Data Preprocessing Notes

Major Operations

1. Handling Negative Values in Stock Data
   - Stocks, especially in the PRC and OPENPRC columns, sometimes have negative values.
   - The forcePositives.py function in .src/helperFunctions/dataPreprocessing/ is used to convert these values to positive. The full implications of this conversion are yet to be fully evaluated.
2. Addressing NaN Values in PRC and OPENPRC
   - OPENPRC missing values are filled with the previous row's PRC.
   - PRC missing values are filled with the current row's OPENPRC, or if unavailable, the previous row's PRC.
   - Rows at the beginning with NaNs are removed until a complete row without NaNs is encountered.
   - This is done in .src/helperFunctions/dataPreprocessing/replaceNaNs.py
3. Dataset Operation Log
   - The major operations you make on the dataset are stored in a log in the tests folder.
   - You do not necessarily need to apply both, and is customizable upon init.

Open High Low Close (OHLC) Data Processing

1. Currently, OHLC values are computed using 5-minute return intervals.

Selection Criteria for Analysis

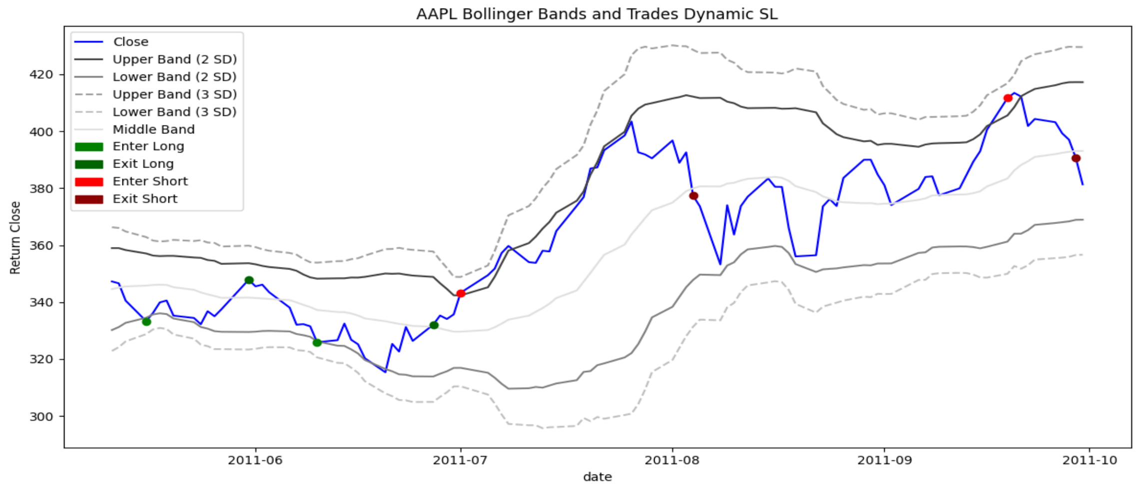
1. Currently, I first apply the NaN major operation, but not the positive, as I am unsure whether all negative values are collection errors or are a product of market illiquidity.
2. Stocks are chosen based on the availability of complete data from January 4, 2010, to December 31, 2020. This results in a total of 1,120 stocks for the study from the original 10,040. This range can be modified as well as the NaN/Positive requirement.

Non-Trades(Splits)

1. Non-trades are points of data in which a trade entry does not occur. They are calculated as follows.
2. Loop over every stock and generate an equal number of non-trades as there are trades for that stock.
   - Specify distances from trades and the splits in which to do. E.X. dist=(min=1, low=3, med=5, max=8), splits=(34, 33, 33)
   - This means a third of the non-trades will be between 1 and 3 days away inclusive, a third will be between 3 and 5 days away inclusive, and the last third will be between 5 and 8 days away inclusive.

Bollinger Naïve 1

Trade Cost = .2% per entry/exit



The Naive strategy enters on band highs/lows and exits on middle band / stop loss triggered at 3SD

Bollinger 1 is only able to trade 1 unit at a time.

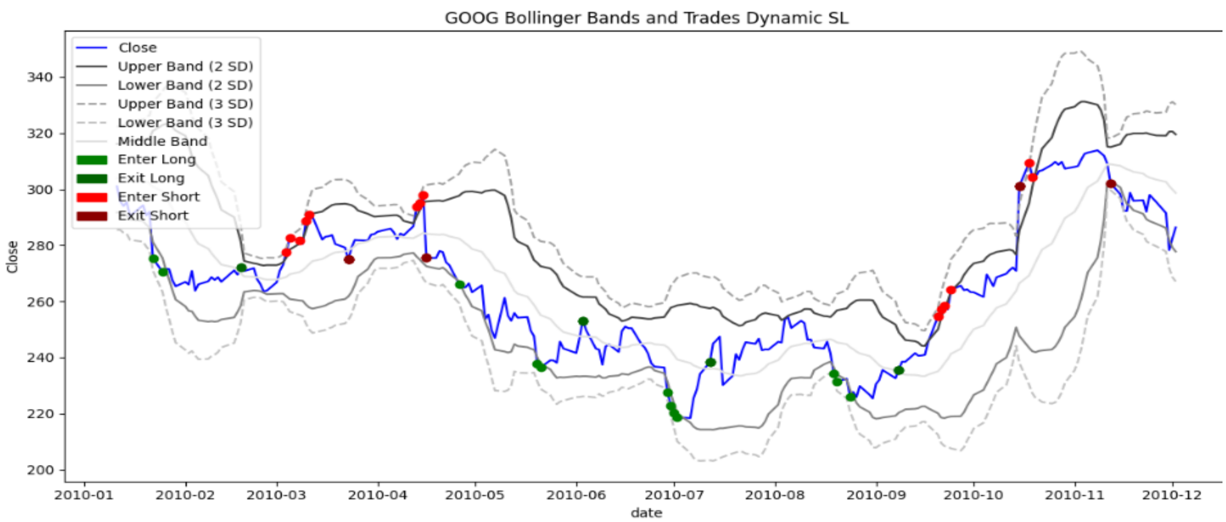
Bands are calculated as follows (Bperiods = 19 -> N = 20)

- Middle Band (MB): MB = (Sum of Close Prices over last N periods) / N)
- Standard Deviation (SD): SD = sqrt((Sum of (Close - MB)^2 over last N periods) / N)
- Upper Band (UB): UB = MB + (1.96 * SD)
- Lower Band (LB): LB = MB - (1.96 * SD)
- Upper Band 3 Standard Deviations (UB3SD): UB3SD = MB + (2.96 * SD)
- Lower Band 3 Standard Deviations (LB3SD): LB3SD = MB - (2.96 * SD)

	Factor	Total Trades	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	125,554	1120	62.21%	0.595%	5.09%	-6.86%	170 days	18d 22h 55m	74743.49%
Overall	With Costs	125,554	1120	62.21%	0.20%	4.45%	-7.93%	170 days	18d 22h 55m	24,521.90%
LONG	Without Costs	58,449	1120	65.79%	0.86%	5.14%	-7.43%	127 days	17d 11h 12m	50,401.13%
LONG	With Costs	58,449	1120	65.79%	0.46%	4.52%	-8.60%	127 days	17d 11h 12m	27,021.53%
SHORT	Without Costs	67,105	1120	59.01%	0.36%	5.05%	-6.46%	170 days	20d 6h 2m	24,343.37%
SHORT	With Costs	67,105	1120	59.01%	-0.04%	4.34%	-7.44%	170 days	20d 6h 2m	-2,499.63%

Bollinger Naïve 2

Trade Cost = .2% per entry/exit



The Naive strategy enters on band highs/lows and exits on middle band / stop loss triggered at 3SD.

Bollinger 2 can trade multiple units at the same time.

