

Golden_Death_Cross

September 29, 2021

1 Golden Cross and Death Cross

<https://www.investopedia.com/terms/g/goldencross.asp>

<https://www.investopedia.com/terms/d/deathcross.asp>

```
[1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings("ignore")

import yfinance as yf
yf.pdr_override()
```

```
[2]: start = '2014-01-01'
end = '2019-01-01'

symbol = 'AAPL'

df = yf.download(symbol, start=start, end=end)
```

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

```
[3]: df.head()
```

```
[3]:
```

	Adj Close	Close	High	Low	Open	Volume
Date						
2014-01-02	71.107201	79.018570	79.575714	78.860001	79.382858	58671200
2014-01-03	69.545288	77.282860	79.099998	77.204285	78.980003	98116900
2014-01-06	69.924515	77.704285	78.114288	76.228569	76.778572	103152700
2014-01-07	69.424438	77.148575	77.994286	76.845711	77.760002	79302300
2014-01-08	69.864105	77.637146	77.937141	76.955711	76.972855	64632400

```
[4]: df['% Change'] = df['Adj Close'].pct_change() # pct_change : percent profit rate
df.head()
```

```
[4]:
```

	Adj Close	Close	High	Low	Open	Volume \
Date						
2014-01-02	71.107201	79.018570	79.575714	78.860001	79.382858	58671200
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2014-01-08	69.864105	77.637146	77.937141	76.955711	76.972855	64632400

```
% Change
Date
2014-01-02      NaN
2014-01-03 -0.021966
2014-01-06  0.005453
2014-01-07 -0.007152
2014-01-08  0.006333
```

```
[5]: df['P_AdjClose'] = df['Adj Close'].shift(1) # P_Adj Close : previous Close
```

```
[6]: df['L_Profit'] = np.log(df['Adj Close'] / df['P_AdjClose']) # L_Profit : Log
      ↪ Profit Rate
```

```
[7]: df['MA_50'] = df['Adj Close'].rolling(center=False, window=50).mean()
df['MA_200'] = df['Adj Close'].rolling(center=False, window=200).mean()
df['diff'] = df['MA_50'] - df['MA_200']

df = df[['Volume', 'Adj Close', 'MA_50', 'MA_200', 'diff']]
df.head(20)
```

```
[7]:
```

	Volume	Adj Close	MA_50	MA_200	diff
Date					
2014-01-02	58671200	71.107201	NaN	NaN	NaN
2014-01-03	98116900	69.545288	NaN	NaN	NaN
2014-01-06	103152700	69.924515	NaN	NaN	NaN
2014-01-07	79302300	69.424438	NaN	NaN	NaN
2014-01-08	64632400	69.864105	NaN	NaN	NaN
2014-01-09	69787200	68.971939	NaN	NaN	NaN
2014-01-10	76244000	68.511696	NaN	NaN	NaN
2014-01-13	94623200	68.870354	NaN	NaN	NaN
2014-01-14	83140400	70.240776	NaN	NaN	NaN
2014-01-15	97909700	71.651016	NaN	NaN	NaN
2014-01-16	57319500	71.251190	NaN	NaN	NaN
2014-01-17	106684900	69.505417	NaN	NaN	NaN
2014-01-21	82131700	70.585274	NaN	NaN	NaN
2014-01-22	94996300	70.898949	NaN	NaN	NaN
2014-01-23	100809800	71.499313	NaN	NaN	NaN
2014-01-24	107338700	70.199638	NaN	NaN	NaN
2014-01-27	138719700	70.769104	NaN	NaN	NaN

2014-01-28	266380800	65.112747	NaN	NaN	NaN
2014-01-29	125702500	64.373535	NaN	NaN	NaN
2014-01-30	169625400	64.248833	NaN	NaN	NaN

```
[8]: prev_key = prev_val = 0

for key, val in df['diff'].iteritems():
    if val == 0:
        continue
    if val * prev_val < 0 and val > prev_val:
        print('[Golden]', key, val, df['Adj Close'][key])
    if val * prev_val < 0 and val < prev_val:
        print('[Death]', key, val, df['Adj Close'][key])
    prev_key, prev_val = key, val
```

