vk7oi66ij

January 12, 2025

[75]:
```
import pandas as pd

# Read the CSV file
nifty50_data = pd.read_csv("C:\\Users\\kkala\\Downloads\\nifty50_closing_prices
 ↪(1).csv")
print(nifty50_data.head())  # Display the first few rows
```

```
                       Date  RELIANCE.NS  HDFCBANK.NS  ICICIBANK.NS  \
0  2024-08-20 00:00:00+05:30  2991.899902  1637.699951   1179.449951
1  2024-08-21 00:00:00+05:30  2997.350098  1625.800049   1174.849976
2  2024-08-22 00:00:00+05:30  2996.250000  1631.300049   1191.099976
3  2024-08-23 00:00:00+05:30  2999.949951  1625.050049   1203.500000
4  2024-08-26 00:00:00+05:30  3025.199951  1639.949951   1213.300049

       INFY.NS       TCS.NS  KOTAKBANK.NS  HINDUNILVR.NS      ITC.NS  \
0  1872.199951  4523.299805   1805.650024    2751.050049  498.799988
1  1872.699951  4551.500000   1812.949951    2791.199951  505.399994
2  1880.250000  4502.000000   1821.500000    2792.800049  504.549988
3  1862.099976  4463.899902   1818.000000    2815.600098  505.799988
4  1876.150024  4502.450195   1812.500000    2821.149902  505.700012

         LT.NS  …  HEROMOTOCO.NS   DRREDDY.NS   SHREECEM.NS  BRITANNIA.NS  \
0  3572.699951  …    5244.399902  6965.350098  24730.550781   5765.799805
1  3596.050049  …    5284.700195  7062.450195  24808.050781   5837.350098
2  3606.500000  …    5329.950195  6969.049805  25012.400391   5836.799805
3  3598.550049  …    5384.899902  6954.500000  24706.050781   5792.649902
4  3641.899902  …    5343.750000  6943.299805  24906.449219   5796.950195

       UPL.NS  EICHERMOT.NS   SBILIFE.NS  ADANIPORTS.NS  BAJAJ-AUTO.NS  \
0  566.150024   4883.250000  1761.300049    1492.550049    9779.700195
1  568.299988   4913.549805  1800.599976    1503.500000    9852.000000
2  579.150024   4933.549805  1795.250000    1492.300049    9914.200195
3  573.700012   4898.100098  1789.300049    1491.300049   10406.450195
4  577.450012   4875.200195  1796.250000    1482.550049   10432.549805

   HINDALCO.NS
0   672.900024
1   685.599976
```

```
2   685.549988
3   685.099976
4   711.849976

[5 rows x 51 columns]
```

[77]:
```
#checking for missing values
missing_values=nifty50_data.isnull().sum()

#check for date column format
date_format_check = pd.to_datetime(nifty50_data['Date'] , errors='coerce').
 ↪notna().all()

#check if the data has sufficient rows for time-series analysis
sufficient_rows = nifty50_data.shape[0]>=20

#preparing a summary of the checks
data_preparation_summary = {"Missing values in column":␣
 ↪missing_values[missing_values>0],
                            "Date column format valid": date_format_check,
                            "Sufficient rows for Time-Series analysis":␣
 ↪sufficient_rows}
data_preparation_summary
```

[77]:
```
{'Missing values in column': HDFC.NS    24
 dtype: int64,
 'Date column format valid': True,
 'Sufficient rows for Time-Series analysis': True}
```

