Cryptocurrency Price Forecasting Models

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Introduction

- Our aim is to predict the future prices of cryptocurrencies and allow clients to pick a portfolio of currency for thier investments and to show which portfolio will give best returns.
- We have list of cryptocurrencies from which the client can choose the currency and select how many days forecast.
- **Libraries used**

- Scikit learn, Prophet, Neural Prophet, yfinance, Pandas, hvplot, tensorflow, keras,
- Colab

Cont..

We used 4 different models;

- 1. Prophet
- 2. Neural Prophet
- 3. PyAF (Python Automatic Forecasting)
- 4. LSTM (Long Short Term Memory) RNN (Recurrent Neural Network)

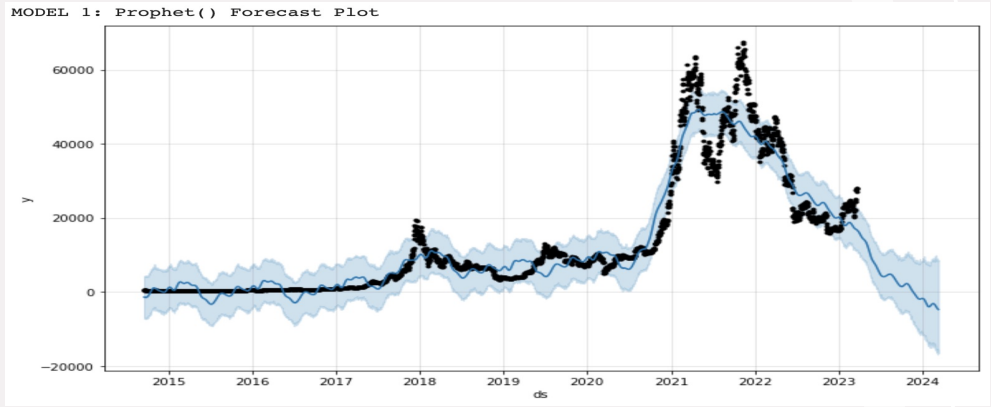
We evaluated each model with the following;

- R-Squared
- Mean Squared Error
- Mean Absolute Error
- Root Mean Squared Error

Model 1:Time-Series Forecasting with Prophet()

- **Description:** The Prophet library is an open-source library designed for making forecasts for univariate time series datasets.

