

TimeSeriesAnalysis

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Preface

R Python

-
- ACF AR, MA ARMA, ARIMA
- ARCH ARCH GARCH IGARCH GARCH-M EGARCH , TGARCH , APARCH GARCH ;
- VAR ;
-

1

Ruey S. Tsay
with R

R (Tsay 2013) An Introduction to Analysis of Financial Data

1.1

1.2

1.3

1.4

1.5

1.6

1.7

2

2.1

Ruey S. Tsay “ ” R (Tsay 2013) An Introduction to Analysis of Financial Data with R

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- AR, MA, ARMA
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-
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-
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-

2.1.1

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

raw_data = []
with open("../ftsdata/q-ko-earns8309.txt", "r", encoding="utf-8") as file:
    for line in file.readlines():
        line = line.strip("\n").strip(" ").replace("\t", " ").split(" ")
        line = list(filter(lambda x: x != "", line))
        raw_data.append(line)
data = pd.DataFrame(raw_data[1:], columns=raw_data[0])

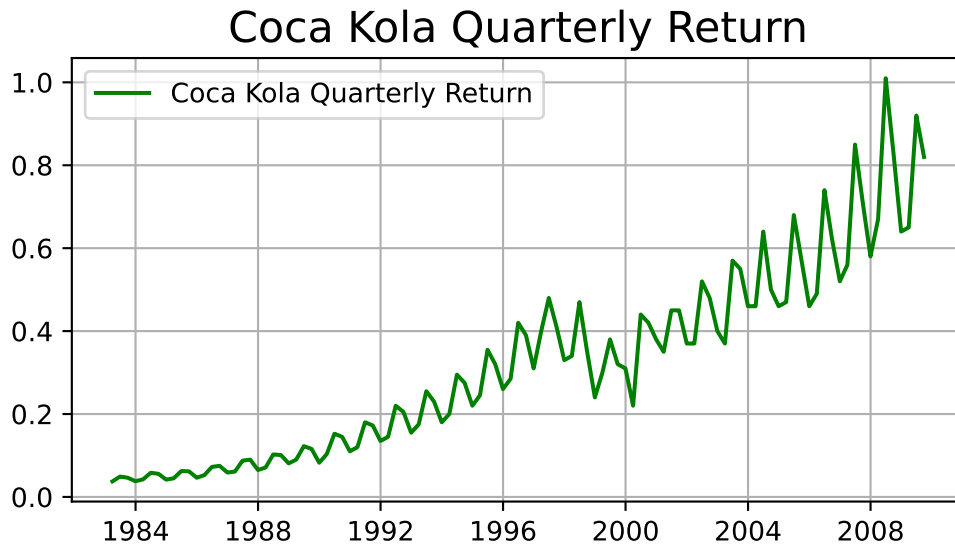
data["pends"] = pd.to_datetime(data["pends"], format="%Y%m%d")
data["anntime"] = pd.to_datetime(data["anntime"], format="%Y%m%d")
```

```

data["value"] = pd.to_numeric(data["value"])

plt.figure(figsize=(6, 3))
plt.plot(data["pends"], data['value'], label='Coca Kola Quarterly Return', color='green')
plt.title('Coca Kola Quarterly Return', fontsize=16)
plt.grid(True)
plt.legend()
plt.show()

```



```

import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

raw_data = []
with open("../ftsdata/q-ko-earn8309.txt", "r", encoding="utf-8") as file:
    for line in file.readlines():
        line = line.strip("\n").strip(" ").replace("\t", " ").split(" ")
        line = list(filter(lambda x: x != "", line))
        raw_data.append(line)
data = pd.DataFrame(raw_data[1:], columns=raw_data[0])

data["pends"] = pd.to_datetime(data["pends"], format="%Y%m%d")

```

```

data["anntime"] = pd.to_datetime(data["anntime"], format="%Y%m%d")
data["value"] = pd.to_numeric(data["value"])

data['Date'] = pd.to_datetime(data['pends'])
data.set_index('Date', inplace=True)

data['Year'] = data.index.year
data['Quarter'] = data.index.quarter

cpal = ['green', 'red', 'yellow', 'black']

plt.figure(figsize=(6, 6))

plt.plot(data.index, data['value'], label='Coca Kola Quarterly Return', color='gray')

