Currency Exchange Rates Analysis: Project Proposal

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1 Problem Setting

Currency exchange rates play crucial roles in the global economy, exerting influence on international trade, investment decisions, tourism, and even the pricing of everyday commodities. Both individuals and businesses are significantly affected by fluctuations in exchange rates, leading to substantial financial implications. This is particularly true for international students, whose financial situations are heavily reliant on such changes, given the frequent need to convert money from their home country to the country where they are currently studying. As our team consists of international students, we are interested in the currency exchange rates between Korean Won (KRW) and our country's currencies (Vietnamese Dong (VND) and Kazakh Tenge (KZT)). In particular, our objective for this data set are to investigate historical trends of the exchanges rates, and how can we strategically plan out our exchanges based on the data by forecasting the future rates. Moreover, it would be appealing that a trading strategy could be developed based on the data to maximize traders' profit.

2 Dataset

We utilize the `GOOGLEFINANCE` API to retrieve the daily currency exchange rates in the last decade, i.e., from January 1st, 2004 to October 31st, 2023. For each currency, there are about 6000 data points corresponding to 20 years of exchange. The number of data points for each currency is different because there is no trading during holidays (e.g. 01/01/2004) and weekends (e.g. 03/01/2004 and 04/01/2004 were Saturday and Sunday respectively).

Date	Close
02/01/2004 23:58:00	0.115788868
05/01/2004 23:58:00	0.114777432
06/01/2004 23:58:00	0.115528245
07/01/2004 23:58:00	0.11447919
08/01/2004 23:58:00	0.115056396

Table 1: KRW - KZT currency exchange rate.

Date	Close
02/01/2004 23:58:00	12.6613773
05/01/2004 23:58:00	12.5970768
06/01/2004 23:58:00	12.724485
07/01/2004 23:58:00	12.622449
08/01/2004 23:58:00	12.6659988

Table 2: KRW - VND currency exchange rate.

3 Candidate models

Our objective is to utilize advanced techniques in time series analysis to predict currency exchange rates. We will investigate various candidate models each bringing unique strengths to the forecasting task. Our first model will be **ARIMA Model** (AutoRegressive Integrated Moving Average) from python **statsmodels** library. We will conduct **Explanatory Data Analysis** (EDA), including seasonal decompositon, stationarity check, and differencing, to estimate and fine-tune ARIMA parameters. Then we will explore alternative models, such as **VAR** models for multivariate time series analysis, **State Space Models** and **Neural Network models** to capture non-linear complex relationships. The second model will be selected through the comparison of performances of different models. Once the model is chosen, we will enhance its performance even further by conducting experiments, which will depend on the chosen model.

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