专业·创新·增值

金程教育
GOLDEN FUTURE

经典策略的Python实现

Classical Trading Strategies

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➢ 主要逻辑

- Moving Average， MA，is the average of prices in last certain period.（通常对收盘价格取平均，时期跨度通常是7 的倍数）
- **移动平均策略**是趋势追踪思想的经典策略之一
- 具体方法有简单移动平均法、指数移动平均法、加权移动平均法。
- 普遍的方法有以下两种：
  - ✓ 方法一
    - ◆ 1) 当上升并且交叉穿过X天的移动平均线时买入；
    - ◆ 2) 当下降并且交叉穿过X天的移动平均线时卖出。
  - ✓ 方法二
    - ◆ 1) 当X天的移动平均线上升并且交叉穿过Y天的移动平均线时买入；
    - ◆ 2) 当X天的移动平均线下降并且交叉穿过Y天的移动平均线时买入。

➢ Step1：Data Importing & Processing & Basic preparation

- 对Jupyter Notebook的画图风格进行设置

```
%matplotlib inline
import matplotlib.pyplot as plt
plt.style.use('seaborn')
import matplotlib as mpl
mpl.rcParams['font.family'] = 'serif'
```

- 关键语句get_k_data, rename(), index()

```
data = ts.get_k_data('399300', start = '2010-01-01', end='2017-06-27')
#历史行情数据接口：tushare的get_k_data()
data = pd.DataFrame(data)
data.rename(columns={'close': 'price'}, inplace=True) #重命名列
data.set_index('date', inplace = True) #设置 索引index
```

Step2：Calculation & Visualization of Two SMAs by Rolling Method

- 关键语句:rolling(), DataFrame.plot()

```
data['SMA1'] = data['price'].rolling(42).mean() #rolling函数的使用
data['SMA2'] = data['price'].rolling(252).mean()
data[['price','SMA1','SMA2']].plot(title='HS300 stock price | 42 & 252 days SMAs',
figsize=(10, 6)) #benchmark 移动平均值与相应价格的关系及时间跨度的影响
```

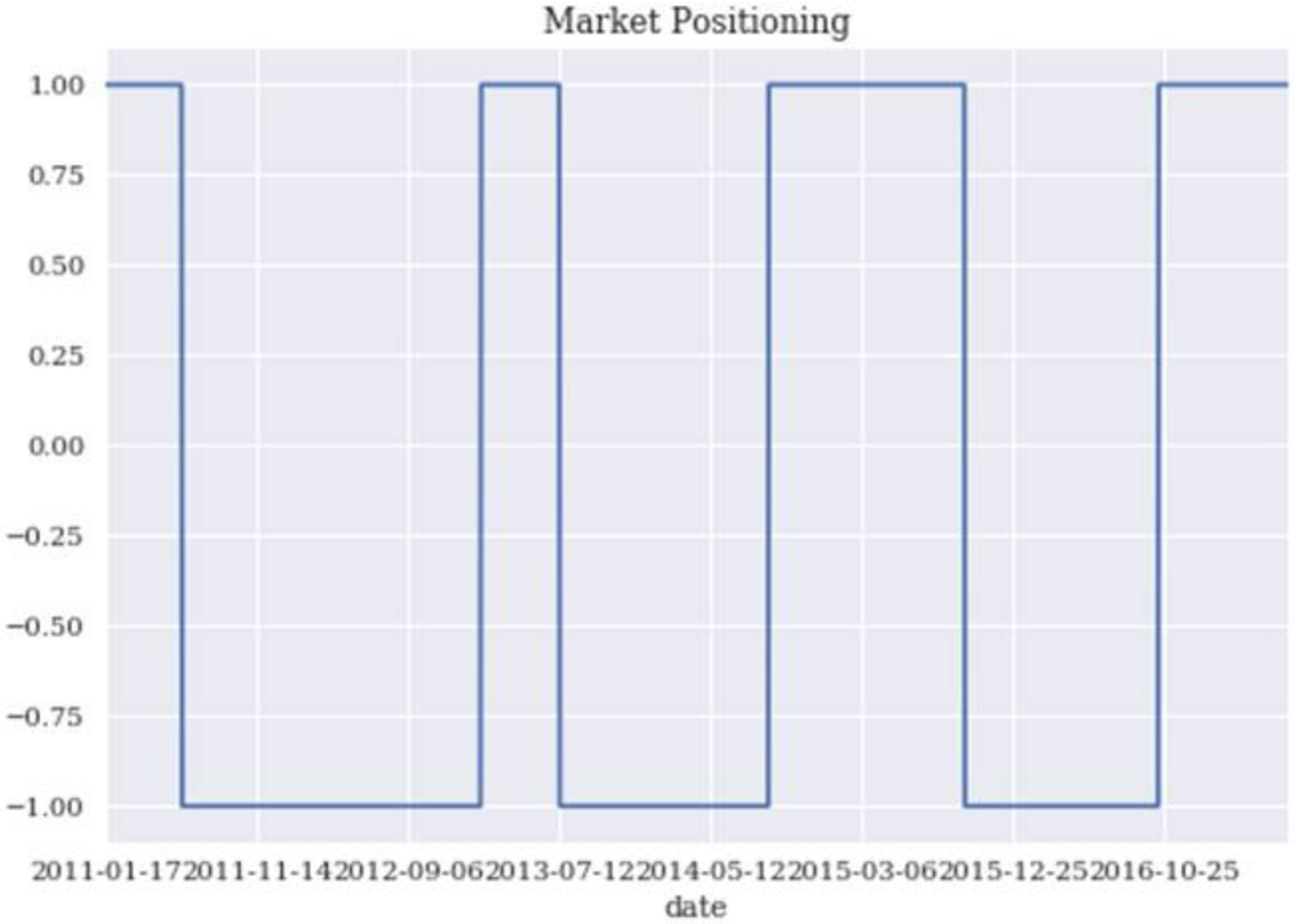
Step3： Market Positioning——Generating Signals by Trading Rule and getting to know more about stock & strategy