- **Evaluation:**

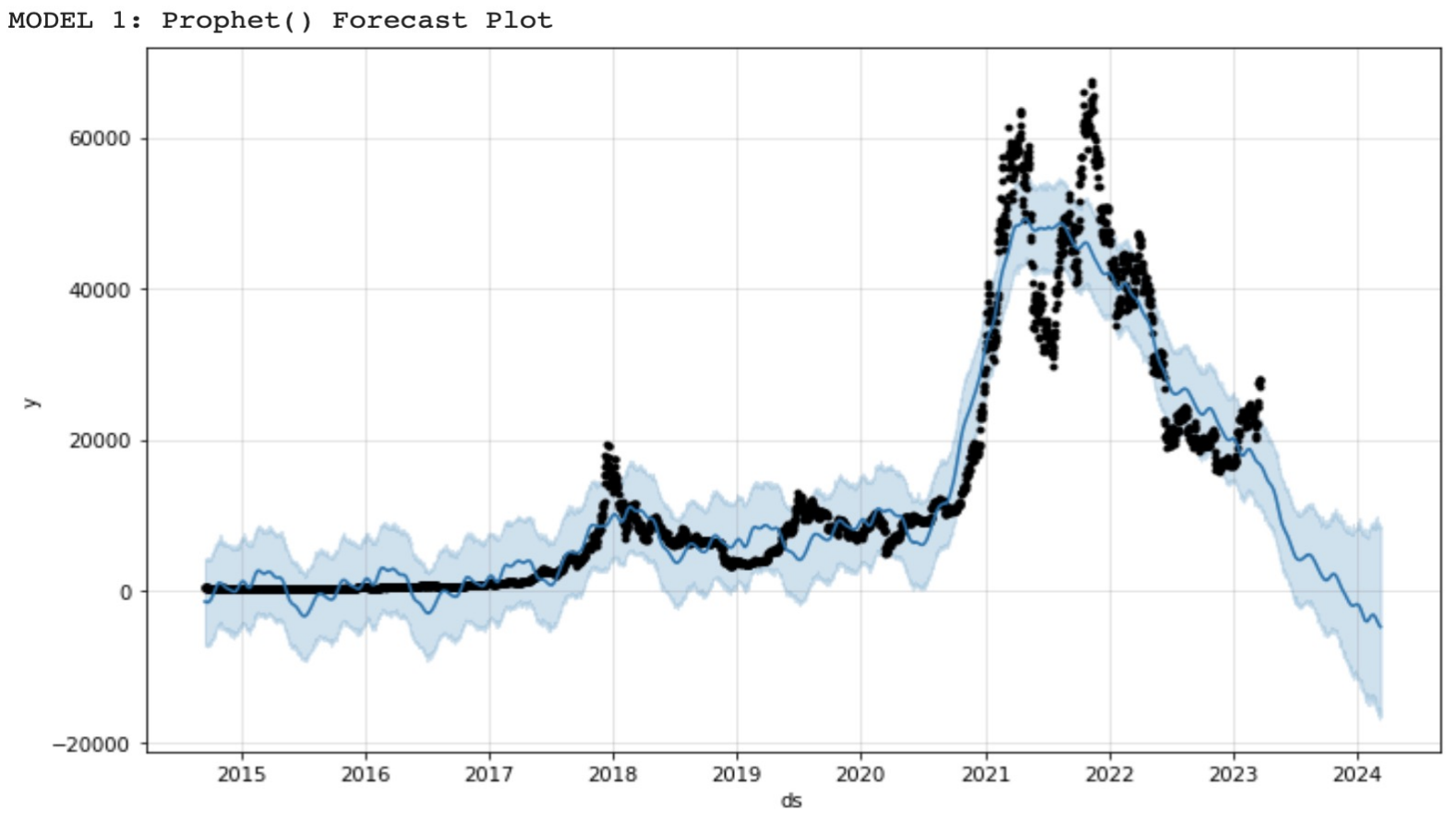


- **Analysis:**

```
Model 1: Prophet()
Coefficient of determination: 0.92
Mean squared error: 19745010.56
Mean absolute error: 3046.29
Root mean squared error: 4443.54
```

Cont..Model 1:

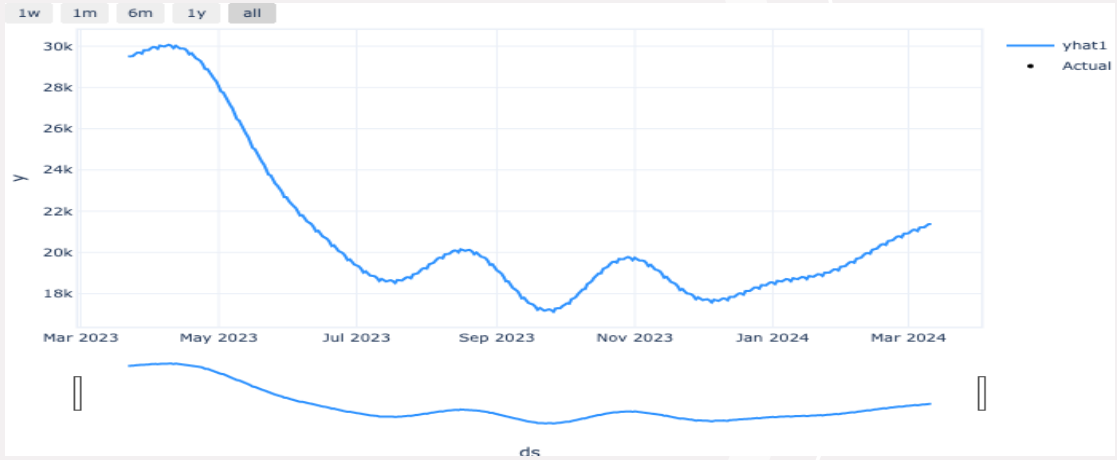
- Forecast: (picture)



Model 2:Time-Series Forecasting with Neural Prophet()

- **Description**: NeuralProphet is a python library for modeling time-series data based on neural networks. It's built on top of PyTorch and is based on Prophet.

