



# The **PLAN BOOK**



Executive Programme in Machine  
Learning and AI





# YOUR **LEARNING JOURNEY** WITH US\*

**40** Modules

**14** Assignments

**34** Live Sessions

**6** Skill Assessment Tests

**46** SGCS

**5** Mentorship Calls

**3** Exams

# **MONTH 1**

**4 MODULES | 4 LIVE SESSIONS | 2 SMALL GROUP COACHING SESSIONS**



Intro to Python  
Python for DS  
Data Visualization using Python  
EDA

# MONTH 1

## WHY THIS MATTERS

Laying a strong foundation for your data journey is important and that requires learning the basics of Python, focusing on Python-based libraries specially used for data science like Numpy, pandas, and more. Data Visualisation and Exploratory Data Analysis (EDA) are also essential to analyse and investigate datasets before you start modelling and making inferences.

### THE LEARNING



- Understand the basics of Python and its libraries, like NumPy, Pandas and Seaborn

- Master different visualization tools like heatmap, barplot, scatter plot, etc. under Seaborn & Plotly libraries

- Find and analyze patterns in data to draw actionable insights

### ENGAGE FURTHER



#### - Live Sessions:

- Understand industry applications of your learning
- Learn advanced concepts and solve coding questions
- Q&A session

#### - Small-Group Coaching (SGC) Sessions:

- Connect with a coach in a group of 8-10 peers
- Engage in peer-to-peer learning



### THE APPLICATION AND ASSESSMENT



- Write and execute basic programs using Python

- Determine how to manipulate, visualize and analyze data to get actionable, data-driven insights

#### - Pre-Test:

Take a pre-skill test to gauge your understanding of topics

# MONTH 2

**3 MODULES | 3 LIVE SESSIONS | 2 SMALL GROUP COACHING SESSIONS**



Intro to Git & Cloud  
Inferential Stats  
Hypothesis Testing

# MONTH 2

## WHY THIS MATTERS

- The industry is gradually shifting to cloud. Most applications are serviced from cloud platforms. Learn about popular cloud services, such as Git and AWS
- Statistical methods are needed to understand the data used to train machine learning (ML) models and interpret their results
- Learn how to formulate and validate different hypotheses to solve real-life business problems



## THE APPLICATION AND ASSESSMENT



- Contribute to open-source libraries such as NumPy
- Host code on GitHub
- The lending club case study will help you develop a basic understanding of risk analytics in banking and financial services and learn how data is used to minimise the risk of losing money while lending to customers



## THE LEARNING



- Version control using Git, creating a portfolio on GitHub, essential services on the AWS cloud

- Descriptive statistics, fundamentals of probability and probability distributions, sampling and inferring results about a population

- You will learn the details of hypothesis testing and the different types of techniques, such as the p-value method, A/B testing, z-test and chi-squared test

- Live sessions continue
- Technical SGC sessions
- Mentorship call:  
Interact with an Industry Mentor to understand in-demand skills and chart your career path

## ENGAGE FURTHER



# **MONTH 3**

**3 MODULES | 3 LIVE SESSIONS | 2 ASSIGNMENTS  
| 4 SMALL GROUP COACHING SESSIONS**



Linear Regression  
Linear Regression - Assignment  
Logistic Regression

# MONTH 3

## WHY THIS MATTERS

- Using the concepts learned earlier, you can help an asset management company make different investments by identifying the best sectors in other countries
- The core of data science comprises understanding data and training it to make predictions on unseen data points. While several advanced algorithms have emerged, a fundamental understanding of the basic concepts and algorithms is necessary

## THE LEARNING



- Understand the nuances of machine learning and the need for it
- The fundamentals of linear regression
- Logistic regression



## THE APPLICATION AND ASSESSMENT



- You will assume the role of an analyst at an investment bank and determine where the bank should invest. You will also have to explain the recommendations instead of the analysis conducted

### - Linear Regression Assignment

Implement the linear regression concepts to build a linear model to predict the demand for bike-sharing



