

AI Forecasting

BITCOIN PRICE PREDICTION

Group 4 - Team Members

- [Juan Carlos Castaneda](#)
- [William Chance](#)
- [Martin Rasumoff](#)
- [Jorge Sira](#)



UNIVERSITY OF MIAMI
MIAMI HERBERT
BUSINESS SCHOOL

Introduction



OUR PROJECT

The objective of this project is to predict the price direction of Bitcoin at the end of the upcoming 4 hours (variable time-frame).

Our aim is to use different machine learning classification techniques, and compare different model performances. We also experimented with variations on re-training size, re-training frequency, as well as the number of features (to be performed). Model outputs the predicted direction which will be interpreted as a long, short, or non-confident signal (based on certain criteria)

Then, the goal is to provide actionable information that enables the trading decision process on when, how much, and what type of trade to execute (short vs long).

Note that this project was inspired by the work performed at the Northumbria University in Newcastle* (Gerlein, Eduardo, McGinnity, Martin, Belatreche, Ammar and Coleman, Sonya, 2016 "Evaluating machine learning classification for financial trading: An empirical approach. Expert Systems with Applications")

OUR PROJECT (cont'd)

The inputs to the models include past quote data (OHLCV), which are enriched within the process with a set of technical indicators, to be used as features on the model training phase.

Part of the project consists in testing different features which includes indicators from several categories such as momentum indicators, volume indicators, volatility indicators, trend indicators, etc.

Our plan is to complete an MVP for this project consisting of creating a software solution that:



1. **Creates different sets of indicators to test a group of predictive models (dataset creation)**
2. **Models each of the datasets using processing windows and frequent re-training (sliding window durations and re-training periods to be defined) - (model creation and findings generation)**
3. **Summarizes the findings**
4. **Presents the outcome to the end-user (GUI)**



Technology

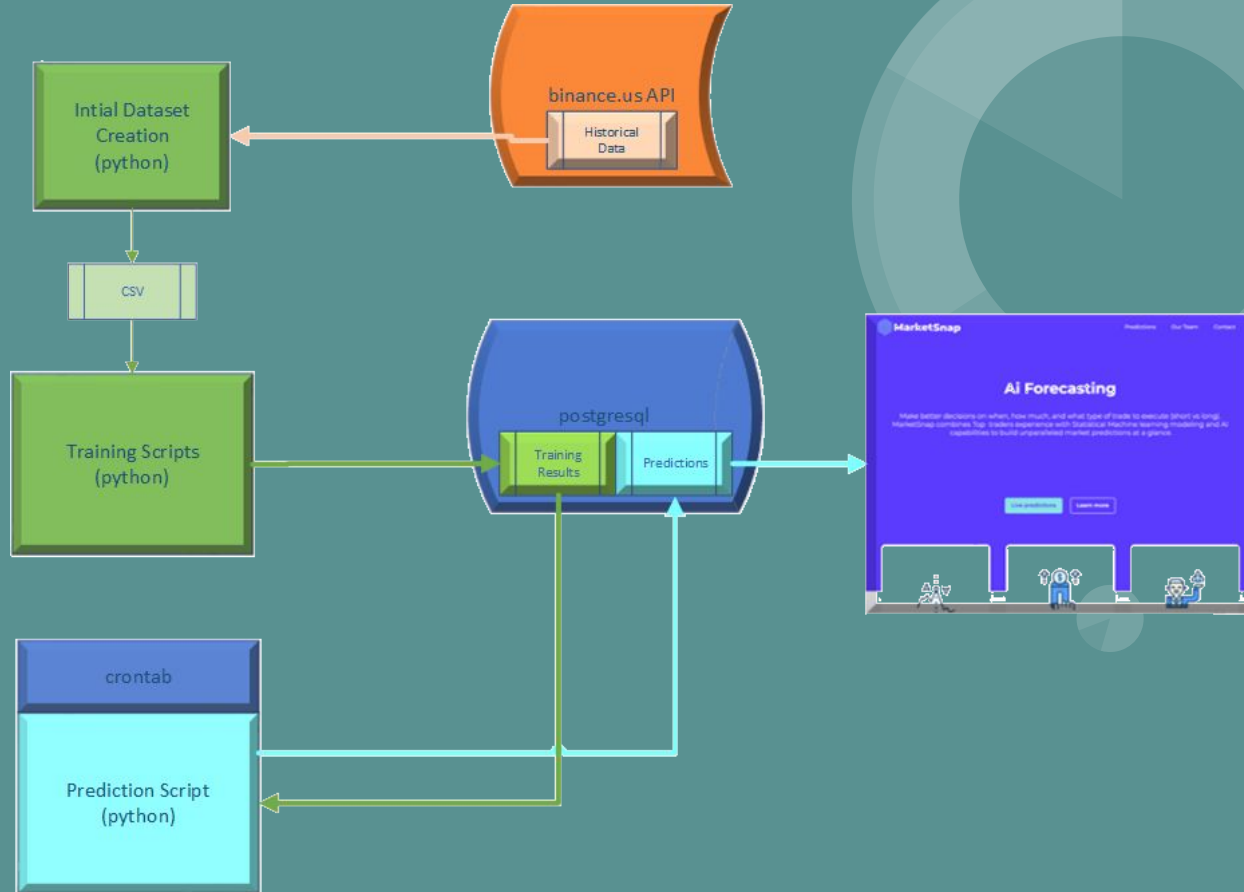


INFRASTRUCTURE

- 3 Virtual Machines running - Debian Linux OS
- Backend - Python, Crontab  python™
- Frontend - Docker, Nginx, Bootstrap + Flask
- Database - Postgresql 



