Data Science and Machine Learning with R Training

Duration: **5 Day**

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Overview

This five-day course is aimed at those who are familiar with data analysis and are interested in learning about how Data Science, Analytics, Machine Learning, and Artificial Intelligence (AI) can be used to yield value from data assets.

This course will be of interest if you are interested in developing your own skills to move from analytics to Data Science, or if you are working with Data Scientists and want to learn more about what's possible.

You will be introduced to key concepts and tools for use in Data Science, including typical Data Science Project lifecycles, potential applications & project pitfalls, relevant aspects of data governance and ethics, roles and responsibilities, Machine Learning and AI model development, exploratory analysis and visualisation, as well as techniques and strategies for model deployment.

Throughout the course you will engage in activities and discussions with one of our Data Science technical specialists. Theoretical modules are complemented with comprehensive practical labs.

Prerequisites

- We recommend that delegates are familiar with fundamental data science concepts, such as those found on our **Introduction to Data Science for Data Professionals**, as well as programming techniques found in **Data Handling in R**.
- You should also have an interest in developing Data Science within your organisation or in becoming a Data Scientist.

Target Audience

Members of the audience are required to have some technical expertise such as table structure, working with tabular data in R, and intermediate data analysis.

They may come from other technical backgrounds such as Data Analysts, Software Developers, and Data Engineers who either work with Data Scientists or are using this course in their journey towards training as a Data Scientist.

They may be Mid/Senior Leadership seeking a greater understanding of how to implement Data Science within their organization.

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What You Will Learn

At the end of the course attendees will know:

- Core concepts of Data Science & Machine Learning
- The Data Science project workflow
- Summary statistics and how to use statistical inference to analyse data
- Data preparation required for Machine Learning
- Methodologies and algorithms used in Machine Learning
- How to use R to build and deploy Machine Learning models
- Regression, Classification and Clustering algorithms
- How to evaluate Machine learning Models and evaluate how good is good enough
- Ethical considerations for Machine Learning

At the end of the course attendees will be able to:

- Speak the language of data scientists
- Write R programs to explore, clean, and model data
- Understand an R program in the context of data science
- Build working Machine Learning models using R
- Deploy a Machine Learning model using R
- Work with tidyverse and tidymodels packages

Outline

Introduction to Data Science & Machine Learning

- Explain the role of the Data Scientist and the skillset it requires
- Describe common application areas of Data Science, and examples of its usage in industry
- Outline the Data Science process detailed in the CRISP-DM methodology
- Detail the characteristics of problems which Data Science can be used to solve
- Define how to evaluate the success of a Data Science Project

Introduction to R for Data Science

- Understand why notebooks are often used in Data Science projects
- Use R and associated libraries to manipulate datasets.
- Describe why virtual environments are used
- Visualise data using R

Descriptive & Inferential Statistics with R

- Understand the role that descriptive and inferential statistics play in Data Science
- Use measures of central tendency, variation, and correlation to understand data
- Use hypothesis tests to establish the significance of effects
- Use statistical visualisations to understand data distributions
- Describe the role of Exploratory Data Analysis in a Data Science project

Preprocessing Data for Analysis

- Appropriately process duplicated data, missing values & outliers

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- Understand the importance of scaling, encoding, and feature selection
- Describe the importance of training, testing & validation sets
- Engineer novel features to analyse

Supervised Learning: Regression

- Describe regression in the context of machine learning
- Build simple and multiple linear regression models
- Understand non-linear regression approaches
- Evaluate & compare regression models

Supervised Learning: Classification

- Describe classification in the context of machine learning
- Build simple and multiple logistic regression models for classification
- Build Decision Tree & Random Forest models for Classification
- Evaluate and compare classification models

Model Selection & Evaluation

- Understand how to choose the best model for regression and classification problems
- Consider tests & baselines that can be used to evaluate model performance & behaviour
- Evaluate 'how good is good enough'

Unsupervised Learning

- Describe clustering and dimensionality reduction in the context of machine learning
- Apply and evaluate KMeans clustering
- Apply and evaluate dimensionality reduction techniques

Ethics for Data Scientists

- Be aware of the legislation and standards Data Scientists must adhere to
- Discuss the importance of legal, ethical, and moral considerations in Data Analytics projects and identify applicable UK legislation for which employees should receive training
- Discuss ethical considerations for data handling
- Recognise ethical considerations in examples of machine learning, deep learning, and AI

Deploying Models & Insights

- Understand how analytical models can be deployed
- Evaluate how best to deploy a given model
- Define checks which can be used to prevent model failures
- Use R and associated libraries to deploy a machine learning model
- Describe which metrics can be used to monitor deployed machine learning models

Where to Go Next

- Understand the role of deep learning in modern Artificial Intelligence
- Know which qualifications and professional memberships can benefit data scientists Work on a practical time series modelling problem.