Day12

March 8, 2021

0.1 Day 12 - First naive backtest on Crossover with double EMAs

[2]:
```
import pandas as pd
import numpy as np
import yfinance as yf

import plotly.graph_objects as go
```

[3]:
```
"""
    :param ticker: closing prices
    :param start: history start date
    :param end: history end date
    :return: stock's historical data
"""
def get_data(ticker,start="2018-03-25"):

    return yf.download(ticker, start)


"""
    :param close: closing prices
    :param length: moving average length
    :return: stock's exponential moving average (EMA)

"""
def get_EMA(close,length=20):
    return close.ewm(span=length, adjust=False).mean()
```

[48]:
```
"""
    :param close: closing prices
    :param len_moving_average: moving average length
    :return buy: list with buy's signals (indexes)
    :return sell: list with sell's signals (indexes)
    :return df_signal_3: new dataframe that contains "close" and "ema(s)"
    :return balance: final balance after trading
"""
def trade_3(close, len_short_ma=20, len_long_ma=100, budget=10000):
```

```
ma_short = get_EMA(close,length=len_short_ma)
ma_long = get_EMA(close,length=len_long_ma)

df_signal_3 = pd.DataFrame({'ma_short' : ma_short,
                            'ma_long' : ma_long,
                            'close' : close}).dropna()

buy = []
sell = []

# trade at most 30% of the total balance
balance = budget
traded = 0
traded_price = 0

# pos = 0 : we do not have any position -> we can buy but we cannot sell
# pos = 1 : we have a position -> we can sell and we cannot buy

# I am not considering trading fees
# I suppose to trade the entire balance
pos = 0

for i in range(len(df_signal_3)-1):

    if df_signal_3.ma_short.iloc[i-1] < df_signal_3.ma_long.iloc[i] \
    and df_signal_3.ma_short.iloc[i+1] > df_signal_3.ma_long.iloc[i] \
    and pos == 0:
        buy.append(i)
        pos = 1

        # update balance
        traded_price = df_signal_3.close[i]
        traded = balance
        balance = 0



    if df_signal_3.ma_short.iloc[i-1] > df_signal_3.ma_long.iloc[i] \
    and df_signal_3.ma_short.iloc[i+1] < df_signal_3.ma_long.iloc[i] \
    and pos == 1:
        sell.append(i)
        pos = 0

        # update balance
        balance += traded * (df_signal_3.close[i]/traded_price)

# final price
```

```
    if pos == 1:
        balance += traded * (df_signal_3.close[len(df_signal_3)-1]/traded_price)

    return buy, sell, df_signal_3, balance
```

[75]:
```
trade = 10000

stock_history_3  = get_data('TSLA','2018-03-06')
stock_history_3 = stock_history_3['Adj Close']
buy_3, sell_3, df_signal_3, balance_3 = trade_3(stock_history_3, 20, 100, trade)

fig_s3 = go.Figure()
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['close'],␣
 ↪name='Close'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_short'],␣
 ↪name='EMA_15d (short)'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_long'],␣
 ↪name='EMA_100d (long)'))


fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[buy_3].index, y=df_signal_3.
 ↪iloc[buy_3]['close'], name='Buy',
                             mode='markers', marker=dict(color='green', size=10,␣
 ↪symbol='triangle-up')))
fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[sell_3].index, y=df_signal_3.
 ↪iloc[sell_3]['close'], name='Sell',
                             mode='markers', marker=dict(color='red', size=10,␣
 ↪symbol='triangle-down')))

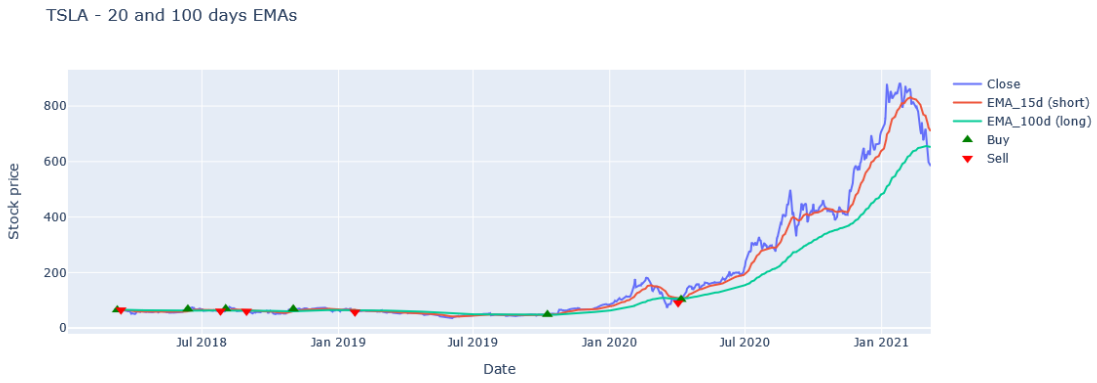
fig_s3.update_layout(
    title="TSLA - 20 and 100 days EMAs",
    xaxis_title="Date",
    yaxis_title="Stock price"
)

fig_s3.show()

#static rendering for github
#fig_s3.show("svg")

print(f"Traded \t\t: {trade}")
print(f"Balance \t: {balance_3:.2f}")
print(f"Net \t\t: {balance_3 - trade :.2f}")
```

```
[**********************100%**********************]  1 of 1 completed
```




```
Traded          : 10000
Balance         : 68022.05
Net             : 58022.05
```