- 关键语句：np.where(), np.log(), hist().

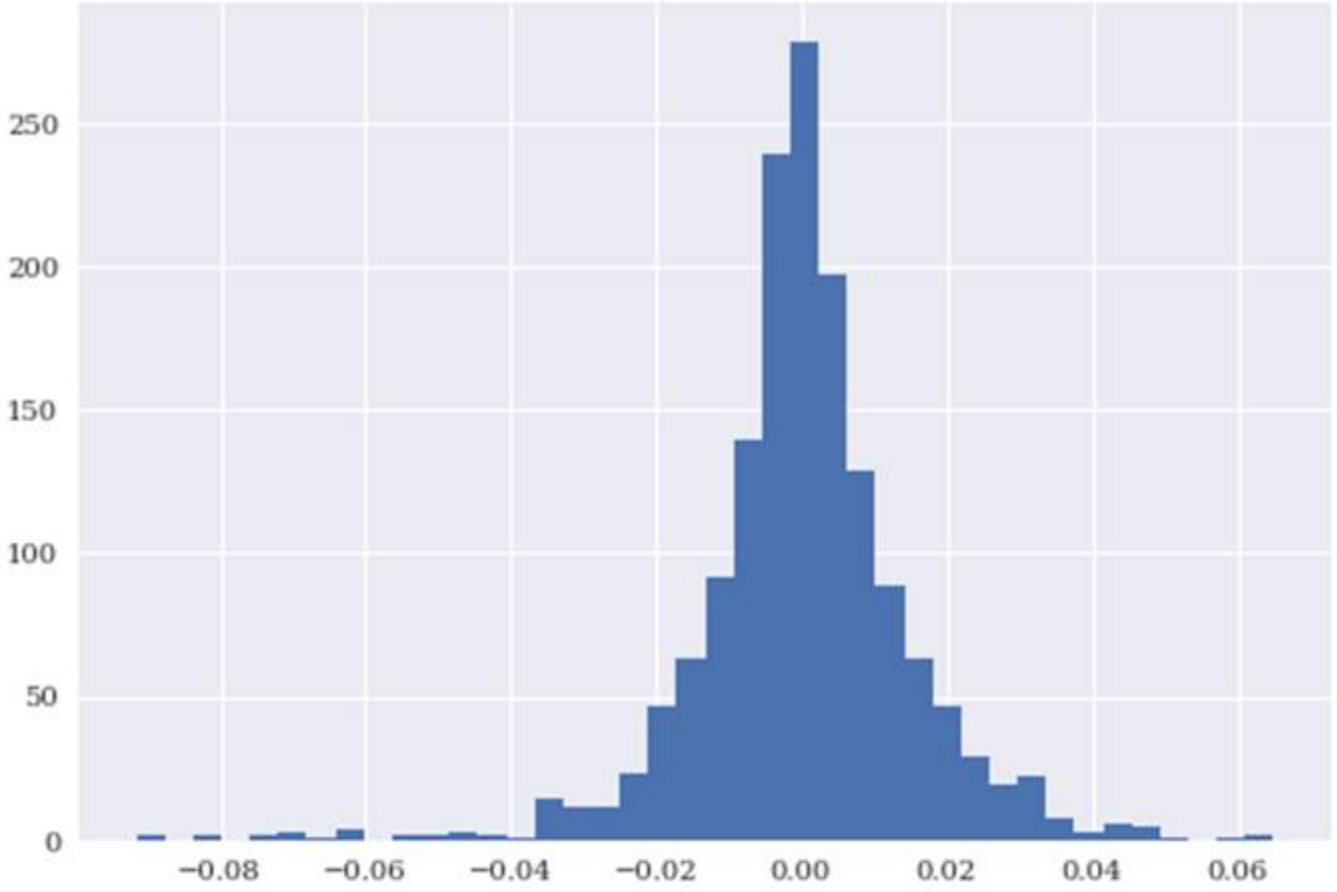
```
data['position'] = np.where(data['SMA1'] > data['SMA2'], 1, -1) #trading signal
data['returns'] = np.log(data['price'] / data['price'].shift(1))
data['returns'].hist(bins=50) #plot a stock's return histogram
data['strategy'] = data['position'].shift(1) * data['returns'] #strategy's return
```

