

Trading Strategy Analysis with Machine Learning

Jupyter Lab & Freqtrade

Marissa, Kausar, Edith & Jodi

Analysis Design

2 Trading Strategies

EMA Crossover

–Exponential Moving Average–

*Indicators identify:
price trend

SMA-RSI-BB

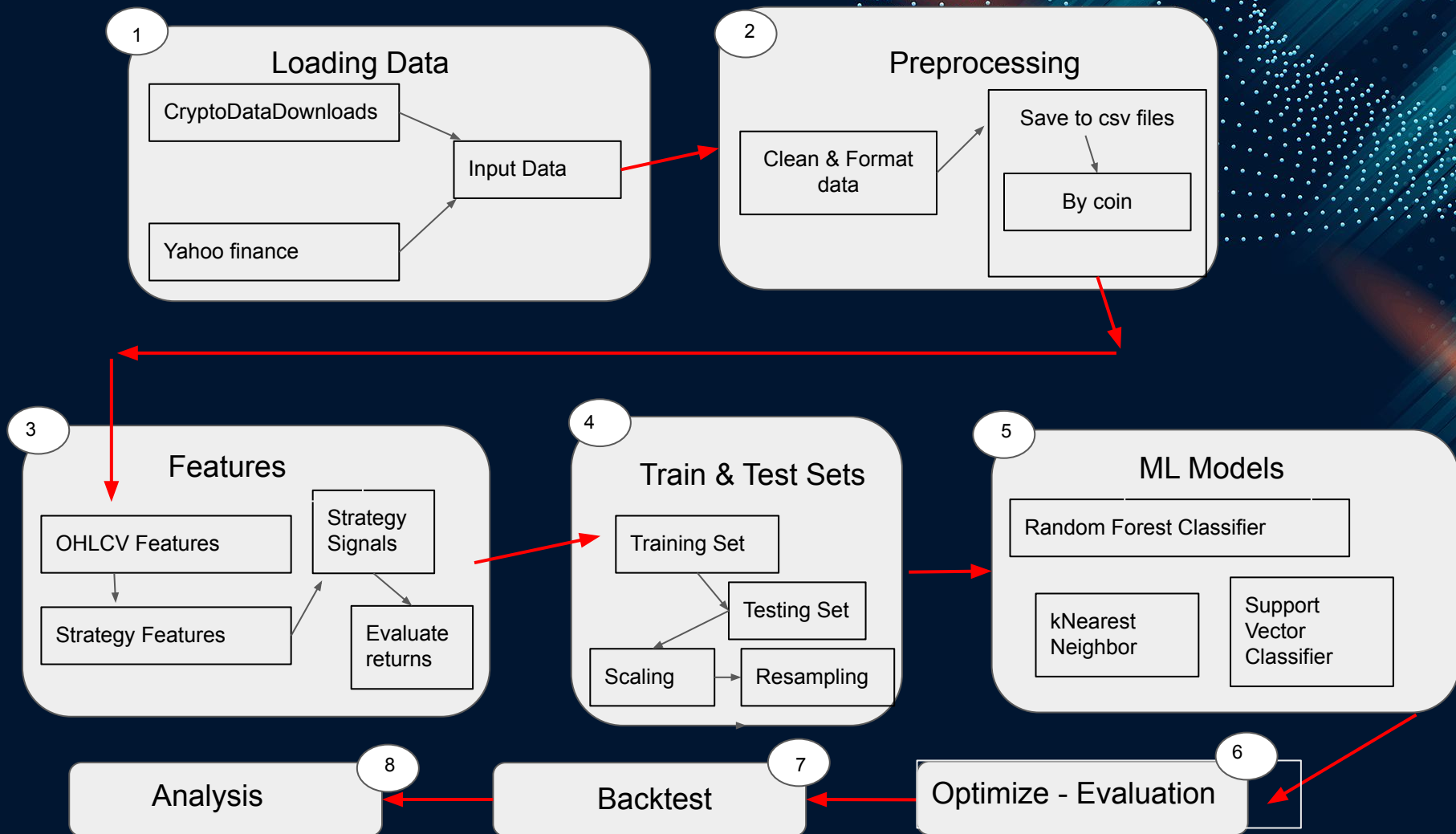
–Simple Moving Average–
–Relative Strength Index–
–Bollinger Bands–

*Indicators identify:
price trend, momentum, and volatility

Machine Learning models:

1. Support Vector Classifier
2. Random Forest Classifier
3. kNearest Neighbor Classifier

Data: BTC/USD data 2018 to 2023.