[79]:
```
#drop the HDFC.NS column since it has missing values
nifty50_data=nifty50_data.drop(columns=['HDFC.NS'])

#Convert the 'Date' column to datetime format
nifty50_data['Date']=pd.to_datetime(nifty50_data['Date'])

#sort the dataset by date to ensure proper time-series order
nifty50_data = nifty50_data.sort_values(by='Date')

#reset index for a clean dataframe
nifty50_data.reset_index(drop=True,inplace=True)
print(nifty50_data.head())
```

```
                       Date  RELIANCE.NS  HDFCBANK.NS  ICICIBANK.NS  \
0 2024-08-20 00:00:00+05:30  2991.899902  1637.699951   1179.449951
1 2024-08-21 00:00:00+05:30  2997.350098  1625.800049   1174.849976
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4 2024-08-26 00:00:00+05:30  3025.199951  1639.949951   1213.300049
```

```
       INFY.NS       TCS.NS  KOTAKBANK.NS  HINDUNILVR.NS      ITC.NS  \
0  1872.199951  4523.299805   1805.650024    2751.050049  498.799988
1  1872.699951  4551.500000   1812.949951    2791.199951  505.399994
2  1880.250000  4502.000000   1821.500000    2792.800049  504.549988
3  1862.099976  4463.899902   1818.000000    2815.600098  505.799988
4  1876.150024  4502.450195   1812.500000    2821.149902  505.700012

         LT.NS  …  HEROMOTOCO.NS   DRREDDY.NS   SHREECEM.NS  BRITANNIA.NS  \
0  3572.699951  …    5244.399902  6965.350098  24730.550781   5765.799805
1  3596.050049  …    5284.700195  7062.450195  24808.050781   5837.350098
2  3606.500000  …    5329.950195  6969.049805  25012.400391   5836.799805
3  3598.550049  …    5384.899902  6954.500000  24706.050781   5792.649902
4  3641.899902  …    5343.750000  6943.299805  24906.449219   5796.950195

       UPL.NS  EICHERMOT.NS   SBILIFE.NS  ADANIPORTS.NS  BAJAJ-AUTO.NS  \
0  566.150024   4883.250000  1761.300049    1492.550049    9779.700195
1  568.299988   4913.549805  1800.599976    1503.500000    9852.000000
2  579.150024   4933.549805  1795.250000    1492.300049    9914.200195
3  573.700012   4898.100098  1789.300049    1491.300049   10406.450195
4  577.450012   4875.200195  1796.250000    1482.550049   10432.549805

   HINDALCO.NS
0   672.900024
1   685.599976
2   685.549988
3   685.099976
4   711.849976

[5 rows x 50 columns]
```

Descriptive Statistics

[82]:
```
descriptive_stats = nifty50_data.describe().T  # Transpose for better␣
↪readability
descriptive_stats = descriptive_stats[['mean', 'std', 'min', 'max']]
descriptive_stats.columns = ['Mean', 'Std Dev', 'Min', 'Max']
print(descriptive_stats.head())
```

```
                    Mean    Std Dev          Min          Max
RELIANCE.NS   2976.912506  41.290551  2903.000000  3041.850098
HDFCBANK.NS   1652.339579  28.258220  1625.050049  1741.199951
ICICIBANK.NS  1236.770818  36.438726  1174.849976  1338.449951
INFY.NS       1914.558324  30.240685  1862.099976  1964.500000
TCS.NS        4478.349976  70.822718  4284.899902  4553.750000
```

PORTFOLIO ANALYSIS

[85]:
```
#assign weights to sa subset of stocks
weights = [0.4,0.35,0.25]
portfolio_data = nifty50_data[['RELIANCE.NS','SBIN.NS','TATAMOTORS.NS']]

#calculate daily returns
daily_returns = portfolio_data.pct_change()

#calculate portfolio returns
portfolio_returns = (daily_returns * weights).sum(axis=1)
portfolio_returns
```

[85]:
```
0     0.000000
1    -0.001689
2    -0.001967
3     0.002289
4     0.004908
5    -0.006315
6    -0.003988
7     0.019204
8    -0.004795
9     0.000360
10   -0.002479
11   -0.003155
12   -0.007348
13   -0.027668
14   -0.002403
15   -0.001665
16   -0.023388
17    0.019042
18    0.000946
19   -0.003624
20   -0.004324
21   -0.001309
22    0.001752
23    0.001763
dtype: float64
```

RISK ASSESSEMENT

[88]:
```
#Calculate standard deviation(volatility)
volatility = daily_returns.std()

#Calculate VaR(95% confidence level)
confidence_level = 0.05
VaR = daily_returns.quantile(confidence_level)

#Display risk metrics
```

```
risk_metrics = pd.DataFrame({'Volatility' : volatility,'Value at Risk' : VaR})
risk_metrics
```

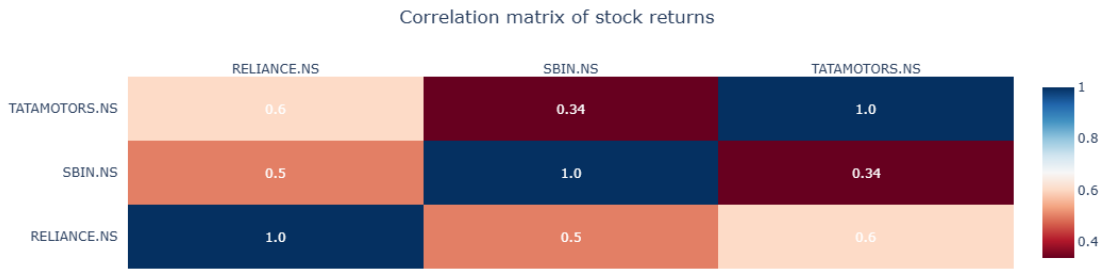
[88]:

	Volatility	Value at Risk
RELIANCE.NS	0.008708	-0.013624
SBIN.NS	0.012729	-0.017201
TATAMOTORS.NS	0.017816	-0.018350