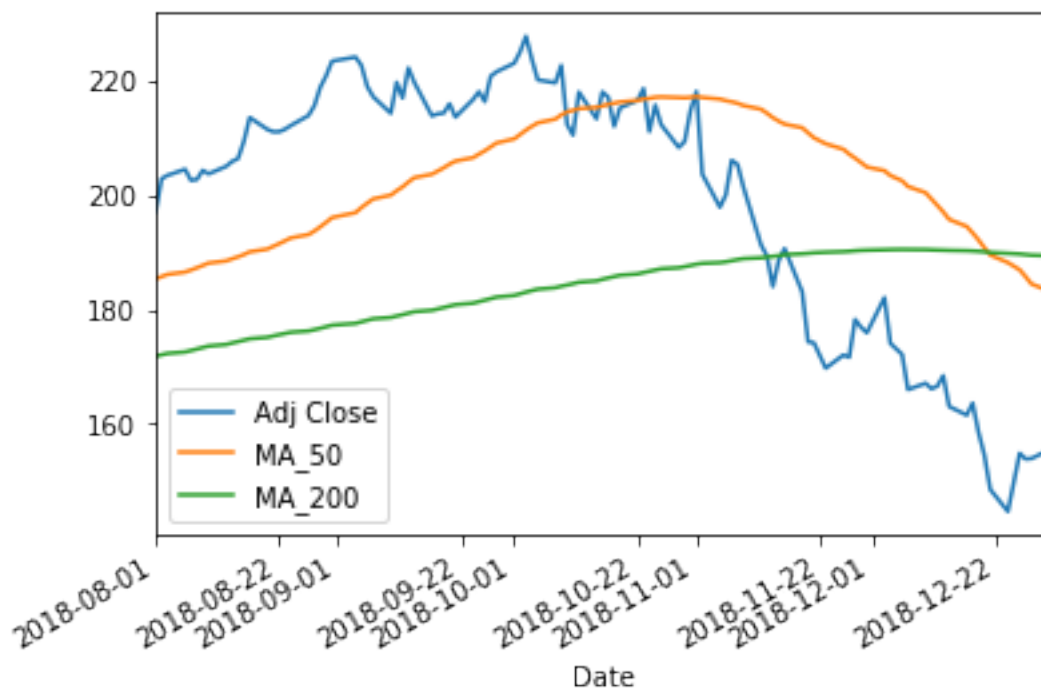
```
[Death] 2015-08-28 00:00:00 -0.21629188537598054 105.41515350341797
[Golden] 2016-08-30 00:00:00 0.02425605773925099 100.74073791503906
[Death] 2018-12-21 00:00:00 -0.44662147521972884 148.49879455566406
```

1.0.1 50-day Moving Average goes ‘under’ 200-day Moving Average is a “Death Cross.”

1.0.2 50-day Moving Average goes ‘over’ 200-day Moving Average is a “Golden Cross.”

```
[9]: df[['Adj Close', 'MA_50', 'MA_200']]['2018-08:'].plot()
```

```
[9]: <matplotlib.axes._subplots.AxesSubplot at 0x1525cc72278>
```



```
[10]: ax = df[['Adj Close', 'MA_50', 'MA_200']].plot(figsize=(18, 8))

prev_key = prev_val = 0

for key, val in df['diff'].iteritems():
    if val == 0:
        continue

    if val * prev_val < 0 and val > prev_val:
        ax.annotate('Golden', xy=(key, df['MA_200'][key]), xytext=(10,-30),
                    textcoords='offset points',
↪arrowprops=dict(arrowstyle='->'))
    elif val * prev_val < 0 and val < prev_val:
        ax.annotate('Death', xy=(key, df['MA_200'][key]), xytext=(10,30),
                    textcoords='offset points',
↪arrowprops=dict(arrowstyle='->'))

    prev_key, prev_val = key, val
```