# MONTH 4

**3 MODULES | 1 LIVE SESSION | 3 SMALL GROUP COACHING SESSIONS | 1 EXAM | 1 SKILL ASSESSMENT TEST**



Logistic Regression  
Naive Bayes  
Model Selection

# MONTH 4

## WHY THIS MATTERS

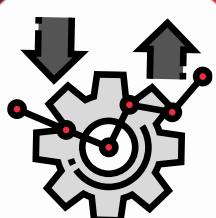
- The Naive Bayes classification model performs better and can train on lesser data than logistic regression
- Given the options available for modelling a solution, it is imperative that you learn how to select the best model to solve any problem

### THE LEARNING



#### Naive Bayes classification

Understand the different evaluation metrics and learn how can you decide which algorithms yield the best value.-Learn about the generalised and regularised regression models and apply them to solve problems that cannot be solved using linear regression.



### THE APPLICATION AND ASSESSMENT



- Build a model that performs well on both train and test datasets
- Evaluate different models with the help of various evaluation metrics



# MONTH 5

**3 MODULES | 1 LIVE SESSION | 3 SMALL GROUP COACHING SESSIONS | 1 ASSIGNMENT | 1 SKILL ASSESSMENT TEST**



Advanced Regression

Advance regression assignment + SVM (Optional)  
Tree Models

# MONTH 5

## WHY THIS MATTERS

- Although you have learnt about linear regression in the previous modules, the industry presents many challenges that require techniques in extension to linear regression
- Expand your understanding of machine learning with industry-benchmarked methods - random forests

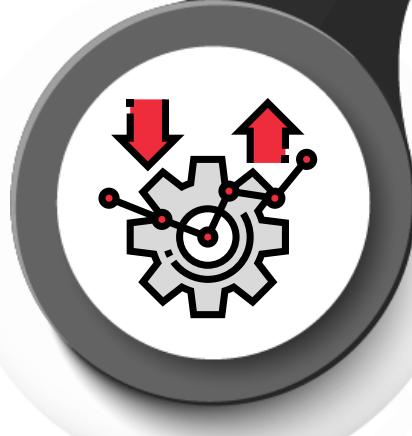


### THE LEARNING



- Learn about the generalised and regularised regression models and apply them to solve problems that cannot be solved using linear regression

- Learn about tree models and boosting and implement them to build cutting-edge machine learning solutions for classification problems. You will also learn about decision trees, random forests, Adaboost, gradient boosting and XGBoost



### THE APPLICATION AND ASSESSMENT



#### Assignment

Implement a regularised regression solution to predict house prices to help an American real estate company make headway in the Australian market.



# **MONTH 6**

**3 MODULES | 3 LIVE SESSIONS | 1 ASSIGNMENT |  
4 SMALL GROUP COACHING SESSIONS | 1 SKILL  
ASSESSMENT TEST**



Boosting + Practical Considerations  
Unsupervised Clustering  
PCA

# MONTH 6

## WHY THIS MATTERS

- Expand your understanding of machine learning with industry-benchmarked methods - boosting. These techniques can drastically increase the performance of any classification/regression task
- Clustering introduces you to the concept of unsupervised learning techniques, wherein you try to find patterns based on similarities in the data since you do not have a target or outcome variable
- Real-life data sets can have many correlated features. Principal-component analysis (PCA) can help you reduce the dimensions of your original data set for resolving such issues

## THE LEARNING



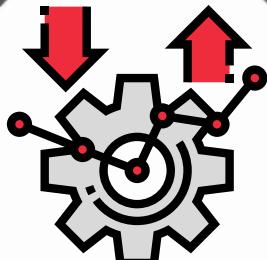
- You will also learn about Adaboost, gradient boosting, and XGBoost
- Unsupervised machine learning using different clustering algorithms, such as k-means clustering, hierarchical clustering, and K-mode clustering
- Learn essential concepts related to dimensionality reduction, the learning algorithm of PCA, and its practical applications in supervised and unsupervised problems

