L'INSTITUT INDO-CANADIEN SHASTRI INDO-CANADIAN INSTITUTE

Investment Analysis and Portfolio Management: Role of Artificial Management and Machine Learning

Syllabus

Week 1: Introduction to financial markets

Risk-Return Analysis in Investment Decisions – Measures of Risk and Return, understanding value of a firm, goals of a firm, cash flow discounting, making investment decisions, valuation of fixed income securities and common stocks, introduction to portfolio theory and asset pricing models, cost of capital.

Week 2: Overview of AI and machine learning models

Probability modelling, inferential statistics, Supervised and Unsupervised learning algorithms, regression, and classification algorithms.

Week 3: Introduction to R Programming

R Fundamentals, Exploratory data analysis and data visualization with R. Statistical Analysis with R, Inferential statistics and hypothesis testing with R.

Week 4: Market Microstructure and Liquidity

Order-driven vs. Quote-driven markets, Market efficiency, Risk preferences, Limit order books, market microstructure types, economic theory of choice, interest rate compounding

Week 5: Portfolio construction

Portfolio risk and expected returns for two securities and multiple securities, risk diversification with portfolios, correlation structure, mean-variance framework, portfolio construction with R

Week 6: Portfolio Optimization

Portfolio Possibility curve, Efficient frontier, Minimum Variance portfolios, Introduction to risk-free lending and borrowing, market risk and beta, portfolio optimization with R

Week 7: Asset Pricing Models

Capital Asset Pricing Model (CAPM), Capital Market Line, Security Market Line, Fallings of CAPM, Single-Index and Multi-Index models, Expected Risk and Return with Index models, 3-Factor Fama-French Model

Week 8: Portfolio Management and Performance Evaluation

Portfolio Management strategies, Active vs Passive Portfolio Management, Value vs Growth investing, One-parameter performance measures Timing & Selection performance measures, application of asset pricing models in performance management

Week 9: Introduction to Algorithmic Trading

Technical analysis and trend determination, Dow Theory, Moving averages, Momentum indicators, Classical price patterns.

Week 10: AI and machine learning in Trading execution and portfolio management

Regression and Classification algorithm applications in security analysis, forecasting, and prediction, Case Study examples

Week 11: Advanced time-series regression algorithms

Panel regression quantile regression, ARMA/ARIMA models, Mean reverting trading strategies with vector error correction models and cointegration, model risk management, back testing, model validation, and stress testing with R

Week 12: Advanced time-series algorithms for financial risk management

Value-at-risk, Expected Shortfall, ARCH/GARCH models, implementation with R