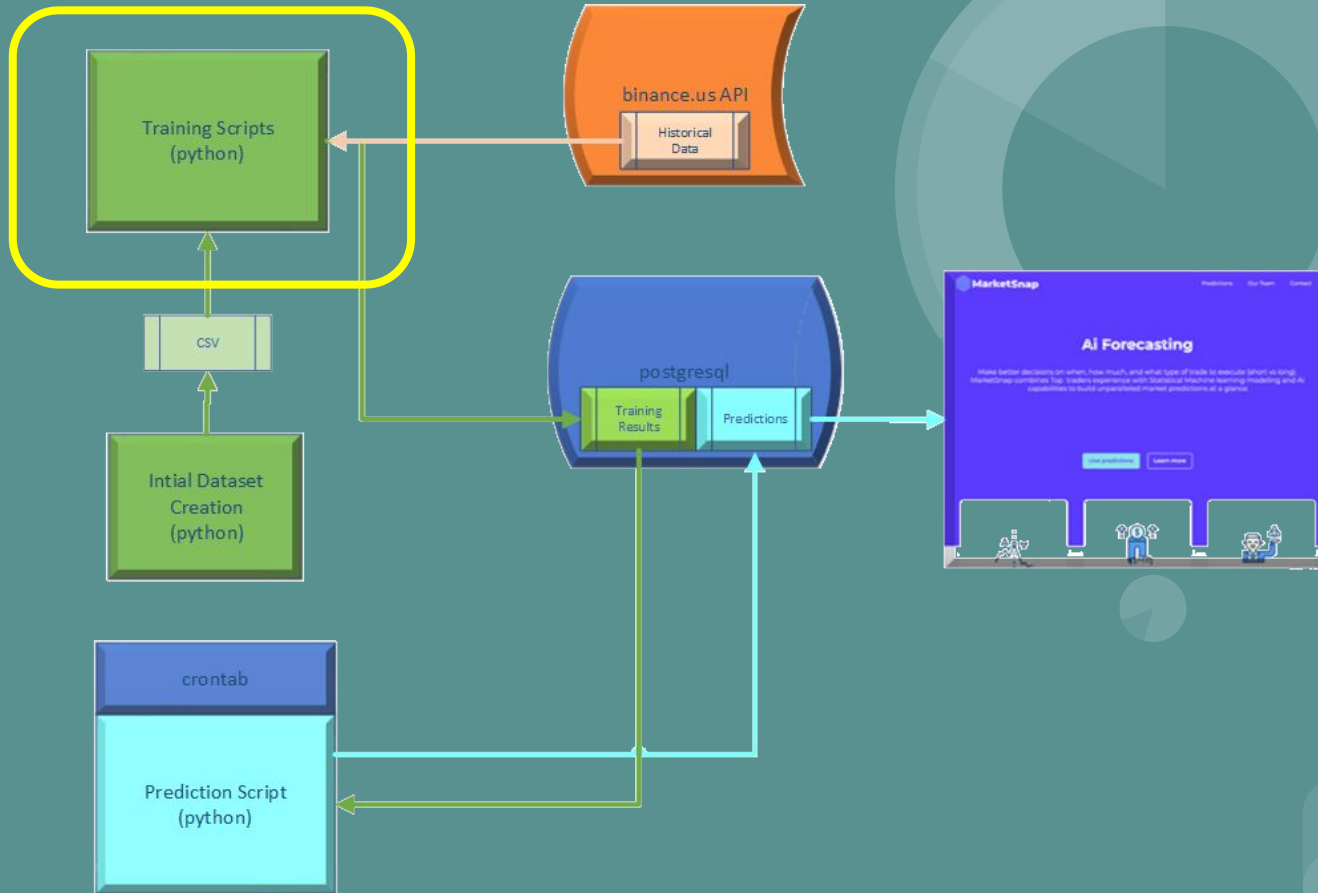
PROCESS FLOW



Experimentation and Deployment



Experimentation Methodology (Training Script)