Strategy Based on Simple Moving Averages

Strategy Based on Simple Moving Averages



Strategy Based on Simple Moving Averages



Step3(续)

- 关键语句：apply()

```
data[['returns', 'strategy']].sum() #returns at the end of sample
data[['returns', 'strategy']].cumsum().apply(np.exp).plot(figsize=(10, 6)) #cumulative return
data[['returns', 'strategy']].mean() * 252#annualized mean return
data[['returns', 'strategy']].std() * 252 ** 0.5 #annualized standard deviation
```

Strategy Based on Simple Moving Averages

- **Step4：evaluate stategy's performance :drawdown & timedelta**
  - 关键语句：cumsum(),cummax()

```
data['cumret'] = data['strategy'].cumsum().apply(np.exp)
data['cummax'] = data['cumret'].cummax()
data[['cumret', 'cummax']].plot(figsize=(10, 6))
drawdown = (data['cummax'] - data['cumret'])
drawdown.max()
temp = drawdown[drawdown == 0] #how many times we at the peak when we see back
periods = (temp.index[1:].to_datetime() - temp.index[:-1].to_datetime())
periods[12:15]
periods.max()
```

Strategy Based on Simple Moving Averages

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主要逻辑

- **Momentum** is the empirically observed tendency for rising asset prices to rise further, and falling prices to keep falling.
- **动量效应**是指在一定时期内，如果某股票或者某股票投资组合在前一段时期表现较好（差），那么，下一段时期该股票或者股票投资组合仍将有良好（较差）的表现。
- 最早由Jegadeesh和Titman S (1993)在发表于《Journal of Finance》上的"*Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency*"一文中提出。

原因

- 'anomaly': Struggle to explain
- 基本面分析中，资产价格的上升来自于供需的变化或产生了新的信息。——*无法解释*
- 大多数的经济学家会把它归因为行为金融学中的“认知偏差”（Recognition Bias）：非理性的投资者没有很好地把新信息融合到交易价格中——“反应不足”（underreaction）。

Strategy1关键语句

```
data['position'] = np.sign(data['returns']) #以自身return的符号作为position
```

```
data['strategy'] = data['position'].shift(1) * data['returns']
```

```
data[['returns', 'strategy']].dropna().cumsum().apply(np.exp).plot(figsize=(10, 6)
```

Strategy Based on Momentum

Strategy2关键语句

```
data['position2'] = np.sign(data['returns'].rolling(2).mean())
#以自身2天的平均return的符号作为position，或6 天，等等。
```

```
data['strategy2'] = data['position2'].shift(1) * data['returns']
```

```
data[['returns', 'strategy2']].dropna().cumsum().apply(np.exp).plot(figsize=(10, 6)
```

Strategy Based on Momentum

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➢ 主要逻辑

- Reasoning is opposite to tendency strategies such as SMA and Momentum to some degree.

'Mean Reversion refers to a tendency of asset prices to return to a trend path.'