## THE APPLICATION AND ASSESSMENT



### Case Study

Apply your learnings from the course on Machine Learning - 2 and solve a real-world case study





# MONTH 7

**3 MODULES | 2 LIVE SESSIONS | 1 ASSIGNMENT  
| 4 SMALL GROUP COACHING SESSIONS**



Introduction to Neural Networks  
Convolutional Neural Networks  
Assignment: CNN



# MONTH 7

## WHY THIS MATTERS

- Introduction to neural networks forms the fundamental block in understanding deep learning
- Convolutional Neural Networks(CNNs) are widely used in solving many computer vision problems such as image classification. They form the building blocks of modern computer vision systems



### THE LEARNING



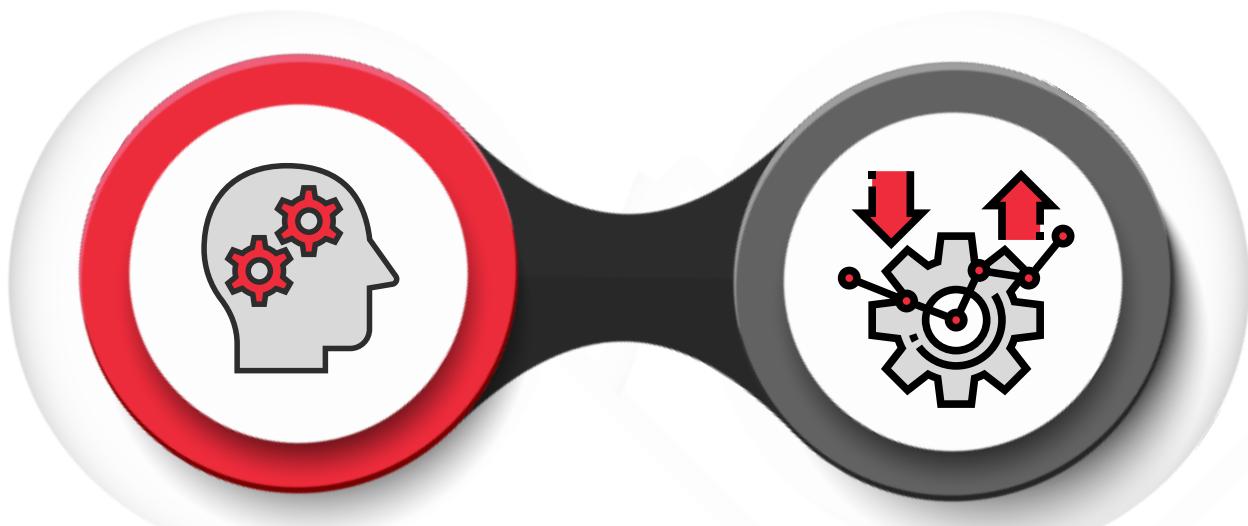
- Understand the working of an artificial neural network to perform a simple image classification task
- Leverage CNN to extract complex features in images or videos and build models that can recognize different classes of images

### THE APPLICATION AND ASSESSMENT



#### Assignment:

The assignment will help you evaluate different images and classify them according to their labels using tensorflow. This will test your skills in transfer learning and model building for image classification



# **MONTH 8**

**2 MODULES | 2 LIVE SESSIONS | 1 ASSIGNMENT |  
4 SMALL GROUP COACHING SESSIONS**



CNN : Practical Considerations  
Recurrent Neural Networks  
Gesture Recognition - Project

# MONTH 8

## WHY THIS MATTERS

It is important for a machine learning professional to understand how CNNs are used in real-time industrial applications and RNNs help solve problems involving sequences of data such as text classification, language modelling, and time series analysis.