[74]:
```
trade = 10000

stock_history_3  = get_data('FB','2018-03-06')
stock_history_3 = stock_history_3['Adj Close']
buy_3, sell_3, df_signal_3, balance_3 = trade_3(stock_history_3, 15, 100, trade)

fig_s3 = go.Figure()
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['close'],␣
 ↪name='Close'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_short'],␣
 ↪name='EMA_15d (short)'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_long'],␣
 ↪name='EMA_100d (long)'))


fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[buy_3].index, y=df_signal_3.
 ↪iloc[buy_3]['close'], name='Buy',
                          mode='markers', marker=dict(color='green', size=10,␣
 ↪symbol='triangle-up')))
fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[sell_3].index, y=df_signal_3.
 ↪iloc[sell_3]['close'], name='Sell',
                          mode='markers', marker=dict(color='red', size=10,␣
 ↪symbol='triangle-down')))

fig_s3.update_layout(
    title="FB - 15 and 100 days EMAs",
    xaxis_title="Date",
    yaxis_title="Value"
```

```
)

fig_s3.show()

#static rendering for github
#fig_s3.show("svg")

print(f"Traded \t\t: {trade}")
print(f"Balance \t: {balance_3:.2f}")
print(f"Net \t\t: {balance_3 - trade :.2f}")
```

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[**********100%**********]  1 of 1 completed
```


```
Traded          : 10000
Balance         : 11579.55
Net             : 1579.55
```

[73]:
```
trade = 10000

stock_history_3  = get_data('GOOGL','2018-03-06')
stock_history_3 = stock_history_3['Adj Close']
buy_3, sell_3, df_signal_3, balance_3 = trade_3(stock_history_3, 15, 100, trade)

fig_s3 = go.Figure()
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['close'],␣
 ↪name='Close'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_short'],␣
 ↪name='EMA_15d (short)'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_long'],␣
 ↪name='EMA_100d (long)'))
```

```
fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[buy_3].index, y=df_signal_3.
 ↪iloc[buy_3]['close'], name='Buy',
                          mode='markers', marker=dict(color='green', size=10,␣
 ↪symbol='triangle-up')))
fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[sell_3].index, y=df_signal_3.
 ↪iloc[sell_3]['close'], name='Sell',
                          mode='markers', marker=dict(color='red', size=10,␣
 ↪symbol='triangle-down')))

