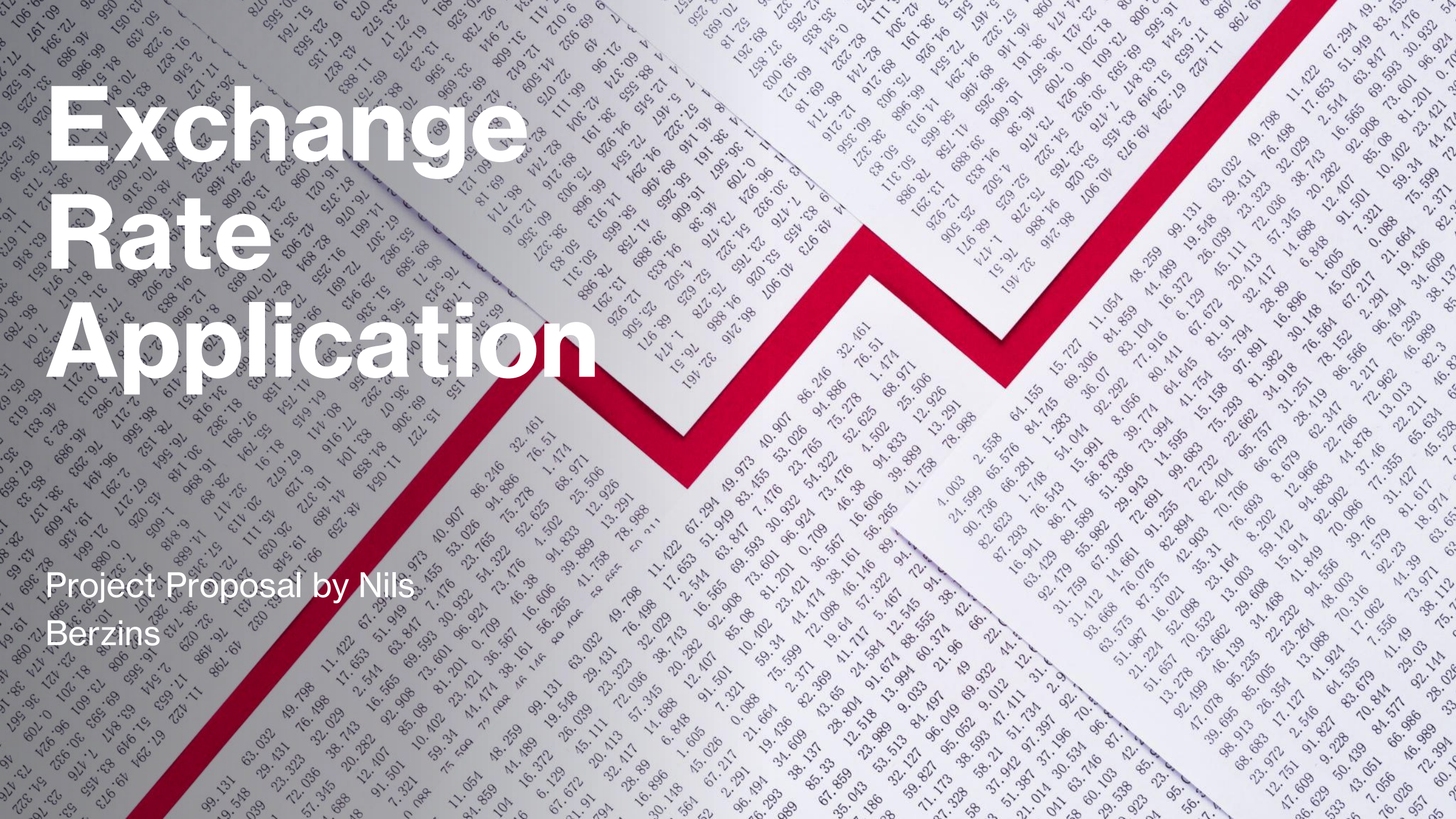
Exchange Rate Application

Project Proposal by Nils Berzins



Data Collection Plan/Process

- Data from ExchangeRate-API
  - 1 request = 1 days exchange rate data
  - Returned JSON data therefore using pandas json_normalize.
  - 256,211 obs in dataset between 2021-01-01 to today.
- Data Collection Next Steps:
  - Parsing other Forex data sources and country borrowing rates data
  - Calculating new variables e.g. 10–30-day momentum, 30-day variance, etc.

