



BITCOIN-USD Trading Using SVM to Detect The Current day's Trend in The Market

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Abstract

Bitcoin is a kind of Cryptocurrency and now is one of type of investment in the stock market. Stock markets are influenced by many risks of factor. And bitcoin is one kind of cryptocurrency that keep rising in recent few years, and sometimes fall without knowing influence behind it, on stock market. Because it's fluctuations, there's a need Automated tool to prediction of bitcoin on stock market. However, because of its volatility, there's a need for a prediction tool for investors to help them consider investment decisions for bitcoin or another cryptocurrency trade. The predict methods will be used on this research is regime prediction to develop model to predict trend at the opening of market using SVM.

Keywords: Cryptocurrency, Prediction Bitcoin, SVM

1. INTRODUCTION

The one of unique characteristics of bitcoin is keep rising in the last few years. Bitcoin exchange rate (USD) is \$3990 USD on November 2018 and daily fluctuations could reach 4.55% [1]. It's interesting to predict value to determine profitable investment for investor. To solve the problem above, there's a need a tool for predictoon to help investors decide for bitcoin or other cryptocurrency market investment. Market technical analysis can determine the trend of the market in by using historical market price [2]. They give the candle graph and market indicator to help the analysis. Even market technical analysis is useful, Therefore, another automation method is needed [3], because There has been much research about SVM prediction, Machine learning provides capability produce results of predictions more accurately without expert. In this research we use machine learning and use data history from yahoo-finance, and train with Support Vector Machine, SVM is one of the popular machine learning to used predict future and current trends in stock market [4] [5] and we combine with regime algorithm [6][7] to predict Bitcoin-USD current day's trend on yahoo-finance stock market.



2. METHODS

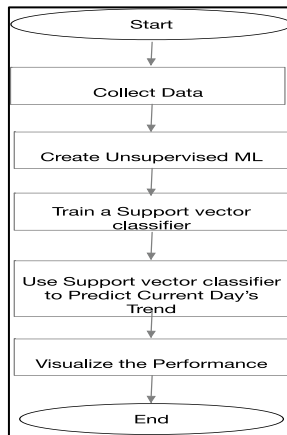


Figure 1. Methods

2.1. Research Methods

2.1.1. Dataset

Dataset is from yahoo finance, we take period 4 years, because at 2014 the data is having too many Nan values, so is not good to train the data with many missing values or called NAN, and will impact to the results. we take the data with symbol “BTC-USD” and saved it as df (dataframe), we choose duration from the year 2015 until 2019.

```
df= web.get_data_yahoo('BTC-USD',start= '2015-01-01', end='2019-02-28')
df=df[['Open', 'High', 'Low', 'Close']]
```

We created variable indicators to used as features for training the algorithm. Before that we decided to select look back period of 10 days, we select 10 to check for the past 2 weeks of trading data and to prevent the noise.

```
n = 10
t = 0.8
split = int (t*len(df))
```

We move the High, Low and Columns by one, to access the past data, we created RSI, SMA, ADX, Correlation, SAR and back to the return the past one day. And this is the result:

Table 1. Sample Result from collect Data

Date	Open	High	Low	Close	...	Corr	SAR	ADX	Return
2014-12-31	311.269989	319.089996	308.890015	318.239990	...	NaN	NaN	NaN	NaN
2015-01-01	318.239990	321.359985	313.540009	314.890015	...	NaN	NaN	NaN	0.022145
2015-01-02	314.890015	316.399994	313.079987	315.209991	...	NaN	308.890015	NaN	-0.010582
2015-01-03	315.209991	315.829987	284.890015	287.130005	...	NaN	311.384009	NaN	0.001016
2015-01-04	287.130005	289.940002	255.869995	264.720001	...	NaN	321.359985	NaN	-0.093304

There are many Nan Values. We need to drop them. we droppend the NaN values with this command algorithm.

```
df = df.dropna()
```

2.1.2. Create Unsupervised Machine Learning

We continue on used a Standard Scaler and make an unsupervised learning to create trend prediction[8]. We printed the average and covariance value feature and this is the results:

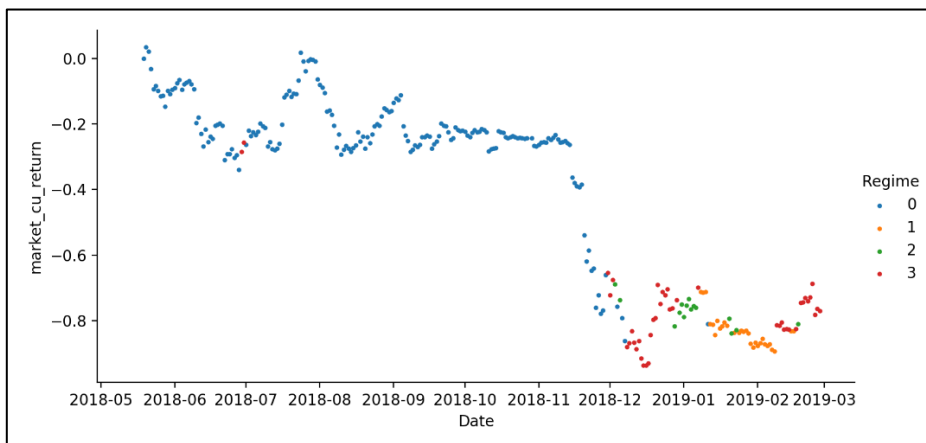


Figure 2. Regime prediction

Based on fig.2

1. The red color for low volatility.
2. The purple color for high volatility..
3. The green color for breakout.

(Mean for regime 0: ', 1.4263478931206095)