## THE LEARNING



- Apply and utilize transfer learning in different scenarios for image classification or object detection. You will also be introduced to the concept of OpenCV which plays a key role in computer vision-related tasks
- Learn about the basic architecture of the RNN, its various architectural variants such as bidirectional RNNs, and some popular gated variants such as the LSTM and the GRU
- Learn and apply two types of architectures for building the gesture recognition system namely: CNN + RNN architecture and 3D convolutional network (Conv3D).

## THE APPLICATION AND ASSESSMENT



### Assignment:

- Get hands-on experience in building an end-to-end pipeline for training CNNs in different classification tasks like flower and chest X-ray images
- In the RNN module, apply RNNs to tag words in an English corpus with their part-of-speech (POS) tag. You will also learn how to generate text using RNN and keras library. Additionally, learn to implement a 1D CNN-RNN architecture to model the relationship between the news and the stock market price of an index
- Apply gesture recognition learnings to make a smart TV system that can control the TV with the user's hand gestures as the remote control



# **MONTH 9**

**2 MODULES | 2 LIVE SESSIONS | 2 ASSIGNMENTS  
| 1 EXAM | 1 SMALL GROUP COACHING SESSION |  
1 SKILL ASSESSMENT TEST**



Lexical Processing  
Syntactic Processing

# MONTH 9

## WHY THIS MATTERS

- Lexical processing introduces you to the intricacies involved in text cleaning and pre-processing, these form the building blocks of more sophisticated text analysis
- Syntactic processing helps in understanding the grammatical structure and hence, the meaning of the text. This finds use in many practical applications such as automated grammar checkers and chatbots

## THE LEARNING



-Learn to clean and extract features from messy real-life text data, create and extract patterns from text using regular expressions, and to use popular python libraries such as NLTK to normalize and clean text

- Learn to form grammatical rules to extract meaningful information from free-form text. You will also be able to train a custom model to recognize common word entities



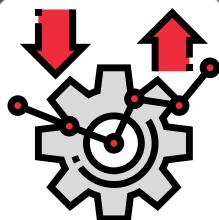
## THE APPLICATION AND ASSESSMENT



### - Assignment:

Apply the skills you have learnt to extract structured data from unstructured text

- Create features for contextual search as well as for advanced text classification tasks. Extract and understand common themes in a corpus of unstructured text



# Month 10

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## MONTH 10

**1 MODULE | 2 LIVE SESSIONS | 1 ASSIGNMENT |  
4 SMALL GROUP COACHING SESSIONS**

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Semantic Processing  
NLP Case Study



# MONTH 10

## WHY THIS MATTERS

Semantic processing methods are the cornerstone of modern NLP and it is important to learn how the contextual meaning of a corpus of text can be understood and modelled using ML methods.

### THE LEARNING



- Learn to create word vectors and model the contextual meaning of words..
- Extract latent topics from a text corpus and understand what broad themes are mentioned in the text.

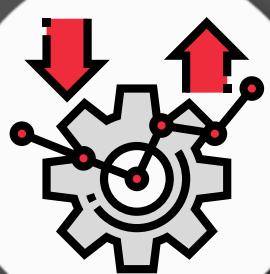


### THE APPLICATION AND ASSESSMENT



#### Case Study

Apply all your learnings from the NLP course and work on a real world case study.



# MONTH 11

**5 MODULES | 2 LIVE SESSIONS | 3 SMALL GROUP COACHING SESSIONS | 1 SKILL ASSESSMENT TEST**



Cloud Essentials: Intro to AWS  
Working with AWS: case study  
MLOps: Introduction  
MLOps: Data Lifecycle  
MLOps: Model Lifecycle

# MONTH 11

## WHY THIS MATTERS

Cloud and MLOps are responsible for streamlining the ML solutions that are put in production. Having a streamlined solution allows you quickly adapt to the changing scenarios of the natural world.