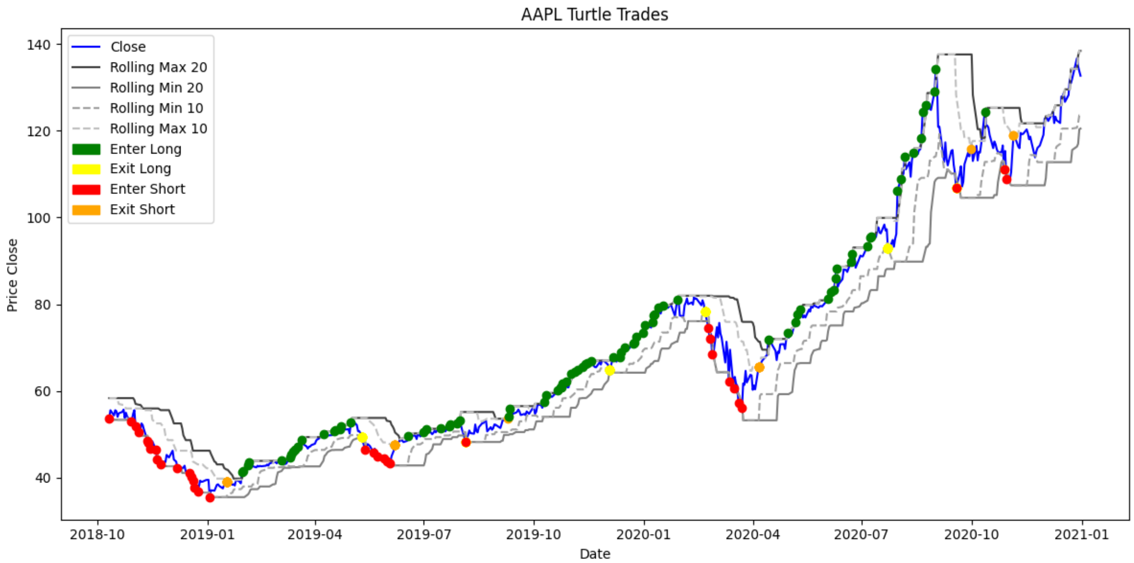
Bands are calculated as follows (Bperiods = 19 -> N = 20)

- Middle Band (MB): MB = (Sum of Close Prices over last N periods) / N)
- Standard Deviation (SD): `SD = sqrt((Sum of (Close - MB)^2 over last N periods) / N)
- Upper Band (UB): UB = MB + (1.96 * SD)
- Lower Band (LB): LB = MB - (1.96 * SD)
- Upper Band 3 Standard Deviations (UB3SD): UB3SD = MB + (2.96 * SD)
- Lower Band 3 Standard Deviations (LB3SD): LB3SD = MB - (2.96 * SD)

Trade Type	**Factor**	**Total Units Traded**	**Different Stocks**	**Win Rate**	**Avg. Trade Return**	**Avg. Win on Trades**	**Avg. Loss on Trades**	**Max Trade Duration**	**Avg. Trade Duration**	**Total Return**
Overall	Without Costs	350,546	1120	62.59%	0.71%	5.37%	-7.15%	170 days	20d 10h 25m	248,516.96%
Overall	With Costs	350,546	1120	62.59%	0.44%	4.94%	-7.88%	170 days	20d 10h 25m	152,885.69%
LONG	Without Costs	156,708	1120	65.70%	0.99%	5.74%	-8.21%	128 days	9d 0h 17m	155,170.38%
LONG	With Costs	156,708	1120	65.70%	0.71%	5.34%	-9.02%	128 days	9d 0h 17m	111,928.22%
SHORT	Without Costs	193,838	1120	60.07%	0.48%	5.04%	-6.42%	170 days	21d 14h 1m	93,346.58%
SHORT	With Costs	193,838	1120	60.07%	0.1%	4.59%	-7.10%	170 days	21d 14h 1m	40,957.47%

Turtle Naïve

Trade Cost = .2% per entry/exit



Entry based on 20-day highs or lows.

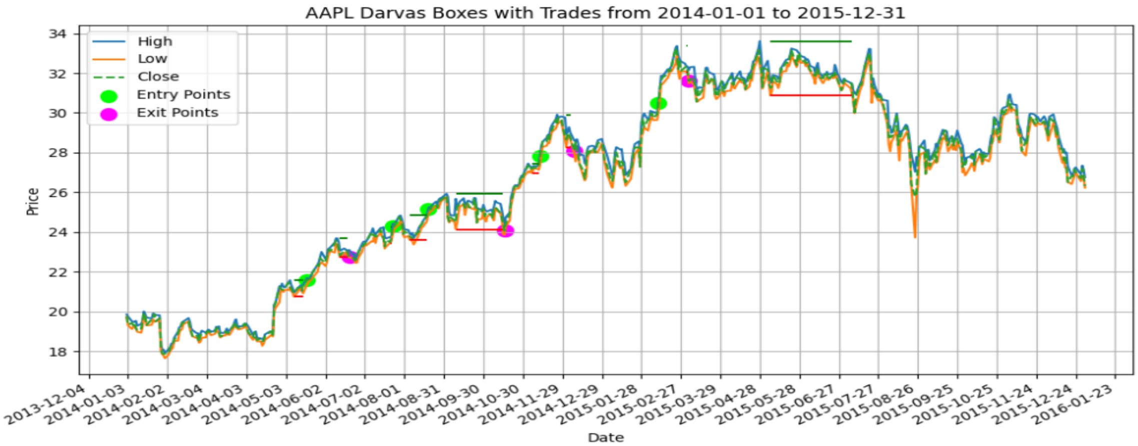
Exit on 10-day highs or lows, opposite to the entry condition.

Trade Type	Factor	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	424,456	1120	34.56%	0.21%	11.7%	-5.87%	362 days	33d 55m	90246.35%
Overall	With Costs	424,456	1120	34.92%	-0.03%	10.79%	-6.24%	362 days	33d 55m	-13,469.67%
LONG	Without Costs	252,693	1120	38.28%	0.45%	9.71%	-5.32%	362 days	35d 13h 55m	113513.61%
LONG	With Costs	252,693	1120	38.28%	0.21%	9.08%	-5.71%	362 days	33d 55m	52,194.07%
SHORT	Without Costs	171,763	1120	29.97%	-0.13%	14.88%	-6.57%	323 days	29d 7h 11m	-21,674.03%
SHORT	With Costs	171,763	1120	29.97%	-0.38%	14.02%	-6.94%	323 days	29d 7h 11m	-65,663.74%

Box Naïve

No Short Trades

Trade Cost = .2% per entry/exit



Boxes are calculated as follows.

- Find a new 12-month high.
- Find the top of the box, which is the highest high for the next three days (4 days total).
- After finding the top, look for the bottom of the box. It's the lowest low for the next three days (4 days total).
- Once the box is complete, a close above the top of the box signals a buy.
- A close below the bottom of the box is the sell signal. Exit and then go back to step 1.

Factor	Total Trades	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Without Costs	22,129	1120	40.25%	0.25%	8.83%	-5.54%	1113 days	46d 20h 33m	5590.63%
With Costs	22,129	1120	40.25%	-0.04%	8.09%	-6.04%	1113 days	46d 20h 33m	-989.55%

Split/Model Notes

Split dictionary:

- Split 1: (10_10_80) non-trades far distance from trades.
- Split 2: (10_80_10) non-trades medium distance from trades.
- Split 3: (80_10_10) non-trades close distance from trades.
- Split 4: (34_33_33) non-trades uniform distance from trades.

Features:

- The current close price and the previous 20 close prices

Scaling/Trimming:

- A MinMaxScaler is applied to every row of the feature data independently. All data points missing all previous close prices are pruned.

Train/Test Split:

- The dataset is divided using an 80/20 train-test split, where the training set begins January 4, 2010. The testing set start date and value counts varies as follows:
    - Bollinger 1: October 1, 2018. || Train: {0: 100,576, 1: 99,186} Test: {0: 24,960, 1: 24,986}
    - Bollinger 2: October 11, 2018. || Train: {0: 281,545, 1: 276,604} Test: {0: 69,001, 1: 70,537}
    - Turtles: October 5, 2018. || Train: {0: 340,666, 1: 335,421} Test: {0: 83,790, 1: 85,232}
    - Box: December 22, 2017. || Train: {0: 17,707, 1: 17,569} Test: {0: 4,422, 1: 4,397}

Naive:

1. For Bollinger/Box
    - If current scaled price > .95 or < .05 that signals an entry
2. For Turtles
    - If current scaled price == 1 or == 0 that signals an entry

Naïve Bayes:

- Using Gaussian NB from sklearn.naive_bayes package

Polynomial Logistic Regression:

- Using 2nd degree polynomial features on logistic regression from sklearn.linear_model

KNN:

- Using 20 neighbors with KNN Classifier from sklearn.neighbors

RFC:

- Using 100 estimators with RF Classifier from sklearn.ensemble

NN:

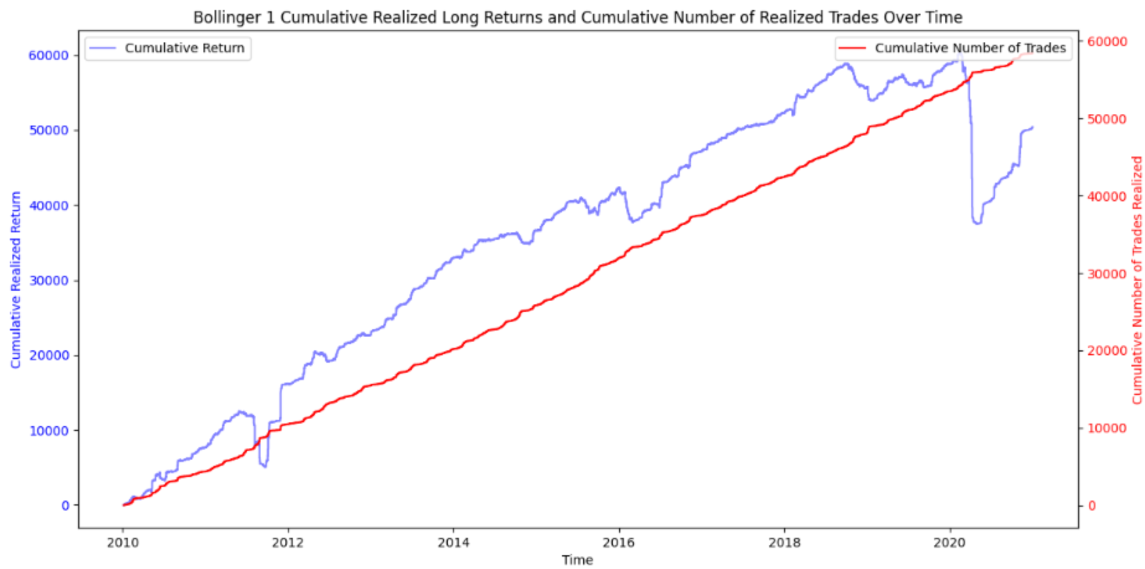
- Using 5 hidden layers with 100 neurons for each layer
- Dropout of .1 between each layer

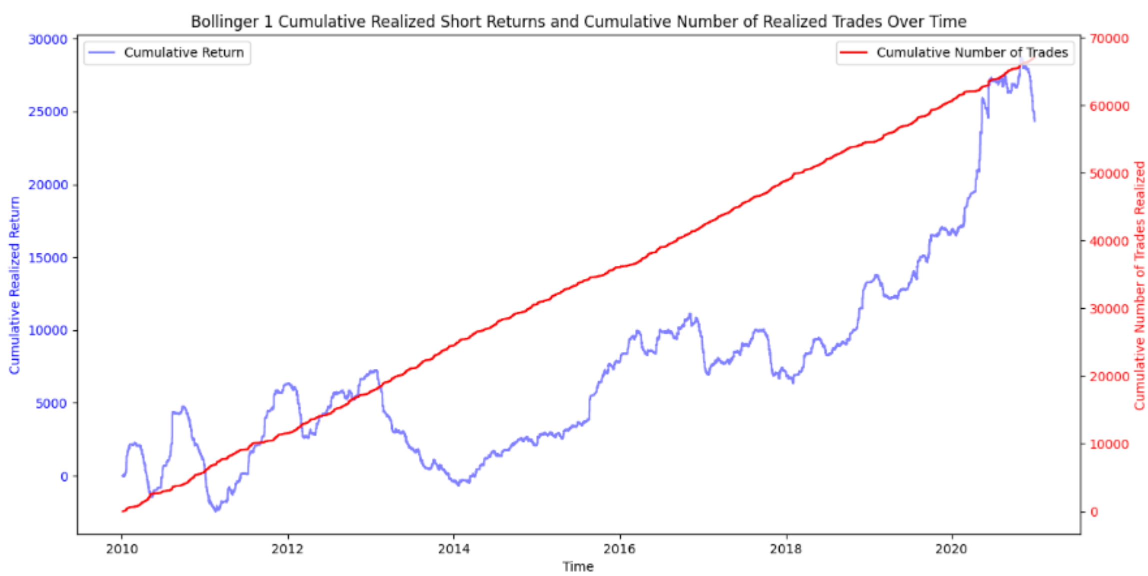
Notable Values (With Trading Costs)

Bollinger Naïve 1 Analysis:

General Observation:

All ML traders underperform compared to the base trader.





Notable Values (With Trading Costs)

Bollinger Naïve 2 Analysis:

General Observation:

Most ML traders underperform compared to the base trader, except for the Naïve Bayes model.

Naïve Bayes Performance (Full Testing Set including COVID):

Naïve Bayes:

Average Trade Return: 0.58%, Total Return: 36,891%, Num Longs: 22,158.

Base Model:

Average Trade Return: 0.32%, Total Return: 22,857%, Num Longs: 33,423.

Observation: Naïve Bayes outperforms the base model due to ability to not-identify long positions.

Naïve Bayes Performance (Partial Testing Set excluding COVID):

Naïve Bayes:

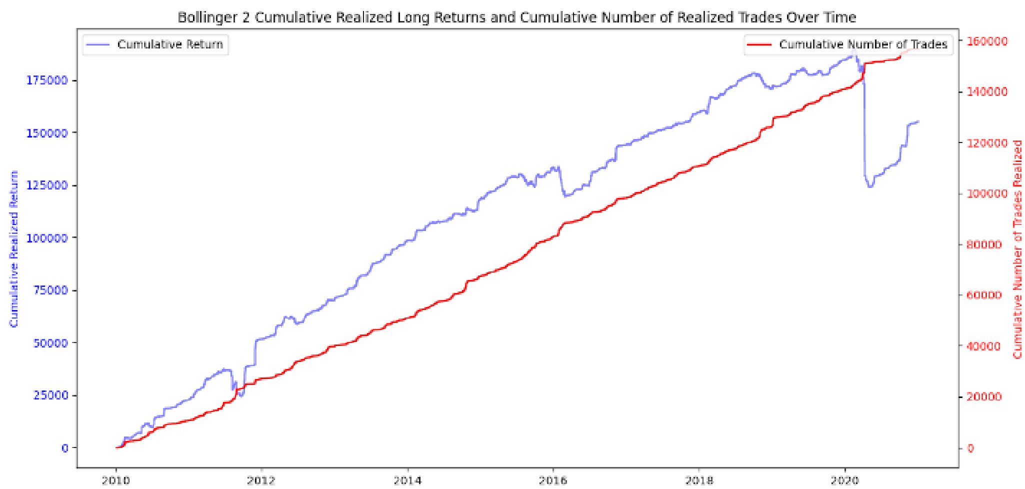
Average Trade Return: 0.87%, Total Return: 30,278%, Num Trades: 34,722

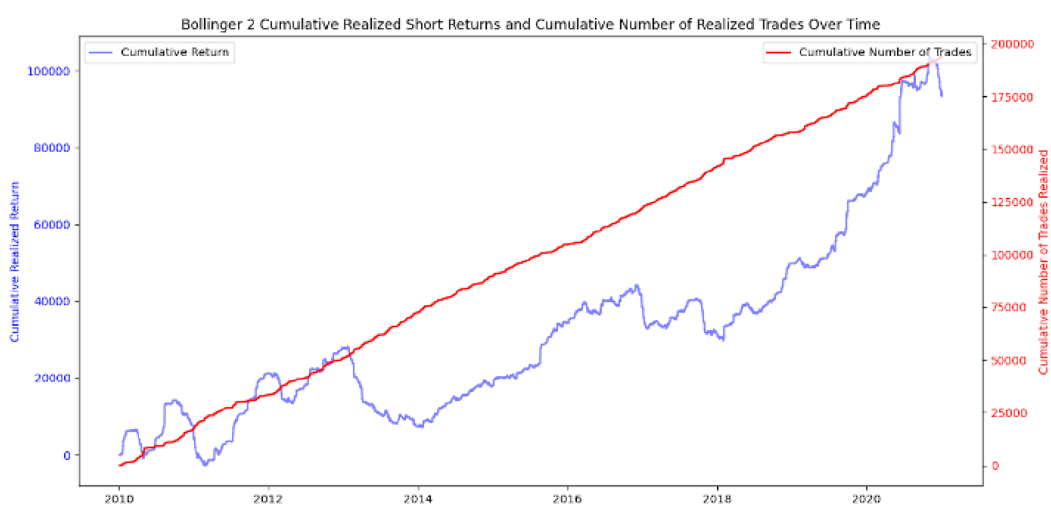
Base Model:

Average Trade Return: 0.86%, Total Return: 32,943%, Num Trades 38,441

Observation:

Naïve Bayes underperforms in this subset due to same reason it's able to outperform during covid.





Notable Values (With Trading Costs)

Turtle Naïve Analysis:

Pre-COVID vs. COVID Periods: There's a notable difference in performance between these periods. Our dataset spans from 2018-10-01 to 2020-12-31.

- Long Trades: Show positive returns over time, but a negative return within the testing set period.
- Short Trades: Ineffectiveness observed until the onset of COVID.

