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This chapter presents the methodology used to achieve the project's objectives. It starts by describing the data collection process and analyzing the data collected, followed by an overview of the pre-processing techniques. The chapter then discusses the model building approach and the hyperparameter optimization strategy.

3.1 Data Collection

Data for this study were obtained from the Yahoo Finance platform using Python's `yfinance` package. The data collection process was designed to support three main aspects of the research: (i) the primary dataset, (ii) supplementary features for multivariate modeling, and (iii) datasets for benchmarking against previous studies.

QUESTION: Should I cite the yfinance package here?

3.1.1 Primary Dataset

The primary dataset consists of the USDEUR exchange rate with a daily frequency, spanning from December 1, 2003 to January 31, 2025.

QUESTION: Should I mention the implementation details of the data collection script?

3.1.2 Supplementary Features for Multivariate Models

To build a robust multivariate model, additional financial indicators were collected. The supplementary data include:

- Crude Oil (WTI Futures)
- Gold Futures
- FTSE 100 Index
- US Dollar Index (DXY)

These datasets cover the period from January 1, 2000 until the present day. When used, they are aligned based on the corresponding currency pair's time base.

3.1.3 Benchmarking Datasets

For comparative analysis with prior research, additional datasets were collected to ensure that the time series forecasting results are directly comparable. Two sets of benchmarking data were collected:

1. A multi-currency dataset covering the period from December 18, 2017 to January 27, 2023. This dataset includes exchange rates for EUR/USD, GBP/USD, AUD/USD, and NZD/USD. For USD/JPY data, the script inverts the closing prices to derive the JPY/USD rate[1]
2. A focused subset for the EUR/USD pair spanning from January 1, 2013 to January 1, 2018[2].

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