CONCEPT

Predictive Analytics and Forecasting: Time Series, Regression and Forecast Accuracy

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Technical depth: Practitioner · **Practical mode:** Modelling build

Introduction

Budgets, inventory, staffing and service capacity are all set against forecasts, yet many organisations still extend last year's figures by a percentage and discover the error only when the quarter closes. This Core Concept course equips analysts and planners to build predictive and time series models that can be tested before they are trusted, from exponential smoothing and ARIMA to regression and classification. Participants work in Excel and Python on cases from several sectors and leave with a Validated Forecasting Model and Forecast Pack for a series their own organisation plans against.

Course Objectives

- Define the purpose, horizon and granularity of a forecast and prepare historical data for modelling
- Select between benchmark, exponential smoothing, ARIMA and regression methods according to data patterns and decision needs
- Build forecasting and predictive classification models in Excel and Python and validate them with rolling-origin backtesting
- Quantify forecast uncertainty with prediction intervals and scenarios, and adjust for structural breaks, promotions and intermittent demand
- Measure whether each step of the forecasting process adds accuracy using Forecast Value Added analysis
- Produce a forecast pack that sets out the model, its accuracy, assumptions and ranges for decision makers

Target Audience

- Demand and supply planners responsible for volume and inventory forecasts
- Financial planning and analysis staff preparing revenue, cost and cash projections
- Data and business analysts building predictive models for customer, risk or operational outcomes
- Workforce and capacity planners forecasting staffing, contact volumes and service workload
- Performance and statistics officers producing projections for public services
- Sales operations analysts maintaining pipeline and sales forecasts

Course Outline

Day 1: Predictive Analytics Foundations and Forecasting Context

- Descriptive, Predictive and Prescriptive Analytics Maturity Model
- Forecast Purpose, Horizon and Granularity Definition Canvas
- Time Series Decomposition: Trend, Seasonality, Cycle and Noise
- Forecast Data Preparation: Calendars, Outliers and Missing Periods
- Current Forecasting Process Assessment with a Naive Forecast Baseline

Day 2: Forecasting Methods and Predictive Modelling Frameworks

- CRISP-DM Lifecycle for Predictive Modelling Projects
- Benchmark Methods: Naive, Seasonal Naive and Moving Average
- Exponential Smoothing Family: Simple, Holt and Holt-Winters ETS
- Box-Jenkins ARIMA and SARIMA Model Identification
- Multiple Regression and Driver-Based Forecasting Models

Day 3: Building and Evaluating Predictive Models

- Excel Forecast Sheet and FORECAST.ETS Model Build
- Python statsmodels and Prophet Model Build
- Churn, Default and Attrition Prediction with scikit-learn Classifiers
- Accuracy Metrics: MAE, RMSE, MAPE, MASE and Forecast Bias
- Rolling-Origin Backtesting and Holdout Validation

Day 4: Uncertainty, Risk and Advanced Problem Cases

- Prediction Intervals and Probabilistic Forecasts
- Scenario and Sensitivity Analysis Aligned to ISO 31000 Principles
- Structural Break, Promotion and Shock Adjustment Techniques
- Intermittent Demand Forecasting with Croston's Method
- Gradient Boosting and Hierarchical Reconciliation Lessons from the M5 Competition

Day 5: Modelling Build and the Forecast Pack

- Retail Demand Case: Model Selection and Backtest
- Public Service Workload Case: Scenario Forecast Build
- Judgemental Adjustment Log and Forecast Value Added Review
- Validated Forecasting Model and Forecast Pack Build
- Forecast Presentation and Peer Challenge Panel

Skills You Will Gain

- Time Series Analysis
- Demand Forecasting
- Predictive Modelling
- Forecast Accuracy Measurement
- Model Backtesting
- Uncertainty Quantification
- Scenario Analysis
- Forecast Communication

Why Attend This Course

- Return to work with a Validated Forecasting Model and Forecast Pack for a series your organisation already plans against
- Show decision makers a range and its likelihood instead of a single number that is certain to be wrong
- Identify which manual overrides in your current process improve accuracy and which make it worse
- Test methods on retail, finance and public service cases alongside planners from other sectors and countries

Conclusion

A forecast is useful only when its accuracy is known and its uncertainty is stated. This course moves from framing the forecasting question and preparing history, through the principal statistical and machine learning methods, to backtesting, prediction intervals and the problem cases that break simple models. The final day turns that material into a Validated Forecasting Model and Forecast Pack, giving participants a tested model and a clear way to present ranges and assumptions to the people who set budgets and capacity.