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import statistics as stats
from pandas import *
from pandas_datareader import data
from matplotlib.pyplot import *

set_option ("display.max_rows", 20000)
set_option ("display.max_columns", 1000)
set_option ("display.width", 1000)

start_date = "2014-01-01"
end_date = "2020-02-22"
google_data = data.DataReader( "GOOG", "yahoo", start_date, end_date )

num_periods_fast = 10
K_fast = 2 / (num_periods_fast + 1)
ema_fast = 0

num_periods_slow = 40
K_slow = 2 / (num_periods_slow + 1)
ema_slow = 0

num_periods_macd = 20
K_macd = 2 / (num_periods_macd + 1)
ema_macd = 0

ema_fast_values = []
ema_slow_values = []
macd_values = []
macd_values_signal = []
macd_histogram_values = []

for close_price in google_data ["Adj Close"]:

    if ema_fast == 0:
        ema_fast = close_price
        ema_slow = close_price
    else:
        ema_fast = (close_price - ema_fast) * K_fast + ema_fast
        ema_slow = (close_price - ema_slow) * K_slow + ema_slow

    ema_fast_values.append (ema_fast)
    ema_slow_values.append (ema_slow)
    macd = ema_fast - ema_slow

    if ema_macd == 0:
        ema_macd = macd
    else:
        ema_macd = (macd - ema_macd) * K_slow + ema_macd

    macd_values.append (macd)

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macd_values_signal.append (ema_macd)
macd_histogram_values.append (macd - ema_macd)

google_data = google_data.assign (FastExponential10DaysMovingAverage= Series
(ema_fast_values, index=google_data.index))
google_data = google_data.assign (SlowExponential40DaysMovingAverage= Series
(ema_slow_values, index=google_data.index))
google_data = google_data.assign (MovingAverageConvergenceDivergence= Series
(macd_values, index=google_data.index))
google_data = google_data.assign (Exponential20DaysMovingAverageofMACD= Series
(macd_values_signal, index=google_data.index))
google_data = google_data.assign (MACDHistogram= Series (macd_histogram_values,
index=google_data.index))

ema_f = google_data ["FastExponential10DaysMovingAverage"]
ema_s = google_data ["SlowExponential40DaysMovingAverage"]
macd = google_data ["MovingAverageConvergenceDivergence"]
ema_macd = google_data ["Exponential20DaysMovingAverageofMACD"]
macd_histogram = google_data ["MACDHistogram"]

fig = figure ()
ax1 = fig.add_subplot (311, ylabel= "Google price in $")
google_data ["Adj Close"].plot (ax=ax1, color="g", lw=2., legend=True)
ema_f.plot (ax=ax1, color="b", lw=2., legend=True)
ema_s.plot (ax=ax1, color="r", lw=2., legend=True)
ax2 = fig.add_subplot (312, ylabel= "MACD")
macd.plot (ax=ax2, color="b", lw=2., legend=True)
ema_macd.plot (ax=ax2, color="g", lw=2., legend=True)
ax3 = fig.add_subplot (313, ylabel= "MACD")
macd_histogram.plot (ax=ax3, color="r", kind="bar", legend=True, use_index=False)

print (google_data)
legend ()
show ()

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