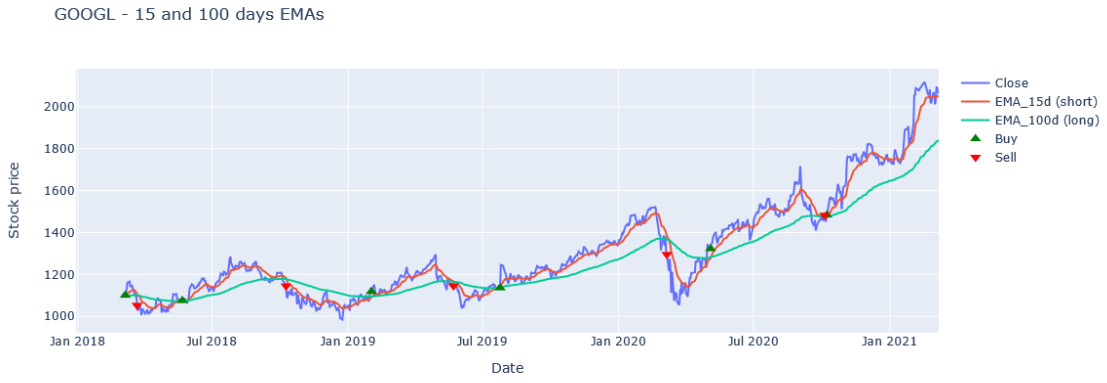
fig_s3.update_layout(
    title="GOOGL - 15 and 100 days EMAs",
    xaxis_title="Date",
    yaxis_title="Stock price"
)

fig_s3.show()

#static rendering for github
#fig_s3.show("svg")

print(f"Traded \t\t: {trade}")
print(f"Balance \t: {balance_3:.2f}")
print(f"Net \t\t: {balance_3 - trade :.2f}")
```

```
[**********************100%**********************]  1 of 1 completed
```




```
Traded          : 10000
Balance         : 18545.52
Net             : 8545.52
```

[72]:
```
trade = 10000
```

```
stock_history_3  = get_data('GME','2018-03-06')
stock_history_3 = stock_history_3['Adj Close']
buy_3, sell_3, df_signal_3, balance_3 = trade_3(stock_history_3, 15, 100, trade)

fig_s3 = go.Figure()
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['close'],␣
 ↪name='Close'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_short'],␣
 ↪name='EMA_15d (short)'))
fig_s3.add_trace(go.Scatter(x=df_signal_3.index, y=df_signal_3['ma_long'],␣
 ↪name='EMA_100d (long)'))


fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[buy_3].index, y=df_signal_3.
 ↪iloc[buy_3]['close'], name='Buy',
                           mode='markers', marker=dict(color='green', size=10,␣
 ↪symbol='triangle-up')))
fig_s3.add_traces(go.Scatter(x=df_signal_3.iloc[sell_3].index, y=df_signal_3.
 ↪iloc[sell_3]['close'], name='Sell',
                           mode='markers', marker=dict(color='red', size=10,␣
 ↪symbol='triangle-down')))

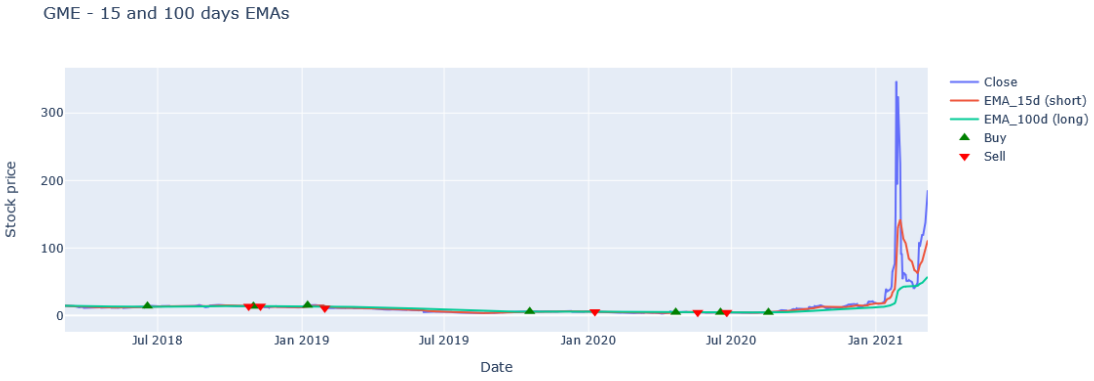
fig_s3.update_layout(
    title="GME - 15 and 100 days EMAs",
    xaxis_title="Date",
    yaxis_title="Stock price"
)

fig_s3.show()

#static rendering for github
#fig_s3.show("svg")

print(f"Traded \t\t: {trade}")
print(f"Balance \t: {balance_3:.2f}")
print(f"Net \t\t: {balance_3 - trade :.2f}")
```

```
[**********************100%**********************]  1 of 1 completed
```




```
Traded          : 10000
Balance         : 225050.11
Net             : 215050.11
```