Introduction to Time Series Analysis in Python

Overview

This hands-on data science course teaches the fundamentals of time series analysis and how to build time series models in Python. Whether you are trying to predict asset prices or understand the effects of air pollution over time, effective time series analysis can help you.

At the end of the workshop, participants will be comfortable applying the Python programming language to visualize and execute time series analysis to see if there is predictive power in your data.

What This Course Offers

- An overview of time series models and how to use them to solve real-world problems
- Hands-on Python programming experience
- Course notes, certificate of completion, and post-seminar email support for 3 months
- An engaging and practical training approach with a qualified instructor with relevant technical, business, and educational experiences
- A Computer Science 101 pre-course webinar

Who Is This For

This course is relevant for individuals working with or needing to understand times series. The most common participants are: investment professionals, traders, economists, biologists, chemists, physicists, entrepreneurs, consultants, and technology individuals. **Cognitir's *Introduction to Data Science* course or the equivalent is required.**

Course and Contact Information

Course Prerequisites: *Introduction to Data Science* is a prerequisite. If you have not been able to take this course with us yet, please contact us.
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Course Curriculum

- **Overview of Time Series Analysis**
    - What is it, wide variety of use cases, time series analysis vs. time series forecasting, common statistical problems in time series (leptokurtic,

heteroskedasticity, serial correlation) and common tests to test for these issues (look at error residuals)

- **Organizing and Visualizing Time Series Data**
  - Exploring Your Time Series Data
    - Start, end, frequency, number of data points
  - Basic Time Series Plots
  - Sampling Frequency
  - Missing Values
  - How to do this in Python – with an example
  - Organizing and Visualizing Time Series Coding Challenge
- **Time Series Stationarity**
  - Trends
  - Random or Not
  - Stationary vs. Non-Stationary
    - Unit/root test
  - Removing variability trends through logarithmic transformation
  - Differencing
  - White Noise Model
  - Random Walk Model
  - How to do this in Python – with example
  - Time Series Stationarity Coding Challenge
- **Autocorrelation and Partial Autocorrelation**
  - Financial Time Series
  - Autocorrelation and Calculation
  - Autocorrelation Function
  - Partial Autocorrelation Function
  - How to do this in Python
  - Autocorrelation and Partial Autocorrelation Coding Challenge
- **Time Series ARIMA Models**
  - Autocorrelation and Autoregression
  - Random Walk vs. AR
  - Autocorrelation and simple moving averages
  - Selecting ARIMA model parameters
  - ARIMA model Estimate and Forecasting
  - How to do this in Python
  - ARIMA Model Coding Challenge
- **Time Series Model Evaluation**
  - Visualizing model predictions
  - In Sample versus Out of Sample Accuracy
  - Types of time series error metrics
  - Model residual diagnostics
  - Model Evaluation Coding Challenge
- **Final Project**

Course Content Developers

David Haber

David heads Cognitir's products and technology. He has led programming workshops at the undergraduate and graduate levels, at blue chip companies, and world renowned management consulting firms.

David has experience working with both startups and large corporations. Previously, he was a lead software and machine learning engineer at Soma Analytics, an investor-backed and award-winning health-tech startup in London. David also worked on optimizing large-scale payment processing systems at Deutsche Bank in Singapore. Outside of Cognitir, he currently advises HiDoc, an early stage digital health startup in Germany.

David holds an MEng (First-Class Honours) in Computer Science from Imperial College London (UK) where he focused on statistical machine learning. He presented his work at international conferences and won several awards for his work. During his studies, he also served as a teaching assistant at Imperial College where he helped undergraduate students master fundamental computer science concepts.

Neal Kumar, CFA

At Cognitir, Neal leads strategy and business development initiatives and advises on new product development.

Outside of Cognitir, Neal consults C-level teams and senior business managers on a variety of strategic topics ranging from M&A to marketing. He also leads training seminars for Wall Street Prep and has consistently received top reviews from attendees and created two training courses that were used in seminars worldwide. Before his consulting and training careers, Neal taught secondary mathematics in St. Louis Public Schools (USA) as a Teach for America Corps Member. Prior to joining Teach For America, Neal worked in investment banking at Lazard, JPMorgan, and Houlihan Lokey.

Neal received his MBA from London Business School (UK) and BBA in Finance from the University of Notre Dame (USA). He is also a CFA Charterholder and a Member of the CFA Institute Education Advisory Committee (EAC) Working Body where he helps shape CFA Program Content.

Derek Sasthav

At Cognitir, Derek leads courses worldwide and helps develop new course materials.

Outside of Cognitir, Derek works at AMEND where he is focused on building analytics capabilities for clients in the middle market. At AMEND, he has worked on impactful data science projects including price volume mix analysis, production scheduling optimization, and operational KPI reporting. Previously, he worked at the IBM North American Analytics Center working on predictive modeling for crime rates in urban areas. Derek studied Industrial Engineering at Ohio State University, where he was president of the Big Data and Analytics Association, a student group focused on teaching data science to students.