- **Evaluation:**

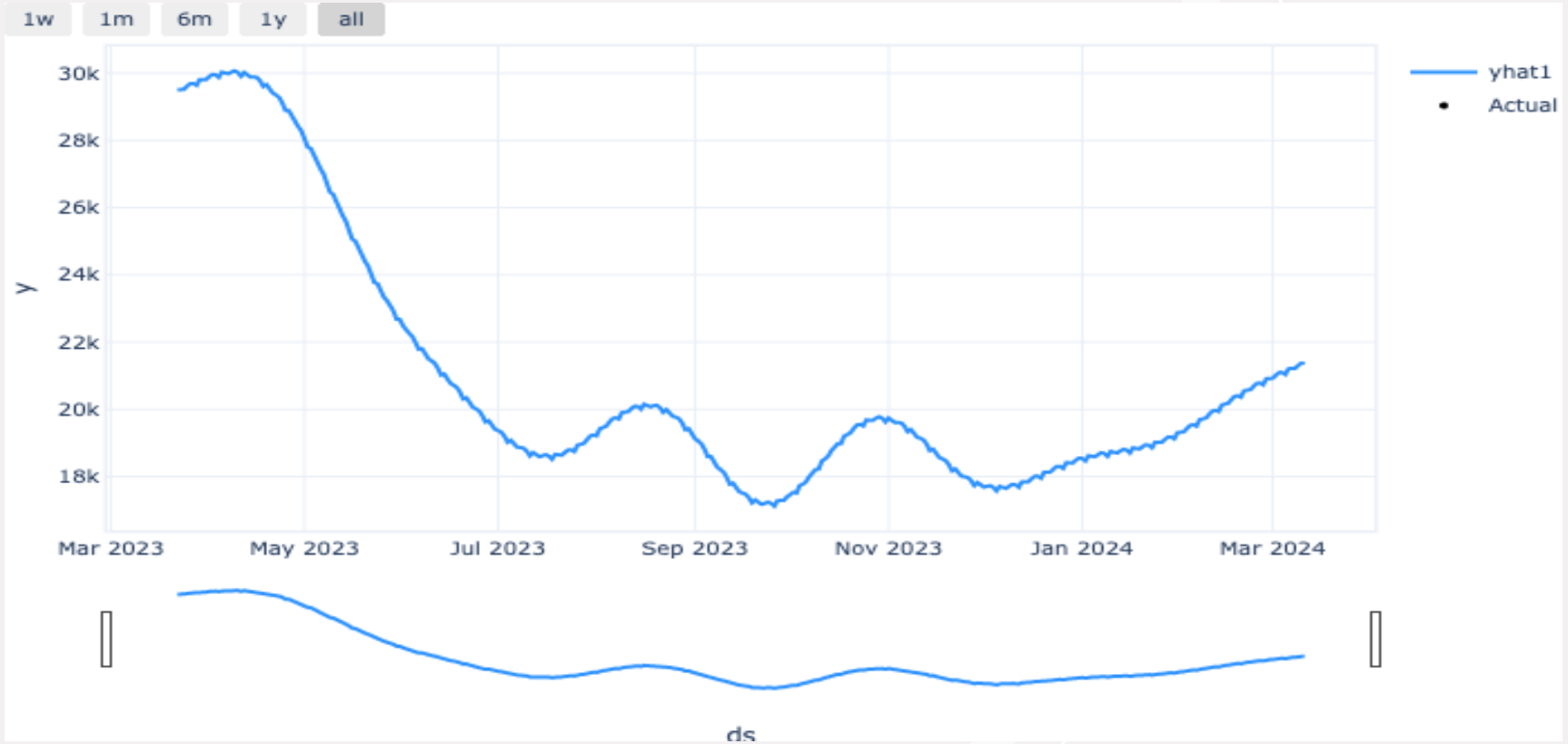


- **Analysis:**

Model 2: Neural Prophet()
Coefficient of determination: 0.80
Mean squared error: 51698344.99
Mean absolute error: 4674.39
Root mean squared error: 4443.54

Cont..Model 2:

❖ Forecast:



Model 3:PyAF or Python Automatic Forecasting

- **Description:** PyAF or Python Automatic Forecasting is an open-source Python package built on top of Scikit-Learn and Pandas, to automatically develop time-series forecasting models.