1.1 Plot Multi-colors of one line

```
[11]: df['Label'] = np.where(df['MA_50'] > df['MA_200'], 1, -1)
```

```
[12]: import matplotlib.patches as mpatches
```

```
df = df.dropna(axis=0, how='any')
```

```

fig, ax = plt.subplots(figsize=(14,7))

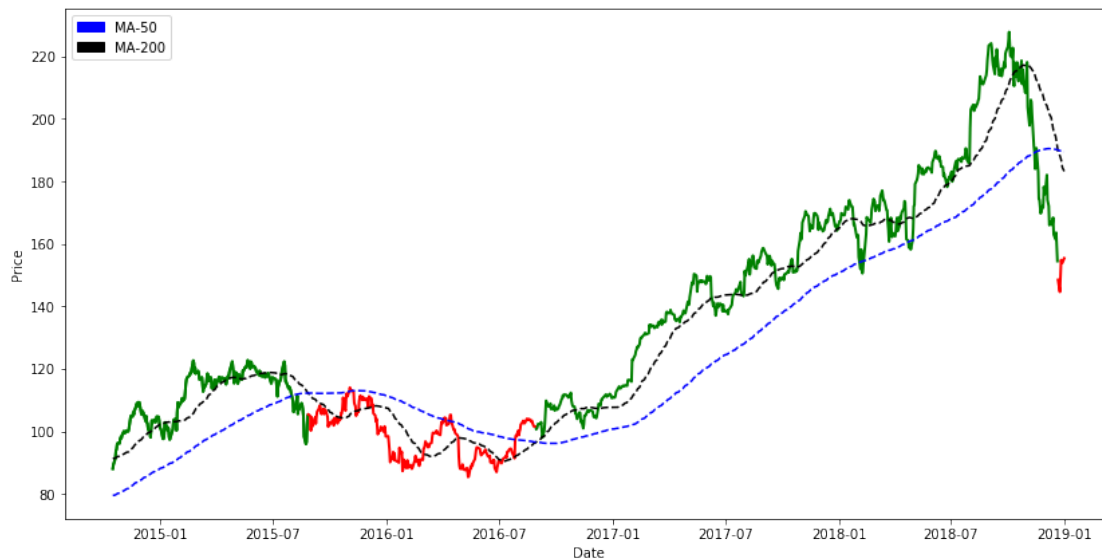
def plot_colors(group):
    global ax
    color = 'r' if (group['Label'] < 0).all() else 'g'
    lw = 2.0
    ax.plot(group.index, group['Adj Close'], c=color, linewidth=lw)

df.groupby((df['Label'].shift() * df['Label'] < 0).cumsum()).apply(plot_colors)

ax.plot(df.index, df['MA_50'], 'k--', label='MA-50')
ax.plot(df.index, df['MA_200'], 'b--', label='MA-200')
ax.set_ylabel('Price')
ax.set_xlabel('Date')
ma50 = mpatches.Patch(color='blue', label='MA-50')
ma200 = mpatches.Patch(color='black', label='MA-200')
ax.legend(handles=[ma50,ma200])

```

[12]: <matplotlib.legend.Legend at 0x1525edd94e0>



1.2 Plot Intersection Points

```

[13]: short_term = 50
      long_term = 200

      signals = pd.DataFrame(index=df.index)
      signals['position'] = 0.0

```

```

signals['Short_MA'] = df['Adj Close'].rolling(window=short_term, center=False).
    ↪mean()
signals['Long_MA'] = df['Adj Close'].rolling(window=long_term, center=False).
    ↪mean()

signals['position'][short_term:] = np.where(signals['Short_MA'][short_term:]
    > signals['Long_MA'][short_term:], 1.0, 0.0)
    ↪1.0, 0.0)

signals['intersection'] = signals['position'].diff()