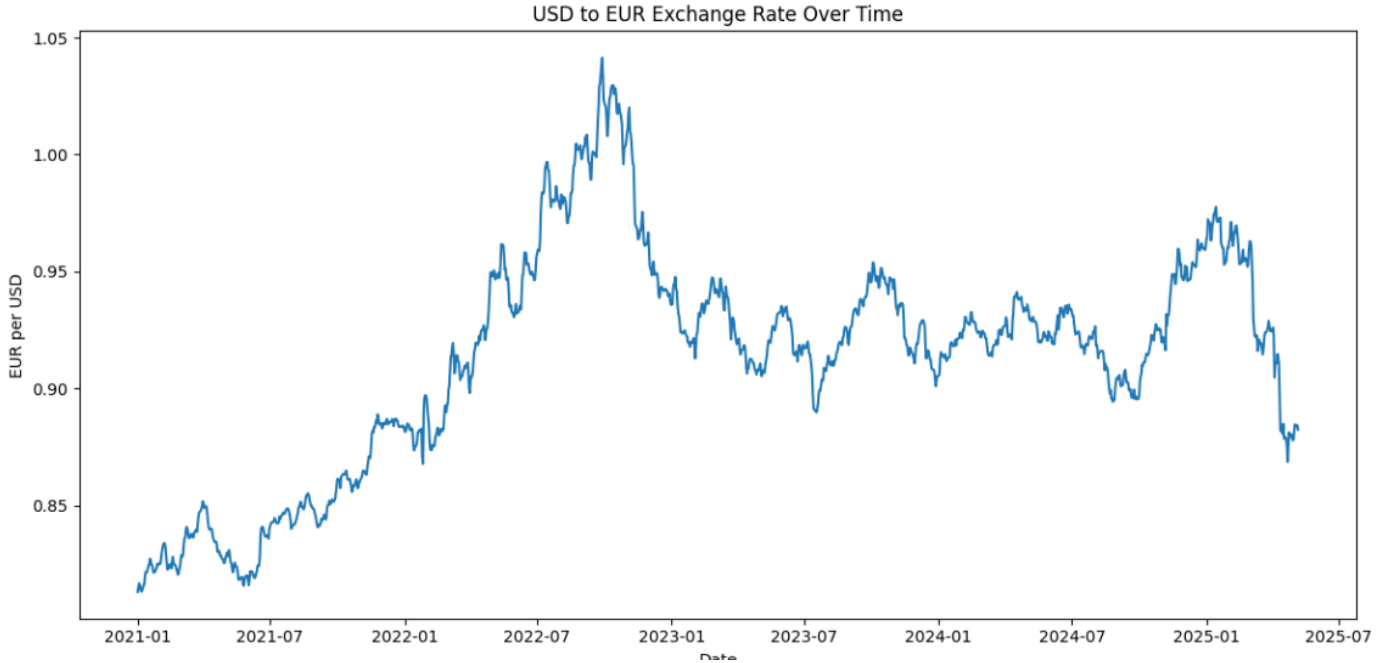
```python
from datetime import datetime, timedelta

API_KEY = "27a7736bc968b92000f698a3"

# Start and end dates
start_date = datetime(2021, 1, 1)
end_date = datetime.today()

# To store all long format days
all_days = []

#Loop over each day starting from 2021
curr_date = start_date
while curr_date <= end_date:
    year = curr_date.year
    month = curr_date.month
    day = curr_date.day

    # Build URL
    url = f"https://v6.exchangerate-api.com/v6/{API_KEY}/history/USD/{year}/{month:02d}/{day:02d}"

    # Request from API and check status
    response = requests.get(url)
    if response.status_code == 200:
        data = response.json()

        if "conversion_rates" in data:
            data_clean = json_normalize(data["conversion_rates"])
            data_long = pd.melt(
                data_clean,
                value_vars=data_clean.columns,
                var_name="Currency",
                value_name="ExRate"
            )
            data_long["Date"] = curr_date.strftime("%Y-%m-%d")
            all_days.append(data_long)
        else:
            print(f"No conversion_rates on {curr_date}")
    else:
        print(f"Failed on {curr_date}: {response.status_code}")

    # Go to next day
    curr_date += timedelta(days=1)

# Combine all data
df_all = pd.concat(all_days, ignore_index=True)

# Preview
print(df_all.head())
```