High-level Experimentation Process

Example using a Training-Window of 500 and a re-training period of 5

How often to re-train

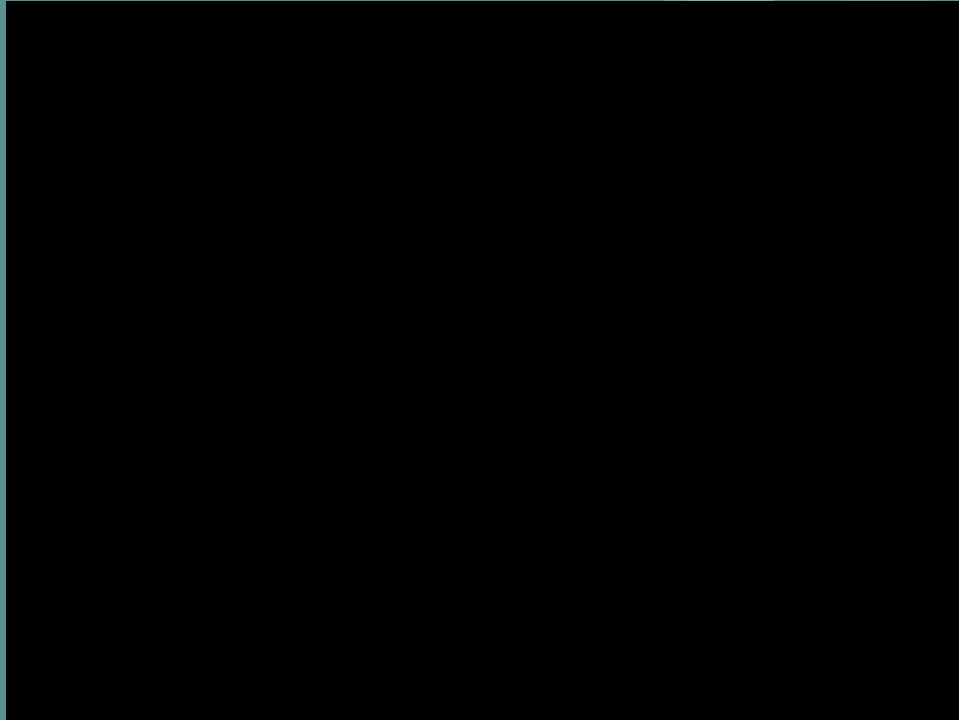
Table 5. Consolidated results for the experiments with variations in retraining set size, retrain period, and number of attributes.

Currency Pair:				USDJPY						
Experiment Setup	Retrain Set Size	Retrain Periods	# of Attributes	Metrics	OneR	C4.5	Jrip	LMT	Kstar	NaiveBayes
Setup 1		5	5	Accuracy	49.29	53.38	51.79	53.17	51.79	52.99
				DOWN Accuracy	48.35	52.82	51.01	52.86	51.19	52.25
				UP Accuracy	50.16	53.82	52.43	53.39	52.81	53.65
				10-Fold Cross-Val.	53.71	51.90	53.51	53.31	48.90	50.90
				Cumulative Return	-55.79	116.88	18.25	106.17	69.94	142.89
Setup 2	500	10	5	Accuracy	49.56	52.97	51.41	53.00	51.48	52.74
				DOWN Accuracy	48.61	52.35	50.59	52.64	51.16	51.98
				UP Accuracy	50.41	53.48	52.05	53.25	52.77	53.42
				10-Fold Cross-Val.	51.70	52.10	52.71	52.30	52.71	51.30
				Cumulative Return	-53.02	116.04	6.97	107.96	64.02	123.55
Setup 3		15	9	Accuracy	50.49	52.00	51.92	52.76	49.77	52.20
				DOWN Accuracy	49.61	51.29	51.29	52.33	50.44	51.50
				UP Accuracy	51.36	52.53	52.34	53.04	52.06	52.75
				10-Fold Cross-Val.	51.30	49.10	51.90	51.10	51.90	53.31
				Cumulative Return	-14.69	18.61	41.86	41.48	62.47	54.76
Setup 4		5	5	Accuracy	50.01	53.89	52.37	53.72	51.01	53.58
				DOWN Accuracy	49.11	53.18	51.53	53.57	51.29	52.86
				UP Accuracy	50.87	54.53	53.16	53.82	52.94	54.23
				10-Fold Cross-Val.	50.15	50.85	51.25	50.05	50.85	52.95
				Cumulative Return	-15.35	146.06	84.50	145.19	70.22	136.94
				Accuracy	49.98	53.69	52.96	53.70	51.17	53.56
				DOWN Accuracy	49.09	52.96	52.25	53.59	51.37	52.84

Test Size Size

High-level Experimentation Process

Example using a Training-Window of 500 and a re-training period of 5



Front-end







Front End - <https://www.marketsnap.io/>



www.marketsnap.io

 **Bitcoin** (BTC) Price Predictions

2021-06-21 20:00 - 24:00	2021-06-22 0:00 - 4:00	2021-06-22 4:00 - 8:00	2021-06-22 8:00 - 12:00	12:00 - 16:00
 Short	 Long	 Long	 Short	Next prediction 02:15 HOURS MINUTES
Correct REFERENCE VALUE \$ 31600.0	Correct REFERENCE VALUE \$ 32637.33	Correct REFERENCE VALUE \$ 32637.33	Missed REFERENCE VALUE \$ 31215.51	



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