Performance Comparison (Full Testing Set including COVID):

Naïve Model:

Average Trade Return: 0.81%, Total Return: 84,989%, Number of Short Trades: 48,283

Base Model:

Average Trade Return: 0.69%, Total Return: 60,422%, Number of Short Trades: 41,126

KNN Model:

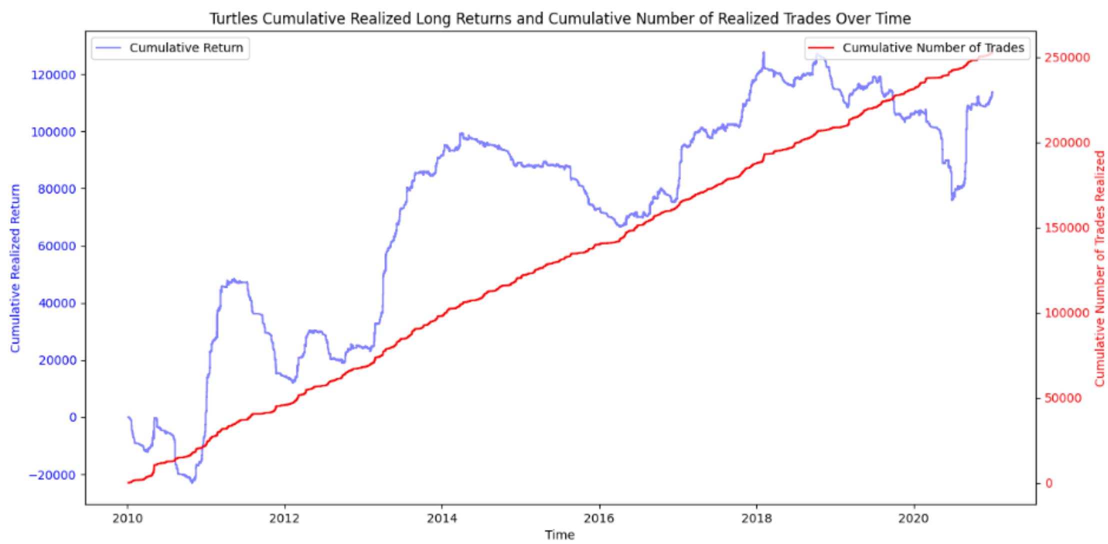
Average Trade Return: 0.76%, Total Return: 73,655%, Number of Short Trades: 44,679

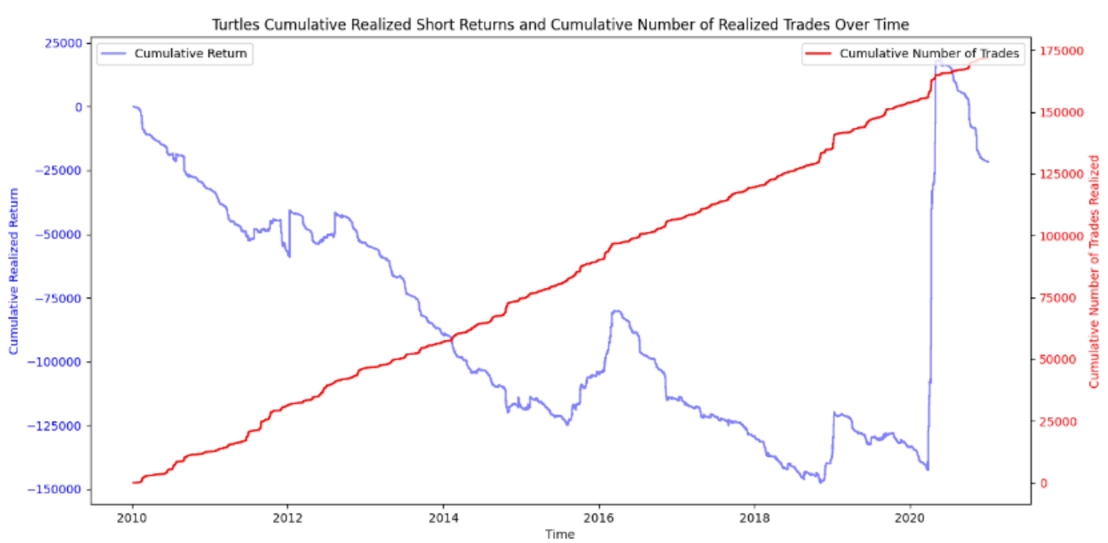
Observation:

Naïve version outperforms due to lenient conditions for trade entry, allowing for more short trades, and KNN follows this pattern, but is less effective than Naïve.

Performance Comparison (Partial Testing Set excluding COVID):

Similar return rates for both base and naïve models, but KNN shows a total return of -31,837% compared to the Base model's -29,918% and the Naïve -28,957%.





Bollinger Naïve 1

Accuracy

Model	**Split 1**	**Split 2**	**Split 3**	**Split 4**
Naive	83.13%	81.04%	77.05%	80.51%
Naive Bayes	76.22%	74.94%	72.22%	74.32%
Log Reg	94.38%	91.68%	87.10%	90.94%
KNN	91.86%	89.61%	85.95%	88.77%
RFC	95.81%	94.60%	92.01%	94.08%
NN	**96.35%**	**95.51%**	**94.14%**	**94.49%**

Precision

Model	**Split 1**	**Split 2**	**Split 3**	**Split 4**
Naive	77.18%	74.67%	70.24%	74.06%
Naive Bayes	74.52%	73.22%	70.57%	72.63%
Log Reg	92.28%	89.17%	83.68%	88.06%
KNN	86.94%	84.13%	79.61%	82.77%
RFC	93.78%	92.59%	89.41%	**91.77%**
NN	**94.04%**	**93.07%**	**91.01%**	91.53%

Specificity

Model	**Split 1**	**Split 2**	**Split 3**	**Split 4**
Naive	72.42%	68.17%	60.17%	67.11%
Naive Bayes	73.01%	71.29%	68.16%	70.61%
Log Reg	91.95%	88.49%	81.99%	87.16%
KNN	85.29%	81.60%	75.22%	79.63%
RFC	**93.54%**	**92.24%**	**88.70%**	**91.32%**
NN	91.96%	91.13%	88.50%	88.77%

Recall

Model	**Split 1**	**Split 2**	**Split 3**	**Split 4**
Naive	93.91%	93.92%	93.92%	93.92%
Naive Bayes	79.45%	78.59%	76.28%	78.04%
Log Reg	96.82%	94.87%	92.21%	94.72%
KNN	**98.47%**	97.64%	96.67%	**97.93%**
RFC	98.09%	96.96%	95.32%	96.83%
NN	98.45%	**97.94%**	**97.63%**	97.86%

Bollinger Naïve 1

Dates represent trades that started between the two.

Base (2018-09-28 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	36478	1120	61.55%	0.5%	5.92%	-8.22%	160 days	18.93 days	18318.44%
Overall	With Costs	36478	1120	61.55%	0.1%	5.27%	-9.26%	160 days	18.93 days	3727.24%
Long	Without Costs	16986	1120	61.62%	-0.02%	5.82%	-9.45%	127 days	18.29 days	-323.52%
Long	With Costs	16986	1120	61.62%	-0.42%	5.17%	-10.5%	127 days	18.29 days	-7117.92%
Short	Without Costs	19492	1120	61.49%	0.96%	6.0%	-7.15%	160 days	19.49 days	18641.96%
Short	With Costs	19492	1120	61.49%	0.56%	5.35%	-8.19%	160 days	19.49 days	10845.16%

Base (2018-09-28 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	25688	1120	62.03%	0.69%	5.03%	-6.45%	160 days	19.36 days	17746.29%
Overall	With Costs	25688	1120	62.03%	0.29%	4.39%	-7.51%	160 days	19.36 days	7471.09%
Long	Without Costs	12156	1120	63.22%	0.65%	5.04%	-6.96%	127 days	18.51 days	7848.56%
Long	With Costs	12156	1120	63.22%	0.25%	4.41%	-8.06%	127 days	18.51 days	2986.16%
Short	Without Costs	13532	1120	60.96%	0.73%	5.02%	-6.02%	160 days	20.13 days	9897.73%
Short	With Costs	13532	1120	60.96%	0.33%	4.36%	-7.05%	160 days	20.13 days	4484.93%

Bollinger Naïve 1

Naive (2018-09-28 – 2021-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	24035	1120	59.73%	0.17%	6.38%	-9.08%	148 days	18.83 days	4080.29%
Overall	With Costs	24035	1120	59.73%	-0.23%	5.71%	-10.08%	148 days	18.83 days	-5533.71%
Long	Without Costs	11199	1120	58.62%	-0.65%	6.28%	-10.5%	127 days	18.22 days	-7239.96%
Long	With Costs	11199	1120	58.62%	-1.05%	5.6%	-11.47%	127 days	18.22 days	-11719.6%
Short	Without Costs	12836	1120	60.7%	0.88%	6.46%	-7.77%	148 days	19.36 days	11320.25%
Short	With Costs	12836	1120	60.7%	0.48%	5.8%	-8.79%	148 days	19.36 days	6185.85%