('Co-Variance for regime 0: ', 1.2409273396350549)
 ('Mean for regime 1: ', -0.519033358676531)
 ('Co-Variance for regime 1: ', 0.15086596332070093)
 ('Mean for regime 2: ', -0.48168648538272163)
 ('Co-Variance for regime 2: ', 0.16917162258686008)
 ('Mean for regime 3: ', -0.4206341985600407)
 ('Co-Variance for regime 3: ', 0.2583432643923261)

Table 2. Mean Regime results

Date	Regime	...	Return	market_cu_return
0.2018-05-19	0	...	0.000161	0.000161
1 2018-05-20	0	...	0.033846	0.034007
3 2018-05-21	0	...	-0.013396	0.020611
3 2018-05-22	0	...	-0.052036	-0.031425
4 2018-05-23	0	...	-0.062863	-0.094288

2.1.3. Train in Support Vector Classifier

Next, we predict the rules of regimes data frame, excluding the Date and Regimes columns,

```
Regimes.loc[Regimes['Return']>0, 'Signal']=1
Regimes.loc[Regimes['Return']<0, 'Signal']=-1
Regimes['return'] = Regimes['Return'].shift(1)
Regimes=Regimes.dropna()
```

We continue with a SVC. That represented by sklearn.

```
cls=SVC(C=1.0, cache_size=200, class_weight=None, c
coef0=0.0, decision_function_shape=None, degree=3,
gamma='auto', kernel='rbf', max_iter=-
1, probability=False, random_state=None,
shrinking=True, tol=0.001, verbose=False)
```

Support Vector Machine (SVM) is a discriminative classifier that generates a separating hyper-plane. Error tolerance budget is included to make separating hyperplane robust in case of inseparable class data. Linear decision boundaries are augmented to more complex boundary shape through kernel implementation (e.g. polynomial, Gaussian and radial kernel). SVMs have received attention for the impressive performance in classification. Below is formulation of the optimization and constraint model for SVM [9].

$$\min_{y,w,b} \frac{1}{2} \|\omega\|^2 + \mathbb{C} \sum_{i=1}^m \xi_i$$

$$s. t. y^i(\omega^T x^i + b) \geq 1 - \xi_i, i = 1, \dots, m \quad \xi_i \geq 0, i = 1, \dots, m. \quad (1)$$

We divide the test data from the unsupervised trend algorithm into train data and tests.

```
'Signal', 'Return', 'market cu return', 'Date'
```

Then we fit the X and y data sets to the algorithm to train it on

```
split2= int(.8*len(Regimes))
X =
Regimes.drop(['Signal', 'Return', 'market_cu_retur
n', 'Date'], axis=1)
y= Regimes['Signal']
cls.fit(X[:split2], y[:split2])
```

We calculated the size of test sets and predictions indexed accordingly to the data frame.

```
p_data=len(X)-split2.
```

3. RESULTS AND DISCUSSION

We store the predictions made by the algorithm in the column. According on these signals we calculated the returns at the beginning of the day with the return at the opening.

Table 3. Sample Data Prediction result signal

Date	Signal
2019-02-17	1
2019-02-18	1
2019-02-19	1
2019-02-20	1
2019-02-21	1
2019-02-22	1
2019-02-23	1

2019-02-24	1
2019-02-25	1
2019-02-26	1
2019-02-27	1
2019-02-28	1
2019-03-01	1

Finally, we calculated cumulative market returns & cumulative strategy returns stored all results in df. After that, we look for the results of the Sharpe ratio to make sure and pull out the performance.

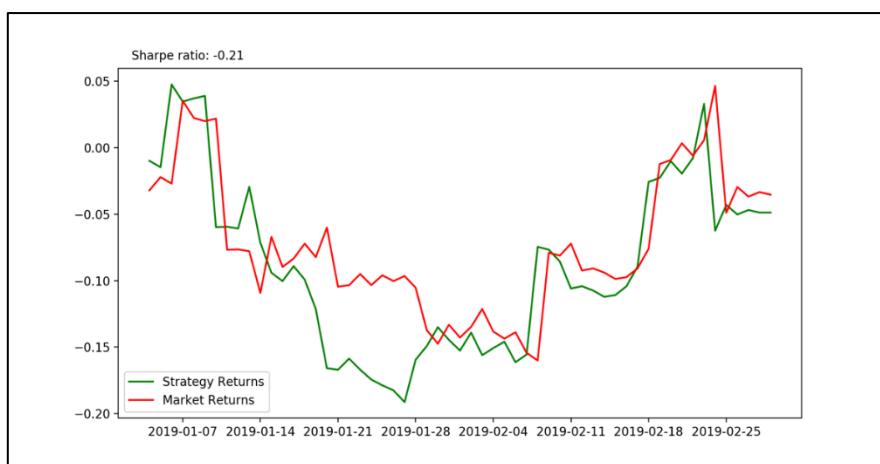


Figure 3. Strategy Return and Market Return

Based on Fig.3, we look and the result based on Strategy Return is -0,05 and market return is in -0,03, and prediction for 01-03-2019 is still minus -0,04 so is not for investment on bitcoin for this day because the value is fall from 24-02-2019 it means negative on stock market. [10]

4. CONCLUSION

SVM and regime prediction can be use to predict current day's trend of Bitcoin on the market, but we need more knowledge to read the data, by expert on reader signal market and strategy return on the trading market. Future research we suggest to use deep learning such as ANN and other technical analytic ex. Market Technical Analysis that we mention on introduction to improve and provide the best results.

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