——Balvers et al.(2000)

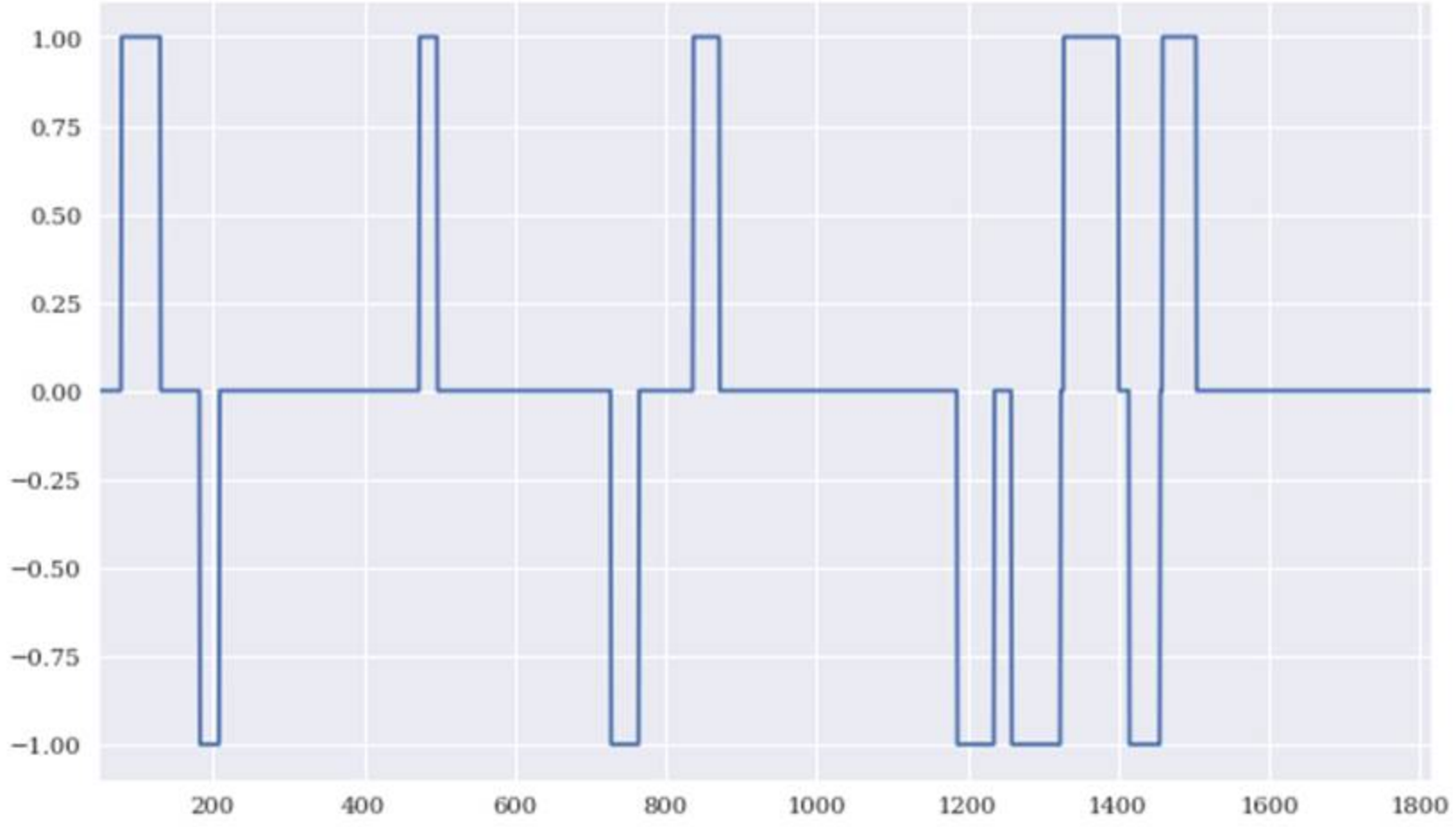
- 关键概念
  - ✓ **distance**：衡量价格偏离的程度，例如：distance = close price – SMA（50）
  - ✓ **threshold**：临界值，阈值，对仓位调整信号做出判断的依据，可以是历史经验得到的数据，也可以是基于合理模型得到的
- 例子：
  - ✓ 当现阶段distance > threshold时，下一步做空；
  - ✓ 当现阶段distance < -threshold时，下一步做多；
  - ✓ 当连续两天distance的值出现一正一负时，说明distance回归均值，平仓，直到下一次出现distance过大时再进行开仓；

关键语句

```
data['position'] = np.where(data['distance'] > threshold, -1, np.nan)
```

```
data['position'] = np.where(data['distance'] < -threshold, 1, data['position'])
```

```
data['position'] = np.where(data['distance'] *data['distance'].shift(1) < 0, 0, data['position'])
```


1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
200
400
600
800
1000
1200
1400
1600
1800

Mean-Reversion

Thank you!