Naive (2018-09-28 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	13692	1120	59.69%	0.42%	5.23%	-6.74%	127 days	19.54 days	5743.56%
Overall	With Costs	13692	1120	59.69%	0.02%	4.56%	-7.74%	127 days	19.54 days	266.76%
Long	Without Costs	6558	1120	59.65%	0.21%	5.21%	-7.23%	127 days	18.57 days	1382.78%
Long	With Costs	6558	1120	59.65%	-0.19%	4.54%	-8.22%	127 days	18.57 days	-1240.5%
Short	Without Costs	7134	1120	59.73%	0.61%	5.24%	-6.29%	127 days	20.43 days	4360.78%
Short	With Costs	7134	1120	59.73%	0.21%	4.57%	-7.29%	127 days	20.43 days	1507.18%

Bollinger Naïve 1

Naïve Bayes (2018-09-28 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	19884	1120	61.64%	0.5%	6.1%	-8.55%	160 days	18.42 days	9862.34%
Overall	With Costs	19884	1120	61.64%	0.1%	5.45%	-9.6%	160 days	18.42 days	1908.74%
Long	Without Costs	8146	1120	62.44%	0.07%	6.02%	-9.88%	127 days	17.05 days	549.86%
Long	With Costs	8146	1120	62.44%	-0.33%	5.38%	-10.95%	127 days	17.05 days	-2708.6%
Short	Without Costs	11738	1120	61.09%	0.79%	6.16%	-7.66%	160 days	19.37 days	9312.48%
Short	With Costs	11738	1120	61.09%	0.39%	5.5%	-8.7%	160 days	19.37 days	4617.28%

Naïve Bayes (2018-09-28 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	11314	1120	60.84%	0.47%	5.0%	-6.62%	160 days	19.23 days	5301.21%
Overall	With Costs	11314	1120	60.84%	0.07%	4.35%	-7.65%	160 days	19.23 days	775.61%
Long	Without Costs	4827	1120	62.09%	0.27%	4.89%	-7.34%	127 days	17.56 days	1317.41%
Long	With Costs	4827	1120	62.09%	-0.13%	4.25%	-8.4%	127 days	17.56 days	-613.39%
Short	Without Costs	6487	1120	59.9%	0.61%	5.09%	-6.11%	160 days	20.47 days	3983.8%
Short	With Costs	6487	1120	59.9%	0.21%	4.42%	-7.12%	160 days	20.47 days	1389.0%

Bollinger Naïve 1

Logistic Regression (2018-09-28 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	23620	1120	60.55%	0.32%	6.41%	-9.08%	148 days	18.8 days	7548.27%
Overall	With Costs	23620	1120	60.55%	-0.08%	5.75%	-10.09%	148 days	18.8 days	-1899.73%
Long	Without Costs	11013	1120	59.36%	-0.57%	6.23%	-10.53%	127 days	18.22 days	-6249.42%
Long	With Costs	11013	1120	59.36%	-0.97%	5.55%	-11.52%	127 days	18.22 days	-10654.7%
Short	Without Costs	12607	1120	61.59%	1.09%	6.57%	-7.73%	148 days	19.3 days	13797.69%
Short	With Costs	12607	1120	61.59%	0.69%	5.92%	-8.77%	148 days	19.3 days	8754.89%

Logistic Regression (2018-09-28 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	13407	1120	60.76%	0.59%	5.26%	-6.66%	127 days	19.53 days	7968.68%
Overall	With Costs	13407	1120	60.76%	0.19%	4.6%	-7.69%	127 days	19.53 days	2605.88%
Long	Without Costs	6459	1120	60.85%	0.34%	5.16%	-7.19%	127 days	18.59 days	2200.3%
Long	With Costs	6459	1120	60.85%	-0.06%	4.5%	-8.21%	127 days	18.59 days	-383.3%
Short	Without Costs	6948	1120	60.68%	0.83%	5.35%	-6.18%	127 days	20.41 days	5768.38%
Short	With Costs	6948	1120	60.68%	0.43%	4.69%	-7.2%	127 days	20.41 days	2989.18%

Bollinger Naïve 1

KNN (2018-09-28 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	24204	1120	60.2%	0.23%	6.39%	-9.13%	160 days	18.84 days	5519.83%
Overall	With Costs	24204	1120	60.2%	-0.17%	5.72%	-10.14%	160 days	18.84 days	-4161.77%
Long	Without Costs	11329	1120	59.15%	-0.63%	6.18%	-10.55%	127 days	18.23 days	-7159.7%
Long	With Costs	11329	1120	59.15%	-1.03%	5.51%	-11.53%	127 days	18.23 days	-11691.3%
Short	Without Costs	12875	1120	61.12%	0.98%	6.57%	-7.82%	160 days	19.37 days	12679.53%
Short	With Costs	12875	1120	61.12%	0.58%	5.91%	-8.86%	160 days	19.37 days	7529.53%

KNN (2018-09-28 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	13737	1120	60.2%	0.48%	5.2%	-6.7%	160 days	19.59 days	6575.65%
Overall	With Costs	13737	1120	60.2%	0.08%	4.53%	-7.71%	160 days	19.59 days	1080.85%
Long	Without Costs	6635	1120	60.24%	0.22%	5.09%	-7.21%	127 days	18.62 days	1453.47%
Long	With Costs	6635	1120	60.24%	-0.18%	4.43%	-8.22%	127 days	18.62 days	-1200.6%
Short	Without Costs	7102	1120	60.15%	0.72%	5.3%	-6.23%	160 days	20.5 days	5122.18%
Short	With Costs	7102	1120	60.15%	0.32%	4.63%	-7.24%	160 days	20.5 days	2281.38%

Bollinger Naïve 1

RFC (2018-09-28 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	24058	1120	60.36%	0.31%	6.46%	-9.11%	160 days	18.92 days	7397.98%
Overall	With Costs	24058	1120	60.36%	-0.09%	5.8%	-10.12%	160 days	18.92 days	-2225.22%
Long	Without Costs	11252	1120	59.29%	-0.55%	6.29%	-10.55%	127 days	18.31 days	-6178.76%
Long	With Costs	11252	1120	59.29%	-0.95%	5.61%	-11.54%	127 days	18.31 days	-10679.6%
Short	Without Costs	12806	1120	61.31%	1.06%	6.61%	-7.77%	160 days	19.45 days	13576.74%
Short	With Costs	12806	1120	61.31%	0.66%	5.96%	-8.81%	160 days	19.45 days	8454.34%

RFC (2018-09-28 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	13655	1120	60.53%	0.56%	5.26%	-6.67%	160 days	19.66 days	7702.62%
Overall	With Costs	13655	1120	60.53%	0.16%	4.6%	-7.69%	160 days	19.66 days	2240.62%
Long	Without Costs	6596	1120	60.64%	0.34%	5.19%	-7.17%	127 days	18.68 days	2241.18%
Long	With Costs	6596	1120	60.64%	-0.06%	4.53%	-8.19%	127 days	18.68 days	-397.22%
Short	Without Costs	7059	1120	60.43%	0.77%	5.32%	-6.21%	160 days	20.57 days	5461.44%
Short	With Costs	7059	1120	60.43%	0.37%	4.66%	-7.23%	160 days	20.57 days	2637.84%

Bollinger Naïve 1

NN (2018-09-28 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	13655	1120	60.53%	0.56%	5.26%	-6.67%	160 days	19.66 days	7702.62%
Overall	With Costs	13655	1120	60.53%	0.16%	4.6%	-7.69%	160 days	19.66 days	2240.62%
Long	Without Costs	6596	1120	60.64%	0.34%	5.19%	-7.17%	127 days	18.68 days	2241.18%
Long	With Costs	6596	1120	60.64%	-0.06%	4.53%	-8.19%	127 days	18.68 days	-397.22%
Short	Without Costs	7059	1120	60.43%	0.77%	5.32%	-6.21%	160 days	20.57 days	5461.44%
Short	With Costs	7059	1120	60.43%	0.37%	4.66%	-7.23%	160 days	20.57 days	2637.84%

NN (2018-09-28 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	13814	1120	60.73%	0.61%	5.28%	-6.66%	160 days	19.61 days	8409.12%
Overall	With Costs	13814	1120	60.73%	0.21%	4.62%	-7.68%	160 days	19.61 days	2883.52%
Long	Without Costs	6700	1120	60.85%	0.37%	5.19%	-7.18%	127 days	18.65 days	2453.04%
Long	With Costs	6700	1120	60.85%	-0.03%	4.54%	-8.2%	127 days	18.65 days	-226.96%
Short	Without Costs	7114	1120	60.61%	0.84%	5.37%	-6.17%	160 days	20.5 days	5956.08%
Short	With Costs	7114	1120	60.61%	0.44%	4.71%	-7.19%	160 days	20.5 days	3110.48%