Analysis fail

*****DATAFRAME
IS
DESCENDING***

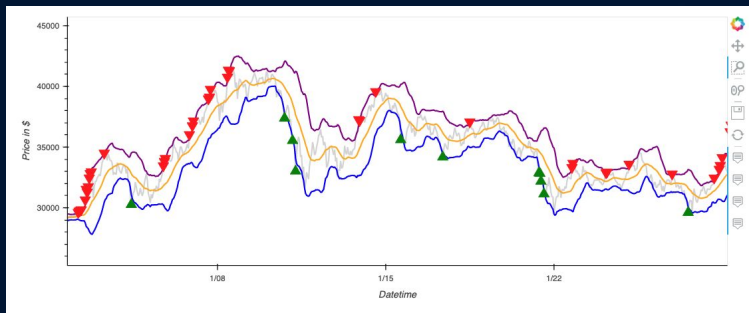


*****FORGOT TO RESAMPLE*****

```
svc_testing_report = classification_report(y_test, svc_pred)
print(svc_testing_report)
```

	precision	recall	f1-score	support
0	0.66	1.00	0.80	21763
1	0.00	0.00	0.00	11195
accuracy			0.66	32958
macro avg	0.33	0.50	0.40	32958
weighted avg	0.44	0.66	0.53	32958

*****Strategy is selling on the uptrend***

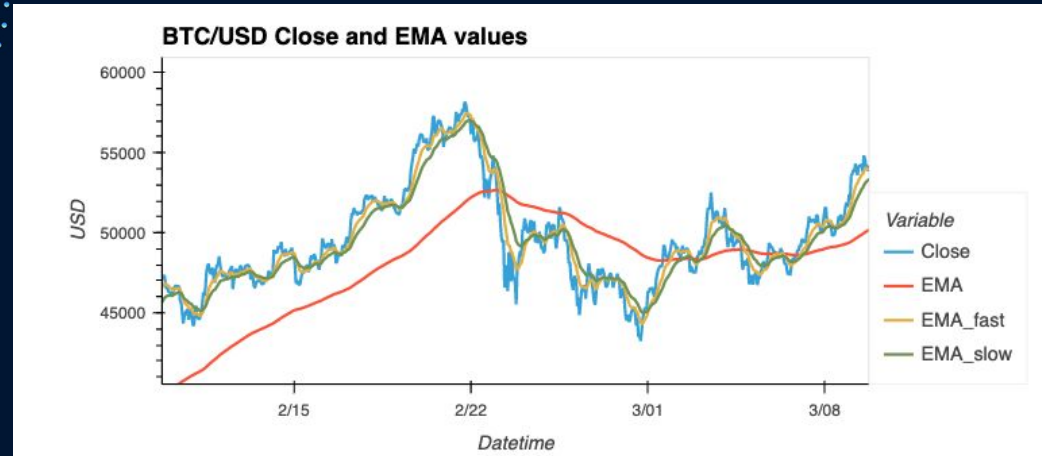
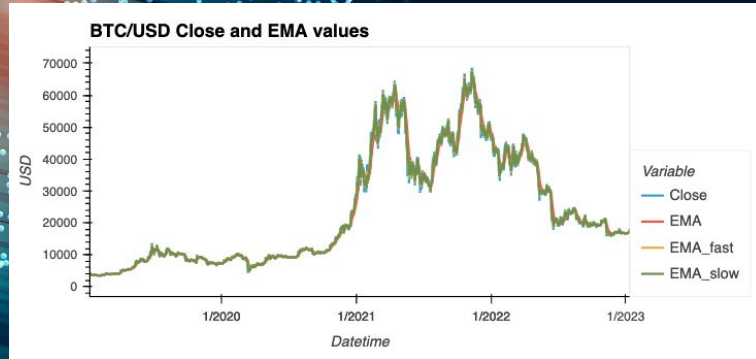


