APPENDIX

Coding Prophet

```
1   import pandas as pd
2   import numpy as np
3   from pandas import read_csv
4   from pandas import to_datetime
5   import matplotlib.pyplot as plt
6
7   np.set_printoptions(threshold=1226)
8   #Input stock price history
9   df = read_csv('bbca5.csv')
10  df.columns = ['ds','y']
11  v = read_csv('test.csv')
12  v.columns = ['ds','y']
13  actual = v['y']
14  #check is the variable to hold the predictable time
15  check = 30
16  df['ds'] = to_datetime(df['ds'])
17  #create a future dataframe according to the length of predicted times
18  future    =    pd.DataFrame({'ds':    pd.date_range(df['ds'].min(),df['ds'].max()    +
    pd.Timedelta(check, 'D'),
19               df.shape[0] + check)})
20
21  #scale the stock price data with maximum absolute scaler
22  df['y_scaled'] = df['y'] / df['y'].max()
23  #scale the time data with min max scaler
24  t_scale = df['ds'].max() - df['ds'].min()
25  df['t'] = (df['ds'] - df['ds'].min()) / t_scale
26  future['t'] = (future['ds'] - future['ds'].min()) / t_scale
27
28
29  i0, i1 = df['ds'].idxmin(), df['ds'].idxmax()
30  T = df['t'].ix[i1] – df['t'].ix[i0]
31  #Calculate the value of growth rate
32  k = (df['y_scaled'].ix[i1] - df['y_scaled'].ix[i0]) / T
33  #Calculate the value of offset
34  m = df['y_scaled'].ix[i0] - k * df['t'].ix[i0]
35  t = future['t']
36  stop = len(t)
37  start = len(t) – check
38  #Set the changepoint
39  changepoints = np.linspace(start, stop, 25)
40  changepoints = changepoints.astype(int)
41
42  date = pd.DatetimeIndex(df['ds'])
```

```
43  #Generate the value of beta
44  beta = np.random.normal(0, 10)
45  #Generate the value of delta
46  deltas = np.random.laplace(0, 0.0001, 25)
47  #Calculate the value of gamma
48  gamma = deltas * -changepoints
49  #Generate a matrix to save the changepoint location
50  a = (t[:, None] > changepoints) * 1
51  #Calculate trend value
52  trend = k + a @ deltas
53  trend = trend * t
54  trend = trend + m + a @ gamma
55  trend = trend * df['y'].max()
56  #Calculate seasonality
57  if check == 7 or check <= 30:
58      n = 3
59      p = 7
60  elif check >= 365:
61      n = 10
62      p = 365.25
63  s =  2 * np.pi * n * t / p
64  seasonality = np.cos(s) + np.sin(s)
65  seasonality = seasonality * beta
66
67  df2 = np.array(1)
68  df2 = trend + seasonality
69  #Calculate the accuracy using Mean Absolute Percentage Error
70  prediction = df2[-check:].astype(int)
71  mape = np.subtract(actual, prediction)
72  mape = abs(mape)
73  mape = mape / actual * 100
74  mape = np.sum(mape) / len(mape)
75  abc = df2[-check:]
76
```

Coding Weighted Moving Average

```
1   import pandas as pd
2   import numpy as np
3   from pandas import read_csv
4   from pandas import to_datetime
5   from matplotlib import pyplot
6   #Input stock price history
7   df = read_csv('bbca5.csv')
8   df.columns = ['ds','y']
9
10  v = read_csv('validation.csv')
11  v.columns = ['ds','y']
```

```
12  actual = v['y']
13
14  alldata= df['y']
15  #check is the variable to hold the predictable time
16  check = alldata[-30:]
17  #check is the variable to hold the weight amount
18  weightamount = 30
19  weight = np.array((15))
20  nextweight = np.sum(weight)
21  #Create weight for data
22  for i in np.arange(weightamount):
23      nextweight = nextweight * 3
24      nextweight = nextweight / 4
25      weight = np.append(weight,nextweight)
26      totalweight = np.sum(weight)
27  #Calculate prediction using Weighted Moving Average formula
28  for i in check:
29      data = alldata[-31:]
30      a = len(data)
31      wma = data * weight
32      wma = wma / totalweight
33      wma = np.sum(wma)
34      alldata = np.append(alldata,wma)
35
36  actual = actual[:30]
37  prediction = alldata[-30:].astype(int)
38  #Calculate the accuracy using Mean Absolute Percentage Error
39  mape = np.subtract(actual, prediction)
40  mape = abs(mape)
41  mape = mape / actual * 100
42  mape = np.sum(mape) / len(mape)
```

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Report #14335827

INTRODUCTION Background Stocks are one of the favorite investment methods of Indonesian people. This is because stocks are "high risk high return" investments. That is an investment that provides high returns even though it has a high risk as well. To find a good stock, we can do fundamental analysis and technical analysis. Fundamental analysis is an analysis of the condition of the company whose shares are traded. The way of analysis we can see the total amount of company income, the amount of expenses, the amount of company debt, and the amount of profit distributed to shareholders. We can see all of that on the Indonesia Stock Exchange website. In addition we can also perform technical analysis. Technical analysis aimed at observing patterns in stock prices. The use of technical analysis is that we can find the best momentum when to buy or sell. But doing technical analysis is not easy because it takes time and enough experience to be able to do the right technical

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