Bollinger Naïve 2

Accuracy

Model	Split 1	Split 2	Split 3	Split 4
Naïve	86.22%	84.75%	82.11%	84.33%
Naive Bayes	76.73%	76.27%	70.02%	73.64%
Log Reg	98.55%	**98.21%**	95.97%	97.40%
KNN	94.83%	93.14%	89.90%	92.14%
RFC	97.73%	97.01%	95.44%	96.64%
NN	**98.60%**	97.84%	**97.12%**	**97.65%**

Precision

Model	Split 1	Split 2	Split 3	Split 4
Naïve	81.42%	79.06%	76.08%	78.73%
Naive Bayes	76.67%	75.53%	70.21%	73.24%
Log Reg	97.53%	**96.93%**	94.07%	95.82%
KNN	91.00%	88.26%	84.13%	86.81%
RFC	96.69%	95.66%	93.92%	95.28%
NN	**97.62%**	96.18%	**96.10%**	**97.88%**

Specificity

Model	Split 1	Split 2	Split 3	Split 4
Naïve	77.50%	74.88%	69.19%	73.88%
Naive Bayes	75.19%	74.73%	68.63%	71.84%
Log Reg	**97.37%**	**96.84%**	93.58%	95.58%
KNN	89.71%	86.72%	80.70%	84.54%
RFC	96.47%	95.52%	93.47%	95.03%
NN	95.67%	94.64%	**94.28%**	**96.37%**

Recall

Model	Split 1	Split 2	Split 3	Split 4
Naive	94.58%	94.58%	94.57%	94.55%
Naive Bayes	78.20%	77.80%	71.35%	75.39%
Log Reg	99.68%	**99.58%**	98.28%	99.18%
KNN	**99.74%**	99.55%	**98.79%**	**99.57%**
RFC	98.95%	98.50%	97.33%	98.21%
NN	98.95%	98.98%	98.06%	96.97%

Bollinger Naïve 2

Dates represent trades that started between the two.

Base (2018-10-11 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	70805	1120	61.55%	0.59%	7.14%	-9.94%	160 days	20.32 days	42021.75%
Overall	With Costs	70805	1120	61.55%	0.32%	6.7%	-10.65%	160 days	20.32 days	22857.47%
Long	Without Costs	33423	1120	59.53%	-0.28%	7.84%	-12.3%	127 days	20.25 days	-9513.45%
Long	With Costs	33423	1120	59.53%	-0.55%	7.39%	-12.97%	127 days	20.25 days	-18516.9%
Short	Without Costs	37382	1120	63.35%	1.38%	6.55%	-7.6%	160 days	20.39 days	51535.2%
Short	With Costs	37382	1120	63.35%	1.11%	6.12%	-8.35%	160 days	20.39 days	41374.34%

Base (2018-10-11 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	38441	1120	63.31%	1.13%	5.65%	-6.71%	160 days	20.81 days	43426.65%
Overall	With Costs	38441	1120	63.31%	0.86%	5.22%	-7.46%	160 days	20.81 days	32943.9%
Long	Without Costs	17958	1120	63.82%	1.09%	5.92%	-7.49%	127 days	20.03 days	19546.67%
Long	With Costs	17958	1120	63.82%	0.81%	5.49%	-8.26%	127 days	20.03 days	14622.71%
Short	Without Costs	20483	1120	62.87%	1.17%	5.4%	-6.04%	160 days	21.48 days	23879.98%
Short	With Costs	20483	1120	62.87%	0.89%	4.97%	-6.78%	160 days	21.48 days	18321.19%

Bollinger Naïve 2

Naive (2018-10-11 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	82509	1120	60.91%	0.42%	6.98%	-9.86%	161 days	20.21 days	34448.6%
Overall	With Costs	82509	1120	60.91%	0.15%	6.55%	-10.53%	161 days	20.21 days	12785.37%
Long	Without Costs	38006	1120	59.52%	-0.32%	7.86%	-12.41%	127 days	20.03 days	-12002.1%
Long	With Costs	38006	1120	59.52%	-0.58%	7.42%	-13.06%	127 days	20.03 days	-22015.8%
Short	Without Costs	44503	1120	62.1%	1.04%	6.25%	-7.53%	161 days	20.37 days	46450.7%
Short	With Costs	44503	1120	62.1%	0.78%	5.83%	-8.22%	161 days	20.37 days	34801.09%

Naive (2018-10-11 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	45097	1120	62.4%	0.94%	5.55%	-6.75%	161 days	20.67 days	42445.89%
Overall	With Costs	45097	1120	62.4%	0.68%	5.13%	-7.46%	161 days	20.67 days	30521.3%
Long	Without Costs	20433	1120	63.64%	1.03%	5.95%	-7.63%	127 days	19.69 days	21113.8%
Long	With Costs	20433	1120	63.64%	0.76%	5.53%	-8.38%	127 days	19.69 days	15625.73%
Short	Without Costs	24664	1120	61.36%	0.86%	5.21%	-6.07%	161 days	21.49 days	21332.09%
Short	With Costs	24664	1120	61.36%	0.6%	4.78%	-6.75%	161 days	21.49 days	14895.57%

Bollinger Naïve 2

Naïve Bayes (2018-10-11 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	63360	1120	62.76%	0.85%	6.72%	-9.09%	161 days	19.75 days	54018.6%
Overall	With Costs	63360	1120	62.76%	0.58%	6.29%	-9.82%	161 days	19.75 days	36891.1%
Long	Without Costs	22158	1120	63.1%	0.34%	7.48%	-11.94%	125 days	18.64 days	7463.15%
Long	With Costs	22158	1120	63.1%	0.05%	7.03%	-12.72%	125 days	18.64 days	1199.72%
Short	Without Costs	41202	1120	62.58%	1.13%	6.31%	-7.57%	161 days	20.35 days	46555.45%
Short	With Costs	41202	1120	62.58%	0.87%	5.89%	-8.28%	161 days	20.35 days	35691.38%

Naïve Bayes (2018-10-11 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	34722	1120	63.91%	1.14%	5.5%	-6.6%	161 days	20.33 days	39704.02%
Overall	With Costs	34722	1120	63.91%	0.87%	5.07%	-7.36%	161 days	20.33 days	30278.71%
Long	Without Costs	12129	1119	67.78%	1.55%	5.94%	-7.75%	125 days	18.23 days	18811.76%
Long	With Costs	12129	1119	67.78%	1.26%	5.52%	-8.64%	125 days	18.23 days	15337.23%
Short	Without Costs	22593	1120	61.83%	0.92%	5.23%	-6.09%	161 days	21.46 days	20892.26%
Short	With Costs	22593	1120	61.83%	0.66%	4.81%	-6.78%	161 days	21.46 days	14941.48%

Bollinger Naïve 2

Logistic Regression (2018-10-11 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	72310	1120	61.55%	0.58%	7.14%	-9.96%	161 days	20.29 days	42195.1%
Overall	With Costs	72310	1120	61.55%	0.31%	6.7%	-10.67%	161 days	20.29 days	22689.07%
Long	Without Costs	33874	1120	59.64%	-0.28%	7.87%	-12.4%	127 days	20.20 days	-9566.81%
Long	With Costs	33874	1120	59.64%	-0.55%	7.42%	-13.07%	127 days	20.20 days	-18701.1%
Short	Without Costs	38436	1120	63.24%	1.35%	6.53%	-7.6%	161 days	20.38 days	51761.91%
Short	With Costs	38436	1120	63.24%	1.08%	6.1%	-8.34%	161 days	20.38 days	41390.1%

Logistic Regression (2018-10-11 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	39103	1120	63.37%	1.14%	5.65%	-6.7%	161 days	20.76 days	44631.61%
Overall	With Costs	39103	1120	63.37%	0.87%	5.22%	-7.45%	161 days	20.76 days	33979.79%
Long	Without Costs	18058	1120	64.08%	1.14%	5.96%	-7.51%	127 days	19.93 days	20586.68%
Long	With Costs	18058	1120	64.08%	0.86%	5.53%	-8.28%	127 days	19.93 days	15603.7%
Short	Without Costs	21045	1120	62.77%	1.14%	5.38%	-6.04%	161 days	21.48 days	24044.93%
Short	With Costs	21045	1120	62.77%	0.87%	4.95%	-6.77%	161 days	21.48 days	18376.09%

Bollinger Naïve 2

KNN (2018-10-11 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	77286	1120	61.51%	0.53%	7.02%	-9.89%	161 days	20.14 days	40712.28%
Overall	With Costs	77286	1120	61.51%	0.26%	6.58%	-10.59%	161 days	20.14 days	20138.26%
Long	Without Costs	36071	1120	59.78%	-0.31%	7.74%	-12.33%	127 days	20.04 days	-11151.2%
Long	With Costs	36071	1120	59.78%	-0.58%	7.3%	-13.0%	127 days	20.04 days	-20758.8%
Short	Without Costs	41215	1120	63.03%	1.26%	6.42%	-7.57%	161 days	20.23 days	51863.46%
Short	With Costs	41215	1120	63.03%	0.99%	5.99%	-8.3%	161 days	20.23 days	40897.04%