**“There is often
more insight in
Failure
than in success”**

—Someone Famous

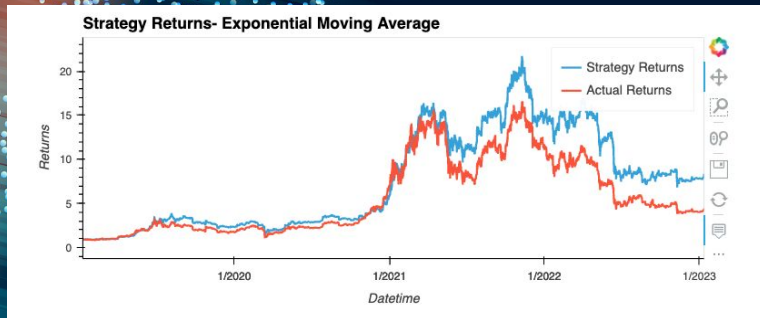
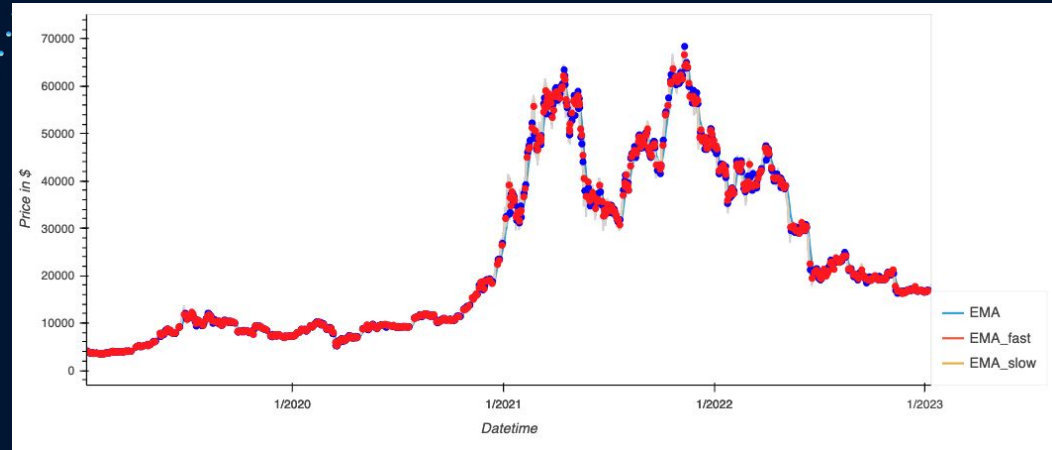
EMA!

EMA =200, EMA middle window=26
EMA short window = 12



EMA!

Signal Values: 1 = 25675 0= 9446



Cumulative Returns Sum:

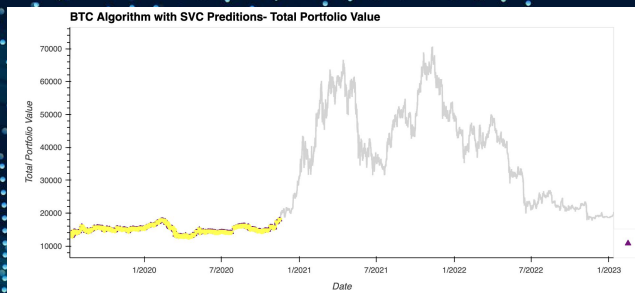
Actual Returns \$200,219.52

Strategy Returns \$264,108.83

models!