## THE LEARNING



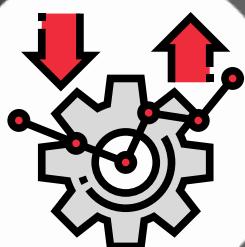
- Learn the different pipelines of a complete solution, viz., data, ML, CI-CD, and deployment
- Learn about industry-wide tools such as Airflow, MLflow, and specific cloud services

## THE APPLICATION AND ASSESSMENT



### Assignment:

You will build an end-to-end ML solution and publish it on GitHub.



# **MONTH 12**

**2 MODULES | 2 LIVE SESSIONS | 1 ASSIGNMENT  
| 4 SMALL GROUP COACHING SESSIONS**



Advanced CV  
MLOps + Deployment: DL (Theory)

# MONTH 12

## WHY THIS MATTERS

In this elective, you will apply the concepts learned under neural networks to advanced computer vision tasks such as object detection and semantic segmentation using YOLO, SSD, UNet, and MaskRCNN.

### THE LEARNING



Learn different algorithms, such as YOLO, SSD, UNet, and MaskRCNN.



### THE APPLICATION AND ASSESSMENT



You will create a custom object detector using the YOLO algorithm to detect the presence of face masks in the images of different people.



# **MONTH 12**

**2 MODULES | 2 LIVE SESSIONS | 1 ASSIGNMENT | 4  
SMALL GROUP COACHING SESSIONS**



Advanced NLP  
MLOps + Deployment: NLP (Theory)

# MONTH 12

## WHY THIS MATTERS

This elective will introduce you to the evolving world of deep learning for different NLP-related applications. It will help you gain a complete understanding of how these complex models work. You will learn how deep learning can help achieve different NLP-related tasks using concepts such as attention mechanisms and transformers.



### THE LEARNING



Learn how to build a machine translation system capable of translating a sentence in one language to another.

### THE APPLICATION AND ASSESSMENT



You will build an attention-based neural machine translation model that translates from one language to another.

# **MONTH 12**

**4 MODULES | 2 LIVE SESSIONS | 1 ASSIGNMENT |  
4 SMALL GROUP COACHING SESSION**



AI Strategy Framework, Structured Problem Solving / Data Storytelling  
Mapping ML with Data Architecture Strategy  
Executing AI Strategy

# MONTH 12

## WHY THIS MATTERS

- You will learn about the business side of building ML solutions
- MLOps is the technical side of end-to-end solution building and AI strategy building is the end-to-end business side



### THE LEARNING



Learn team building, data architecture building, infrastructure management, skill management and all the managerial aspects of building ML solutions.

### THE APPLICATION AND ASSESSMENT



Given a business, you will learn how to create valuable ML solution ideas and then prioritise the order in which they need to be executed.



# CAPSTONE

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## MONTH 13

2 LIVE SESSIONS | 1 ASSIGNMENT |  
1 SKILL ASSESSMENT TEST | 1 EXAM

## MONTH 14

1 LIVE SESSION | 1 ASSIGNMENT

# CAPSTONE

## WHY THIS MATTERS

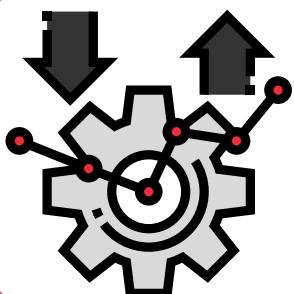
Making ML models available to end users is as important as training them. In the deployment module, you will learn how to put models into production



## THE LEARNING



Put all your learning to use by working on a real-world business problem from start to finish

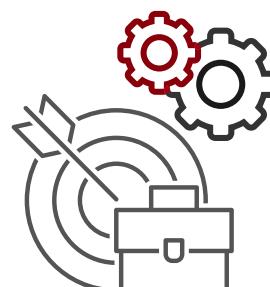


## ENGAGE FURTHER



Once you successfully complete the program, a dedicated career coach will work with you for six months.

The coach will guide you on building your resume, LinkedIn profile, and provide a detailed career plan to achieve your desired outcome



**READY TO GO  
THE DISTANCE?**

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**Kickstart your journey  
on the road of learning!**