KNN (2018-10-11 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	41791	1120	63.22%	1.08%	5.57%	-6.66%	161 days	20.6 days	45307.51%
Overall	With Costs	41791	1120	63.22%	0.82%	5.14%	-7.39%	161 days	20.6 days	34074.27%
Long	Without Costs	19226	1120	63.92%	1.08%	5.86%	-7.44%	127 days	19.78 days	20793.15%
Long	With Costs	19226	1120	63.92%	0.81%	5.44%	-8.2%	127 days	19.78 days	15556.94%
Short	Without Costs	22565	1120	62.62%	1.09%	5.31%	-6.02%	161 days	21.3 days	24514.36%
Short	With Costs	22565	1120	62.62%	0.82%	4.88%	-6.73%	161 days	21.3 days	18517.33%

Bollinger Naïve 2

RFC (2018-10-11 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	71970	1120	61.49%	0.57%	7.14%	-9.98%	161 days	20.32 days	40686.11%
Overall	With Costs	71970	1120	61.49%	0.3%	6.7%	-10.69%	161 days	20.32 days	21263.16%
Long	Without Costs	33780	1120	59.55%	-0.31%	7.86%	-12.41%	127 days	20.25 days	-10588.1%
Long	With Costs	33780	1120	59.55%	-0.58%	7.41%	-13.08%	127 days	20.25 days	-19692.8%
Short	Without Costs	38190	1120	63.2%	1.34%	6.54%	-7.62%	161 days	20.39 days	51274.18%
Short	With Costs	38190	1120	63.2%	1.07%	6.11%	-8.36%	161 days	20.39 days	40955.92%

RFC (2018-10-11 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	38898	1120	63.29%	1.13%	5.65%	-6.71%	161 days	20.8 days	43868.74%
Overall	With Costs	38898	1120	63.29%	0.86%	5.22%	-7.46%	161 days	20.8 days	33264.96%
Long	Without Costs	18017	1120	64.09%	1.14%	5.94%	-7.49%	127 days	19.96 days	20517.18%
Long	With Costs	18017	1120	64.09%	0.86%	5.51%	-8.27%	127 days	19.96 days	15548.1%
Short	Without Costs	20881	1120	62.61%	1.12%	5.38%	-6.06%	161 days	21.52 days	23351.56%
Short	With Costs	20881	1120	62.61%	0.85%	4.95%	-6.78%	161 days	21.52 days	17716.86%

Bollinger Naïve 2

NN (2018-10-11 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	73478	1120	61.52%	0.57%	7.11%	-9.93%	161 days	20.29 days	42112.18%
Overall	With Costs	73478	1120	61.52%	0.3%	6.68%	-10.63%	161 days	20.29 days	22346.46%
Long	Without Costs	34086	1120	59.63%	-0.29%	7.85%	-12.38%	127 days	20.19 days	-9779.69%
Long	With Costs	34086	1120	59.63%	-0.56%	7.4%	-13.05%	127 days	20.19 days	-18963.9%
Short	Without Costs	39392	1120	63.15%	1.32%	6.51%	-7.61%	161 days	20.37 days	51891.87%
Short	With Costs	39392	1120	63.15%	1.05%	6.08%	-8.35%	161 days	20.37 days	41310.28%

NN (2018-10-11 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	39750	1120	63.31%	1.13%	5.63%	-6.68%	161 days	20.76 days	44956.32%
Overall	With Costs	39750	1120	63.31%	0.86%	5.2%	-7.43%	161 days	20.76 days	34160.24%
Long	Without Costs	18164	1120	64.06%	1.14%	5.94%	-7.48%	127 days	19.91 days	20692.28%
Long	With Costs	18164	1120	64.06%	0.86%	5.51%	-8.25%	127 days	19.91 days	15683.85%
Short	Without Costs	21586	1120	62.67%	1.12%	5.37%	-6.03%	161 days	21.47 days	24264.04%
Short	With Costs	21586	1120	62.67%	0.86%	4.94%	-6.75%	161 days	21.47 days	18476.39%

Turtles

Accuracy

Model	Split 1	Split 2	Split 3	Split 4
Naive	91.77%	90.07%	87.45%	89.77%
Naive Bayes	65.18%	64.41%	61.02%	62.92%
Log Reg	95.00%	93.39%	91.03%	92.94%
KNN	89.56%	86.80%	83.22%	85.95%
RFC	**96.23%**	**94.82%**	**92.74%**	**94.52%**
NN	95.65%	94.00%	92.29%	93.83%

Precision

Model	Split 1	Split 2	Split 3	Split 4
Naive	91.55%	88.49%	84.50%	88.13%
Naive Bayes	67.67%	65.93%	63.06%	64.93%
Log Reg	92.36%	90.08%	87.28%	89.52%
KNN	84.10%	80.76%	77.39%	79.80%
RFC	**94.16%**	**91.85%**	89.40%	**91.66%**
NN	92.93%	90.77%	**90.71%**	90.34%

Specificity

Model	Split 1	Split 2	Split 3	Split 4
Naive	91.13%	87.79%	82.26%	87.04%
Naive Bayes	69.81%	68.00%	64.79%	66.66%
Log Reg	91.54%	89.06%	85.27%	88.11%
KNN	80.71%	76.52%	70.98%	74.43%
RFC	**93.63%**	**91.12%**	**87.93%**	**90.70%**
NN	88.91%	86.89%	87.75%	86.15%

Recall

Model	Split 1	Split 2	Split 3	Split 4
Naive	92.38%	92.32%	92.40%	92.38%
Naive Bayes	60.73%	60.89%	57.41%	59.32%
Log Reg	98.32%	97.65%	96.53%	97.58%
KNN	98.06%	96.92%	94.91%	97.02%
RFC	**98.72%**	**98.46%**	**97.33%**	**98.19%**
NN	98.11%	96.83%	93.52%	97.81%

Turtles

Dates represent trades that started between the two.

Base (2018-10-01 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	87163	1120	34.99%	0.94%	16.56%	-7.48%	245 days	31.62 days	81945.27%
Overall	With Costs	87163	1120	34.99%	0.69%	15.85%	-7.86%	245 days	31.62 days	60422.58%
Long	Without Costs	46037	1120	34.9%	-0.31%	11.5%	-6.65%	245 days	33.05 days	-14269.6%
Long	With Costs	46037	1120	34.9%	-0.56%	10.79%	-7.03%	245 days	33.05 days	-25612.7%
Short	Without Costs	41126	1120	35.09%	2.34%	22.2%	-8.42%	212 days	30.02 days	96214.87%
Short	With Costs	41126	1120	35.09%	2.09%	21.49%	-8.8%	212 days	30.02 days	86035.23%

Base (2018-10-01 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	51398	1120	34.08%	-0.34%	10.71%	-6.06%	245 days	32.03 days	-17251.6%
Overall	With Costs	51398	1120	34.08%	-0.58%	9.99%	-6.44%	245 days	32.03 days	-29918.9%
Long	Without Costs	27664	1120	36.92%	-0.36%	8.52%	-5.57%	245 days	34.73 days	-10051.1%
Long	With Costs	27664	1120	36.92%	-0.61%	7.86%	-5.96%	245 days	34.73 days	-16811.1%
Short	Without Costs	23734	1120	30.77%	-0.3%	13.78%	-6.58%	212 days	28.89 days	-7200.48%
Short	With Costs	23734	1120	30.77%	-0.55%	12.97%	-6.94%	212 days	28.89 days	-13107.8%

Turtles

Naive (2018-10-01 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	104453	1120	35.22%	1.05%	16.43%	-7.32%	246 days	31.52 days	110079.1%
Overall	With Costs	104453	1120	35.22%	0.81%	15.75%	-7.69%	246 days	31.52 days	84989.81%
Long	Without Costs	56170	1120	35.68%	-0.04%	11.51%	-6.45%	246 days	33.12 days	-1991.5%
Long	With Costs	56170	1120	35.68%	-0.27%	10.84%	-6.82%	246 days	33.12 days	-15398.6%
Short	Without Costs	48283	1120	34.69%	2.32%	22.31%	-8.32%	212 days	29.66 days	112070.6%
Short	With Costs	48283	1120	34.69%	2.08%	21.62%	-8.69%	212 days	29.66 days	100388.4%

