searching**
- **Sorting**

## Numpy |

- **Basic Numpy**
- **Indexing/ Slicing**
- **Broadcasting**
- **Appending/ Inserting on Axis**
- **Mathematical and Statistical operations**
- **Advance Numpy**
- **Sort/ Conditions**
- **Transpose operations**
- **Joining/ Splitting**
- **Linear Algebra**

## Data Manipulation with Pandas |

- **Introduction**
- **Data Extraction**
- **Series/ DataFrame Creations**
- **Indexing and Slicing**
- **Grouping and Merging**
- **Conditions/ Grouping/ Imputation**

- **Append/ Concat/ Merge/ Join**
- **DateTime Functionalities and Resampling**
- **Window Functions**
- **Excel and Sql Functions**
- **Pivot table/ Crosstab/ Melt**
- **Sql with Pandas**

## **Data Visualization** |

- **Scatterplots/ Barplots/ Histograms/ Density Plots**
- **3D plots**
- **Boxplotting and Outlier Detection**
- **Visualizing Linear Relationships**
- **Customization of Matplotlib**
- **Subplotting**
- **Seaborn and Plotly**

# About Placement Assistance

- ✓ All eligible candidates will receive placement assistance after program completion
- ✓ Access to Opportunities with Leading Companies
- ✓ Workshops on Resume Review & Interview Preparation
- ✓ Career Guidance & Mentorship by Industry Experts from Rooman

## Salary Scale



## Job Roles Offered



- Data Scientist
- ML Engineer
- Data Analyst
- Business Analyst
- Applied Scientist
- Research Analyst
- ML Ops
- Domain Specific Analyst