20% training
80% test

Support Vector Classifier



```
svc_testing_report = classification_report(y_test, svc_pred)
print(svc_testing_report)
```

	precision	recall	f1-score	support
0	0.46	0.35	0.40	8361
1	0.78	0.85	0.81	22414
accuracy			0.71	30775
macro avg	0.62	0.60	0.60	30775
weighted avg	0.69	0.71	0.70	30775

SVC Strategy Returns vs. Actual Returns with Support Vecotr Classifier model



Cumulative Returns Sum of testing data:

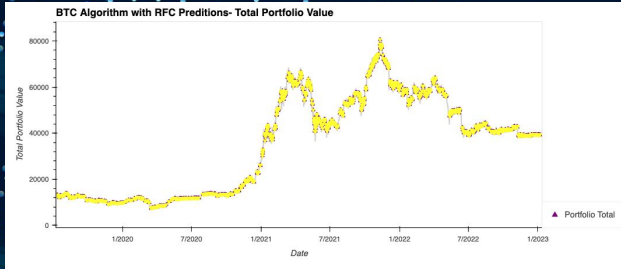
Actual Returns \$63,400.48

SVC-Strategy Returns \$99,708.40

models!

**20% training,
80% test**

Random Forest Classifier
& kNearest Neighbor



```
print(forest_pred_report)
```

	precision	recall	f1-score	support
0	0.92	0.63	0.75	8361
1	0.88	0.98	0.92	22414
accuracy			0.88	30775
macro avg	0.90	0.81	0.84	30775
weighted avg	0.89	0.88	0.88	30775

RFC Strategy Returns vs. Actual with Random Forest Classifier model



Cumulative Returns Sum of testing data:
Actual Returns \$63,400.48
RFC- Strategy Returns \$62,060.44

01

SVC

- *Best returns
- * 1560 trades

- *not good with volatility

53% portfolio returns

02

RFR

- *Best balanced precision/Recall

- *might do better in Backtesting

2% portfolio returns

03

kNN

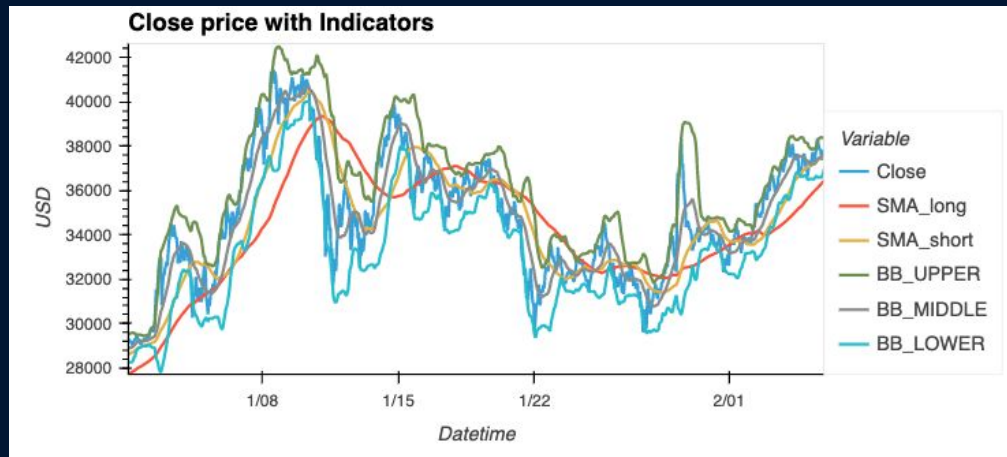
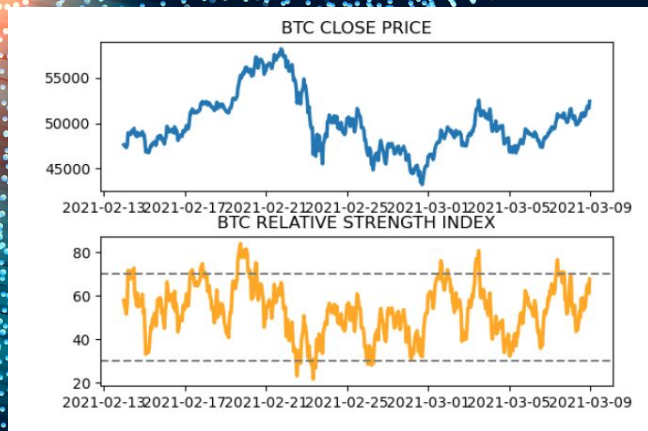
- *Good happy medium