```

```
[14]: print(signals)
```

Date	position	Short_MA	Long_MA	intersection
2014-10-16	0.0	NaN	NaN	NaN
2014-10-17	0.0	NaN	NaN	0.0
2014-10-20	0.0	NaN	NaN	0.0
2014-10-21	0.0	NaN	NaN	0.0
2014-10-22	0.0	NaN	NaN	0.0
2014-10-23	0.0	NaN	NaN	0.0
2014-10-24	0.0	NaN	NaN	0.0
2014-10-27	0.0	NaN	NaN	0.0
2014-10-28	0.0	NaN	NaN	0.0
2014-10-29	0.0	NaN	NaN	0.0
2014-10-30	0.0	NaN	NaN	0.0
2014-10-31	0.0	NaN	NaN	0.0
2014-11-03	0.0	NaN	NaN	0.0
2014-11-04	0.0	NaN	NaN	0.0
2014-11-05	0.0	NaN	NaN	0.0
2014-11-06	0.0	NaN	NaN	0.0
2014-11-07	0.0	NaN	NaN	0.0
2014-11-10	0.0	NaN	NaN	0.0
2014-11-11	0.0	NaN	NaN	0.0
2014-11-12	0.0	NaN	NaN	0.0
2014-11-13	0.0	NaN	NaN	0.0
2014-11-14	0.0	NaN	NaN	0.0
2014-11-17	0.0	NaN	NaN	0.0
2014-11-18	0.0	NaN	NaN	0.0
2014-11-19	0.0	NaN	NaN	0.0
2014-11-20	0.0	NaN	NaN	0.0
2014-11-21	0.0	NaN	NaN	0.0
2014-11-24	0.0	NaN	NaN	0.0
2014-11-25	0.0	NaN	NaN	0.0
2014-11-26	0.0	NaN	NaN	0.0
...
2018-11-15	1.0	212.989678	189.429142	0.0

2018-11-16	1.0	212.457661	189.603541	0.0
2018-11-19	1.0	211.832831	189.759619	0.0
2018-11-20	1.0	210.924644	189.840216	0.0
2018-11-21	1.0	210.067101	189.936764	0.0
2018-11-23	1.0	209.016235	190.032500	0.0
2018-11-26	1.0	208.061743	190.130503	0.0
2018-11-27	1.0	207.216790	190.195936	0.0
2018-11-28	1.0	206.496784	190.286429	0.0
2018-11-29	1.0	205.746838	190.355311	0.0
2018-11-30	1.0	204.945184	190.392028	0.0
2018-12-03	1.0	204.313018	190.462213	0.0
2018-12-04	1.0	203.459201	190.495175	0.0
2018-12-06	1.0	202.539077	190.522235	0.0
2018-12-07	1.0	201.530953	190.511637	0.0
2018-12-10	1.0	200.455751	190.491888	0.0
2018-12-11	1.0	199.345925	190.450452	0.0
2018-12-12	1.0	198.215513	190.414157	0.0
2018-12-13	1.0	197.081890	190.388291	0.0
2018-12-14	1.0	195.785703	190.350684	0.0
2018-12-17	1.0	194.539285	190.299594	0.0
2018-12-18	1.0	193.407487	190.256024	0.0
2018-12-19	1.0	192.183834	190.187669	0.0
2018-12-20	1.0	190.819312	190.107305	0.0
2018-12-21	0.0	189.540965	189.987586	-1.0
2018-12-24	0.0	188.223276	189.833842	0.0
2018-12-26	0.0	186.958919	189.722554	0.0
2018-12-27	0.0	185.767732	189.614768	0.0
2018-12-28	0.0	184.484067	189.514833	0.0
2018-12-31	0.0	183.249006	189.421312	0.0

[1059 rows x 4 columns]

```
[15]: fig = plt.figure(figsize=(14,8))

# Add a subplot and label for y-axis
ax = fig.add_subplot(111, ylabel='Price in $')

# Plot the Adj Close price
df['Adj Close'].plot(ax=ax, color='b', lw=2.)

# Plot the short and long moving averages
signals[['Short_MA', 'Long_MA']].plot(ax=ax, lw=2.)

# Plot the Signal of Golden Cross
ax.plot(signals.loc[signals.intersection == 1.0].index,
        signals.Short_MA[signals.intersection == 1.0],
        'o', markersize=10, color='gold', label='Golden Cross')
```

```

# Plot the Signal of Death Cross
ax.plot(signals.loc[signals.intersection == -1.0].index,
        signals.Short_MA[signals.intersection == -1.0],
        'o', markersize=10, color='black', label='Death Cross')

ax.set_title('Golden Cross and Death Cross')
ax.legend(loc='best')

# Show the plot
plt.show()

```