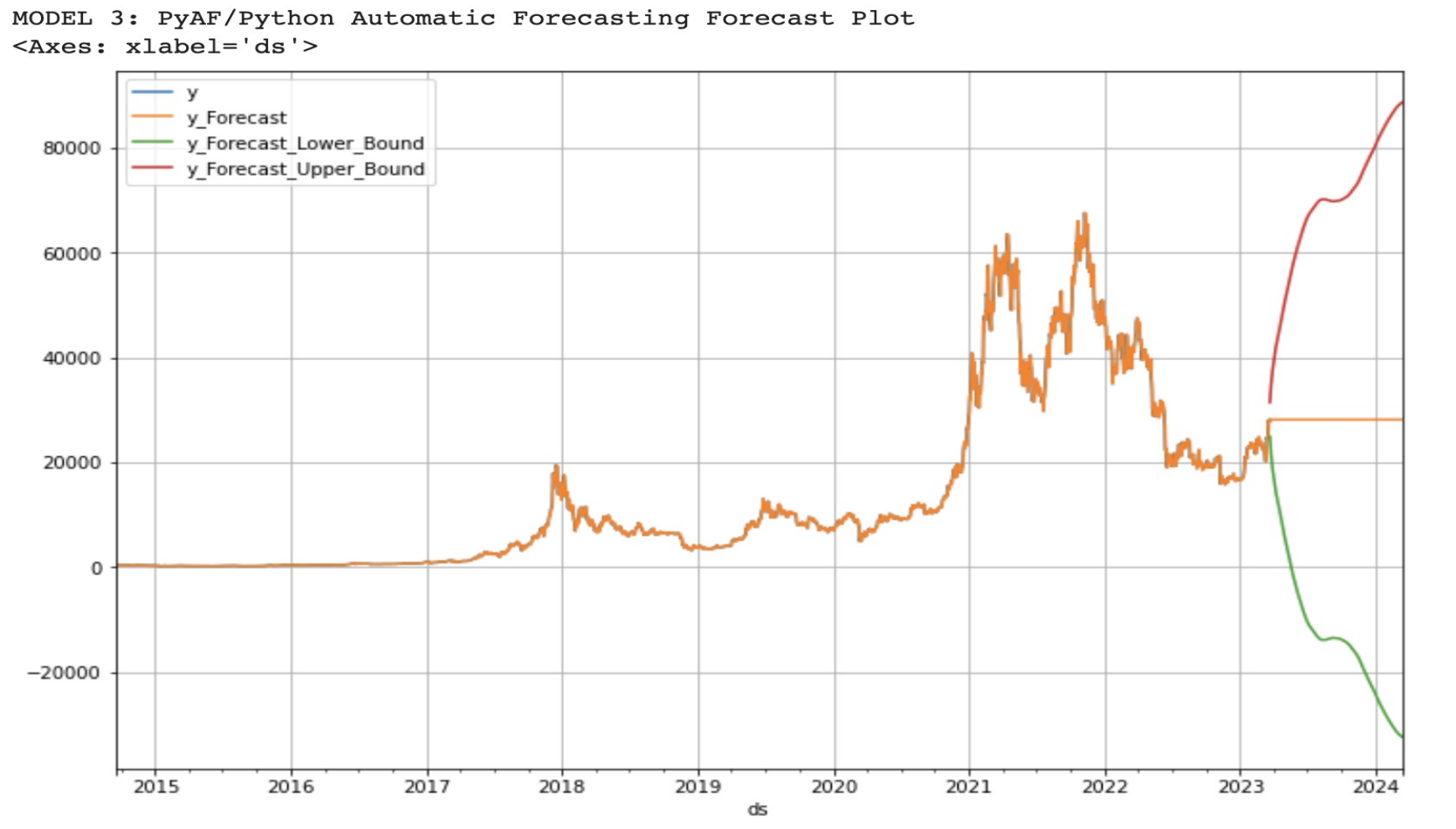
- **Evaluation:**

- **Analysis:**

```
Model 3: PyAF/Python Automatic Forecasting
Coefficient of determination: 1.00
Mean squared error: 627365.26
Mean absolute error: 358.94
Root mean squared error: 4443.54
```

Cont..Model 3:

- Forecast: (picture)



Model 4: LSTM RNN

- **Description:** Long short term Memory (LSTM), Recurrent Neural Network (RNN) are neural networks used for classifying, processing and making predictions based on time series data. LSTM is an extension of RNN that improve the RNN's memory and enables it to remember input over a long period of time. Hence, it is an ideal for predicting and processing data.
- Evaluation:
- **Analysis:**

```
Model 4: LSTM Recurrent Neural Networks
Coefficient of determination: 0.89
Mean squared error: 0.00
Mean absolute error: 0.04
Root mean squared error: 0.20
```

Analysis

- Time Series Forecasting Models

Models / Results	Prophet	Neural Prophet	PyAF	LSTM RNN
Coeff. of Determination	0.92	0.80	1.00	0.89
Mean Squared error	19745010.56	51698344.99	627365.26	0.00
Mean absolute error	3046.29	4674.39	358.94	0.00
Root mean squared error	4443.54	4445.54	4443.54	0.20

Portfolio Advisors

- Allowing the clients to interact by using the UI, which allows them to choose currency, amount to invest and forecasted time to achieve their maximum returns.

Future Improvements

- In conclusion, Model 2: Time-Series Forecasting with Neural Prophet() was chosen as the successful model for implementaion. This model presented both realistic numberic Evalution of errors while preserving the "meaningfulness" of the prediction values.
- Clearly more fine tuning is required to ensure that the RMSE is further reduced while increasing the R2-Squared value.
- Further improvement in visualization of future forecast and testing with other cryptocurrency is required.
- It is, nonetheless, a beginning.

References

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Thank You