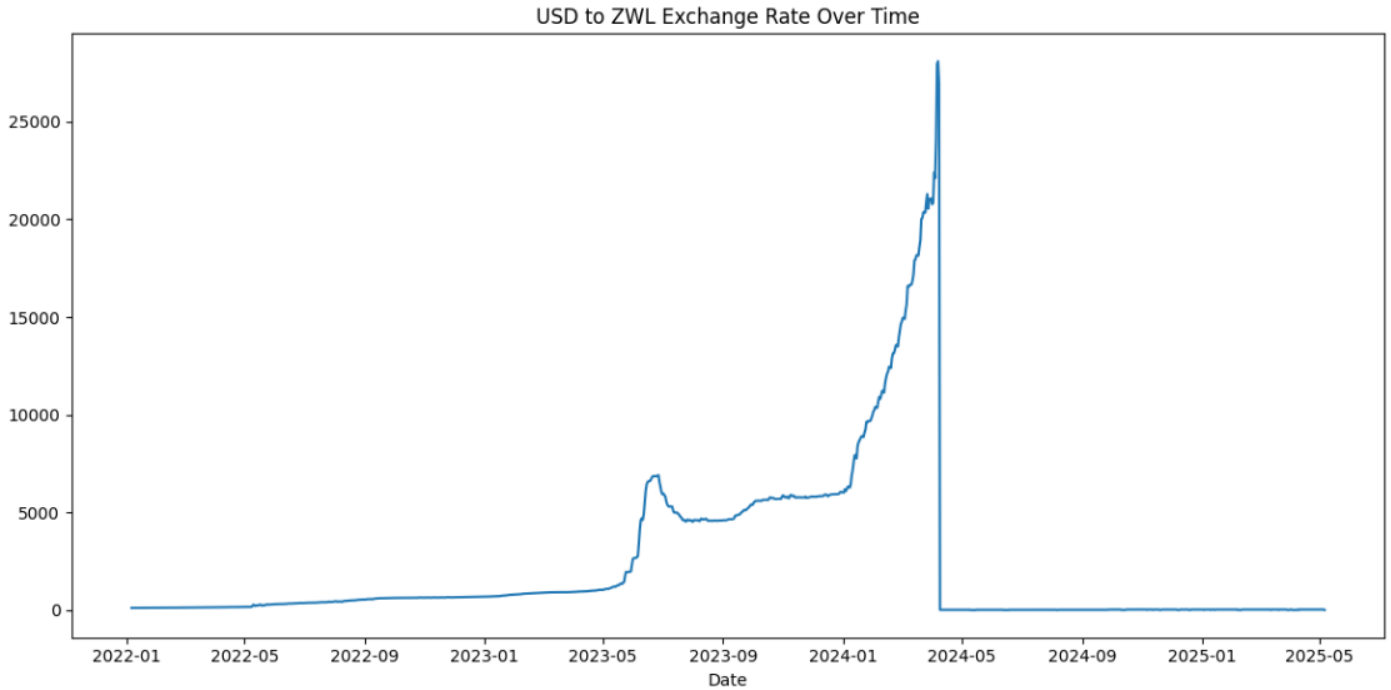
```
  Currency      ExRate        Date
0      USD    1.000000  2021-01-01
1      AED    3.672500  2021-01-01
2      AFN   78.167102  2021-01-01
3      ALL  100.791577  2021-01-01
4      AMD  522.686556  2021-01-01
```

EDA

- Well-managed API/Dataset
  - Null Counts:
    - Currency: 0
    - Exchange Rate: 0
    - Date: 0
- Changes in World Currencies – Newly Retired/Adopted
  - ZWL → ZiG
    - Leading to a graphical collapse in the ex-rate.

Currency	ExRate	Date	DlyReturn
ZWL	13.4097	2024-05-16	inf
LBP	89500.0000	2024-02-28	496.666667
LBP	8253.7500	2023-02-17	447.512438
ZWL	25.2906	2024-11-21	378.562643
ZWL	25.4834	2024-11-13	363.747702
Currency	ExRate	Date	DlyReturn
ZWL	0.000000	2024-05-14	-100.000000
VES	4.159131	2021-10-09	-99.999593
ZWL	13.561600	2024-04-09	-99.949731
ZWL	5.284200	2024-11-19	-79.100286
ZWL	5.495100	2024-11-12	-78.525790





End Goal

- Python Shiny Dashboard
  - Providing “Graphics and Predictive Modelling Services for Investors and Consumers”

- Graphics and Predictive Modelling Services:
  - Simple ExRate Graphics (seen in past slide)
  - Currency Trend Predictor (ML Solution, likely LSTM)
  - Travel Planner (Cheapest time for Travel, e.g. Europe 2022/Japan 2024)
  - *Maybe* Carry Trade Screener

- (Might be biting off more than I can chew)