Naive (2018-10-01 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	61657	1120	34.41%	-0.23%	10.67%	-5.97%	246 days	31.98 days	-14164.8%
Overall	With Costs	61657	1120	34.41%	-0.47%	9.98%	-6.33%	246 days	31.98 days	-28957.3%
Long	Without Costs	33831	1120	37.71%	-0.15%	8.58%	-5.46%	246 days	34.86 days	-5220.28%
Long	With Costs	33831	1120	37.71%	-0.39%	7.95%	-5.84%	246 days	34.86 days	-13234.3%
Short	Without Costs	27826	1120	30.4%	-0.32%	13.83%	-6.52%	212 days	28.48 days	-8944.49%
Short	With Costs	27826	1120	30.4%	-0.57%	13.03%	-6.87%	212 days	28.48 days	-15723.0%

Turtles

Naïve Bayes (2018-10-01 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	61945	1120	35.06%	0.32%	13.3%	-6.7%	246 days	32.35 days	19984.52%
Overall	With Costs	61945	1120	35.06%	0.07%	12.58%	-7.09%	246 days	32.35 days	4314.98%
Long	Without Costs	51070	1120	35.46%	-0.05%	11.62%	-6.48%	246 days	33.08 days	-2669.22%
Long	With Costs	51070	1120	35.46%	-0.29%	10.94%	-6.85%	246 days	33.08 days	-14935.2%
Short	Without Costs	10875	1120	33.21%	2.08%	21.7%	-7.69%	178 days	28.93 days	22653.74%
Short	With Costs	10875	1120	33.21%	1.77%	20.76%	-8.16%	178 days	28.93 days	19250.1%

Naïve Bayes (2018-10-01 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	36712	1120	36.54%	-0.2%	9.22%	-5.63%	246 days	33.71 days	-7216.99%
Overall	With Costs	36712	1120	36.54%	-0.45%	8.54%	-6.03%	246 days	33.71 days	-16463.4%
Long	Without Costs	30399	1120	37.49%	-0.21%	8.51%	-5.46%	246 days	34.75 days	-6428.08%
Long	With Costs	30399	1120	37.49%	-0.45%	7.88%	-5.84%	246 days	34.75 days	-13691.6%
Short	Without Costs	6313	1112	31.92%	-0.12%	13.24%	-6.42%	178 days	28.69 days	-788.91%
Short	With Costs	6313	1112	31.92%	-0.44%	12.26%	-6.88%	178 days	28.69 days	-2771.81%

Turtles

Logistic Regression (2018-10-01 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	92790	1120	35.0%	0.97%	16.51%	-7.42%	246 days	31.56 days	89941.14%
Overall	With Costs	92790	1120	35.0%	0.72%	15.81%	-7.79%	246 days	31.56 days	67267.43%
Long	Without Costs	50168	1120	35.3%	-0.18%	11.53%	-6.58%	246 days	33.12 days	-9069.1%
Long	With Costs	50168	1120	35.3%	-0.42%	10.85%	-6.96%	246 days	33.12 days	-21239.9%
Short	Without Costs	42622	1120	34.66%	2.32%	22.48%	-8.39%	212 days	29.72 days	99010.24%
Short	With Costs	42622	1120	34.66%	2.08%	21.77%	-8.77%	212 days	29.72 days	88507.33%

Logistic Regression (2018-10-01 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	54249	1120	34.08%	-0.37%	10.51%	-6.02%	246 days	32.0 days	-20249.2%
Overall	With Costs	54249	1120	34.08%	-0.62%	9.79%	-6.39%	246 days	32.0 days	-33513.4%
Long	Without Costs	29971	1120	37.49%	-0.26%	8.52%	-5.53%	246 days	34.92 days	-7680.89%
Long	With Costs	29971	1120	37.49%	-0.5%	7.87%	-5.92%	246 days	34.92 days	-14901.7%
Short	Without Costs	24278	1120	29.87%	-0.52%	13.6%	-6.55%	212 days	28.4 days	-12568.3%
Short	With Costs	24278	1120	29.87%	-0.77%	12.77%	-6.91%	212 days	28.4 days	-18611.7%

Turtles

KNN (2018-10-01 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	97274	1120	35.11%	1.0%	16.43%	-7.36%	246 days	31.48 days	97247.9%
Overall	With Costs	97274	1120	35.11%	0.76%	15.74%	-7.74%	246 days	31.48 days	73655.61%
Long	Without Costs	52595	1120	35.38%	-0.13%	11.53%	-6.54%	246 days	32.97 days	-7073.09%
Long	With Costs	52595	1120	35.38%	-0.38%	10.85%	-6.91%	246 days	32.97 days	-19739.4%
Short	Without Costs	44679	1120	34.78%	2.33%	22.29%	-8.33%	212 days	29.73 days	104321%
Short	With Costs	44679	1120	34.78%	2.09%	21.59%	-8.71%	212 days	29.73 days	93394.98%

KNN (2018-10-01 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	56891	1120	34.17%	-0.32%	10.54%	-5.97%	246 days	31.9 days	-18028.3%
Overall	With Costs	56891	1120	34.17%	-0.56%	9.83%	-6.34%	246 days	31.9 days	-31837.8%
Long	Without Costs	31400	1120	37.33%	-0.25%	8.54%	-5.5%	246 days	34.66 days	-7942.86%
Long	With Costs	31400	1120	37.33%	-0.49%	7.9%	-5.89%	246 days	34.66 days	-15457.3%
Short	Without Costs	25491	1120	30.29%	-0.4%	13.58%	-6.49%	212 days	28.5 days	-10085.4%
Short	With Costs	25491	1120	30.29%	-0.64%	12.77%	-6.84%	212 days	28.5 days	-16380.6%

Turtles

RFC (2018-10-01 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	91412	1120	35.0%	0.96%	16.51%	-7.43%	246 days	31.58 days	87999.37%
Overall	With Costs	91412	1120	35.0%	0.72%	15.81%	-7.8%	246 days	31.58 days	65589.13%
Long	Without Costs	49100	1120	35.18%	-0.23%	11.49%	-6.6%	246 days	33.09 days	-11250.1%
Long	With Costs	49100	1120	35.18%	-0.47%	10.8%	-6.98%	246 days	33.09 days	-23211.2%
Short	Without Costs	42312	1120	34.81%	2.35%	22.39%	-8.38%	212 days	29.82 days	99249.45%
Short	With Costs	42312	1120	34.81%	2.1%	21.68%	-8.76%	212 days	29.82 days	88800.33%

RFC (2018-10-01 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	53526	1120	34.04%	-0.36%	10.59%	-6.02%	246 days	31.99 days	-19234.0%
Overall	With Costs	53526	1120	34.04%	-0.6%	9.87%	-6.4%	246 days	31.99 days	-32359.6%
Long	Without Costs	29337	1120	37.32%	-0.27%	8.53%	-5.53%	246 days	34.87 days	-8019.48%
Long	With Costs	29337	1120	37.32%	-0.52%	7.88%	-5.91%	246 days	34.87 days	-15114.0%
Short	Without Costs	24189	1120	30.06%	-0.46%	13.68%	-6.56%	212 days	28.51 days	-11214.5%
Short	With Costs	24189	1120	30.06%	-0.71%	12.85%	-6.92%	212 days	28.51 days	-17244.2%

Turtles

NN (2018-10-01 – 2020-12-31)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	88614	1120	34.86%	0.98%	16.83%	-7.52%	246 days	31.49 days	86551.91%
Overall	With Costs	88614	1120	34.86%	0.73%	16.12%	-7.9%	246 days	31.49 days	64725.35%
Long	Without Costs	45525	1120	35.02%	-0.27%	11.62%	-6.69%	246 days	33.11 days	-12302.3%
Long	With Costs	45525	1120	35.02%	-0.52%	10.92%	-7.07%	246 days	33.11 days	-23519.6%
Short	Without Costs	43089	1120	34.7%	2.29%	22.38%	-8.4%	212 days	29.77 days	98854.12%
Short	With Costs	43089	1120	34.7%	2.05%	21.67%	-8.77%	212 days	29.77 days	88244.91%

NN (2018-10-01 – 2020-01-01)

Trade Type	Cost Scenario	Total Units Traded	Different Stocks	Win Rate	Avg. Trade Return	Avg. Win on Trades	Avg. Loss on Trades	Max Trade Duration	Avg. Trade Duration	Total Return
Overall	Without Costs	51546	1120	33.76%	-0.38%	10.78%	-6.09%	246 days	31.86 days	-19659.4%
Overall	With Costs	51546	1120	33.76%	-0.63%	10.05%	-6.46%	246 days	31.86 days	-32374.4%
Long	Without Costs	26938	1120	37.19%	-0.29%	8.63%	-5.58%	246 days	34.95 days	-7809.49%
Long	With Costs	26938	1120	37.19%	-0.53%	7.97%	-5.97%	246 days	34.95 days	-14407.7%
Short	Without Costs	24608	1120	30.01%	-0.48%	13.7%	-6.58%	212 days	28.48 days	-11849.9%
Short	With Costs	24608	1120	30.01%	-0.73%	12.87%	-6.94%	212 days	28.48 days	-17966.7%