- *not good with volatility

-2.5% portfolio returns

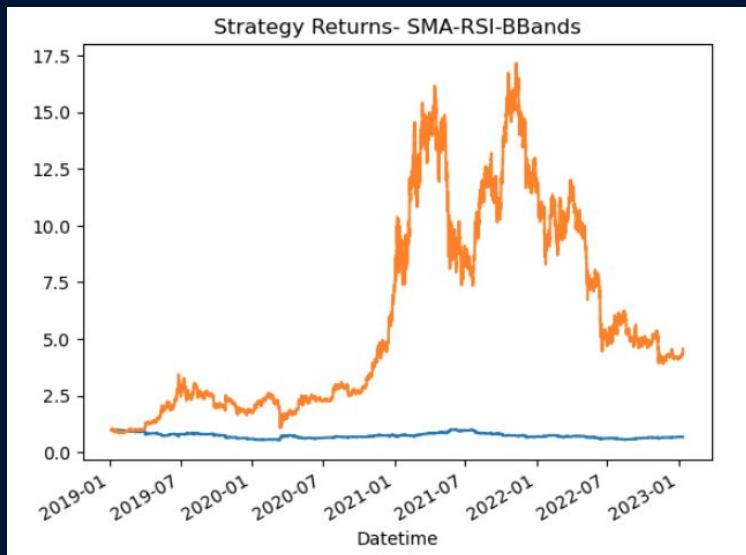
S-R-B!

Simple Moving Average Relative Strength Index
Bollinger Bands



Rolling Windows:
SMAlong = 100 SMAsort = 50 RSI = 14
Bollinger Bands = 20, with 2.5 std

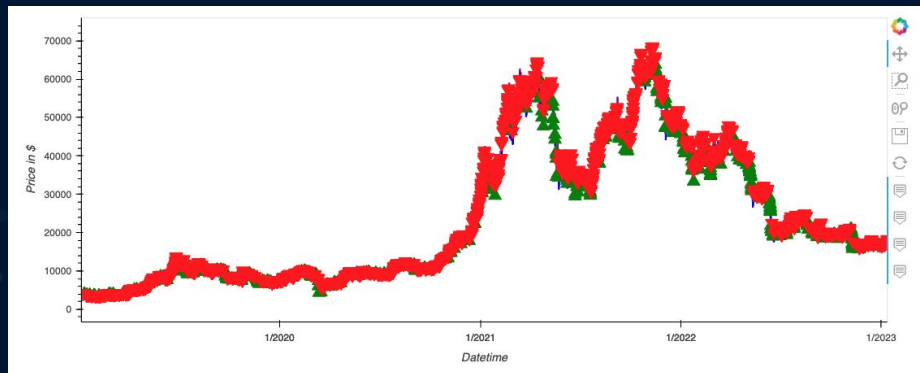
SRB Strategy Results



Enter/Exit Trades:

0 = 33432

1 = 1789



Cumulative Returns Sum:

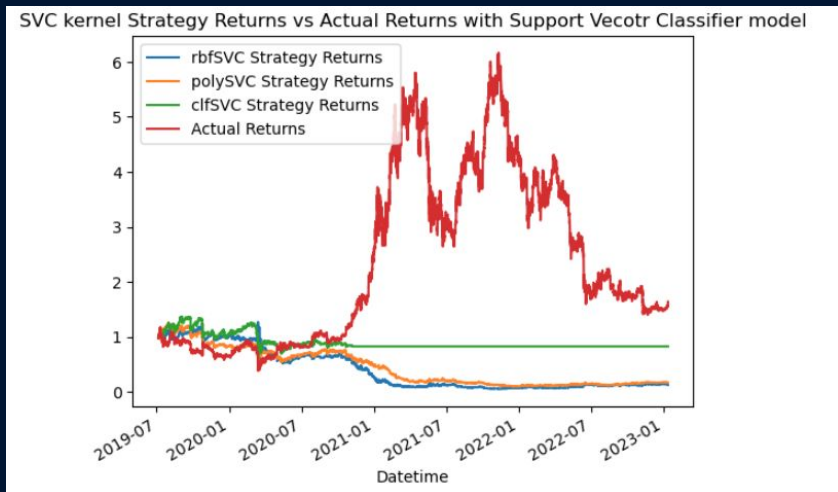
Actual Returns \$207,229.02

Strategy Returns \$22,885.53

SRB Model Analysis

—SVC Model—

rbf kernel, poly kernel, clf kernel



Cumulative Returns Sum:

clfActual Returns \$27,772.86
Strategy Returns \$72,159.74

SVC & kNN get resampled
Not Random Forest

—poly Kernel

	precision	recall	f1-score	support
-1.0	0.12	0.80	0.21	1766
0.0	0.96	0.59	0.74	28431
1.0	0.18	0.42	0.25	678
accuracy			0.60	30875
macro avg	0.42	0.60	0.40	30875
weighted avg	0.90	0.60	0.69	30875

negative returns on portfolio holdings

SRB Model Analysis

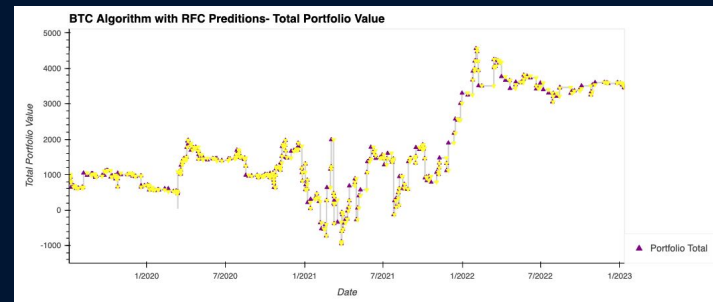
—RFC Model—



—WELL BALANCED?

	precision	recall	f1-score	support
-1.0	0.58	0.11	0.19	1766
0.0	0.93	0.99	0.96	28431
1.0	0.62	0.02	0.04	678
accuracy			0.92	30875
macro avg	0.71	0.38	0.40	30875
weighted avg	0.90	0.92	0.90	30875

kNN resampled
Not Random Forest

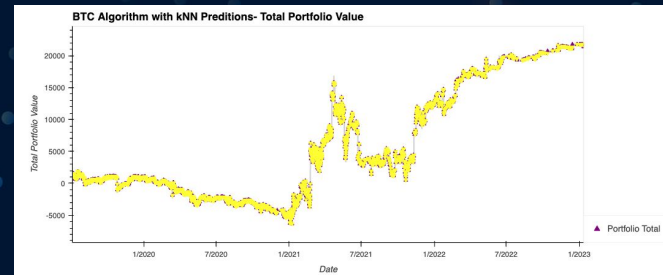


5% return on portfolio

—kNN Model—



	precision	recall	f1-score	support
-1.0	0.16	0.46	0.23	1766
0.0	0.94	0.84	0.89	28431
1.0	0.23	0.18	0.20	678
accuracy			0.80	30875
macro avg	0.44	0.49	0.44	30875
weighted avg	0.88	0.80	0.83	30875



10% return on portfolio

01

kNN

* balanced
Classification #s

*good buy/sell/hold
Timing

10% return on
portfolio

02

RFC

*poor Recall on
buy/sell

*precision good

5% return on
portfolio

03

SVC

*did not handle
volatility well,
inconsistent across
time

Return losses on
portfolio



WHOA!

You still with me????.

Best Strategy for BTC 2019-2023:

EMA

best model: SVC/RFC

THERE IS MORE TO COME, EXCITED YET?



Marissa

Backtesting



Kausar

Freqtrade
deployment



Edith

Freqtrade
AI options