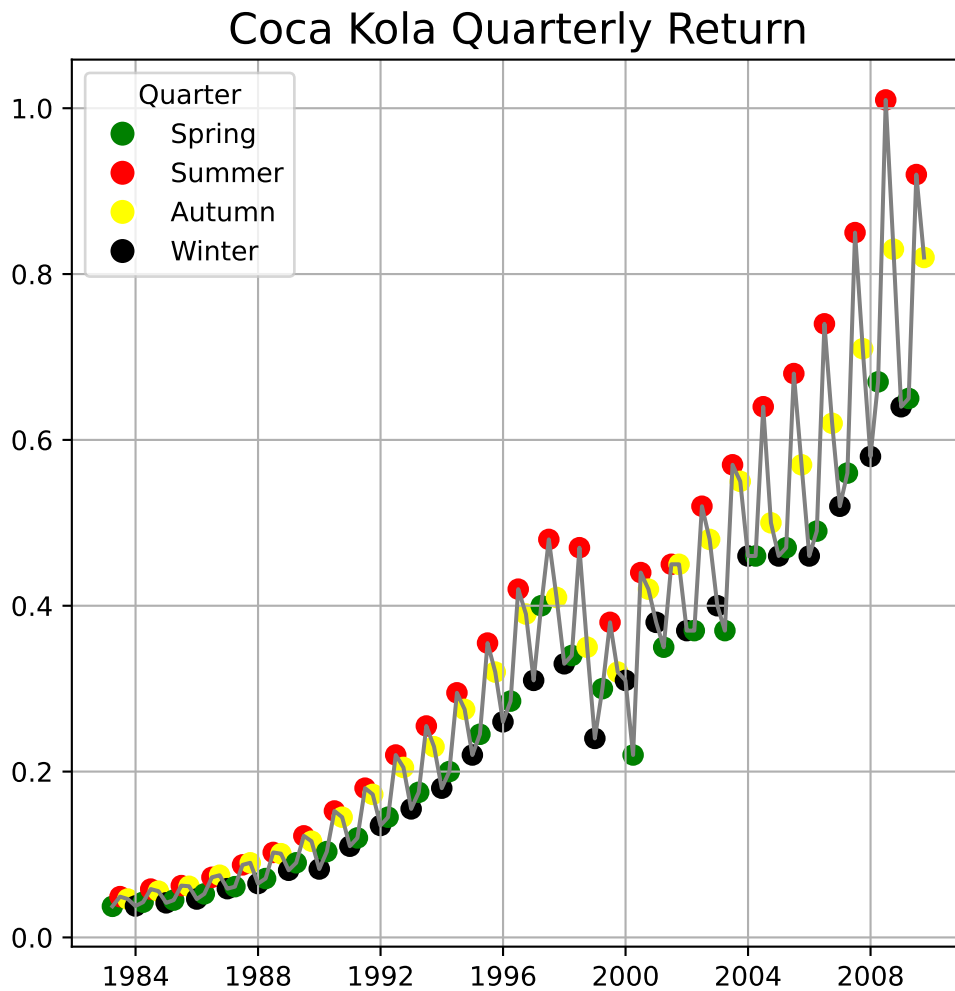
for i, row in data.iterrows():
    plt.scatter(row.name, row['value'], color=cpal[row['Quarter'] - 1], s=50)

plt.title('Coca Kola Quarterly Return', fontsize=16)
plt.grid(True)

quarter_labels = ['Spring', 'Summer', 'Autumn', 'Winter']
plt.legend([plt.Line2D([0], [0], marker='o', color='w', markerfacecolor=cpal[i], markersize=
    quarter_labels,
    title='Quarter')

plt.show()

```



2.1.2 500

0

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

raw_data = []
with open("../ftsdata/m-ibmsp-2611.txt", "r", encoding="utf-8") as file:
    for line in file.readlines():
        line = line.strip("\n").strip(" ").replace("\t", " ").split(" ")
```



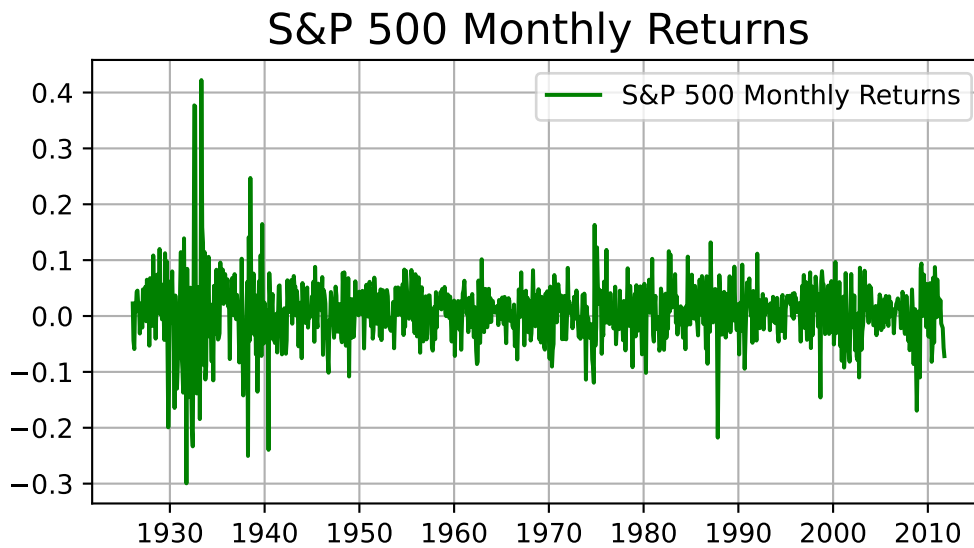
```

        line = list(filter(lambda x: x != "", line))
        raw_data.append(line)
data = pd.DataFrame(raw_data[1:], columns=raw_data[0])

data["date"] = pd.to_datetime(data["date"], format="%Y%m%d")
data["ibm"] = pd.to_numeric(data["ibm"])
data["sp"] = pd.to_numeric(data["sp"])
data.head()

plt.figure(figsize=(6, 3))
plt.plot(data["date"], data['sp'], label='S&P 500 Monthly Returns', color='green')
plt.title('S&P 500 Monthly Returns', fontsize=16)
plt.grid(True)
plt.legend()
plt.show()

```



2.2

2.3

2.4

2.5