CORRELATION ANALYSIS

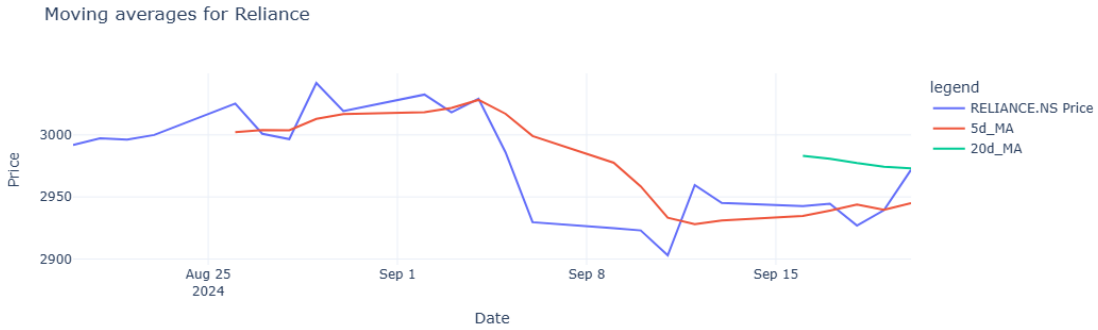
[91]:

```
import plotly.figure_factory as ff

#calculate correlation matix
correlation_matrix = daily_returns.corr()

#calculate correlartion matrix
fig = ff.create_annotated_heatmap(
    z=correlation_matrix.values,
    x=list(correlation_matrix.columns),
    y=list(correlation_matrix.index),
    annotation_text=correlation_matrix.round(2).values,
    colorscale='RdBu',
    showscale=True
)

fig.update_layout(
    title="Correlation matrix of stock returns",
    title_x=0.5,
    font=dict(size=12),
    plot_bgcolor='white',
    paper_bgcolor='white'
)
fig.show()
```



MOVING AVERAGES

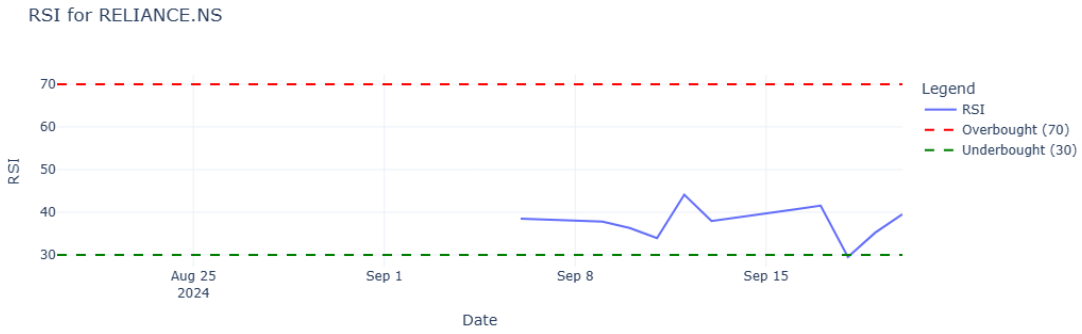
[94]:
```
import plotly.graph_objects as go

#calculating moving averages for reliance
nifty50_data['RELIANCE_5d_MA'] = nifty50_data['RELIANCE.NS'].rolling(window=5).
 ↪mean()
nifty50_data['RELIANCE_20d_MA'] = nifty50_data['RELIANCE.NS'].
 ↪rolling(window=20).mean()

fig = go.Figure()

fig.add_trace(go.Scatter(
    x=nifty50_data['Date'],
    y=nifty50_data['RELIANCE.NS'],
    mode='lines',
    name='RELIANCE.NS Price'
))

fig.add_trace(go.Scatter(
    x=nifty50_data['Date'],
    y=nifty50_data['RELIANCE_5d_MA'],
    mode='lines',
    name='5d_MA'
))

fig.add_trace(go.Scatter(
    x=nifty50_data['Date'],
    y=nifty50_data['RELIANCE_20d_MA'],
    mode='lines',
    name='20d_MA'
))

fig.update_layout(
    title = "Moving averages for Reliance",
    xaxis_title = "Date",
    yaxis_title = "Price",
    template = "plotly_white",
    legend=dict(title="legend")
)

fig.show()
```



RELATIVE STRENGTH INDEX(RSI)

[97]:
```
#RSI Calculation
def calculate_rsi(prices,window=14):
    delta = prices.diff()
    gain = (delta.where(delta>0,0)).rolling(window=window).mean()
    loss = (-delta.where(delta<0,0)).rolling(window=window).mean()
    rs = gain/loss
    rsi = 100 - (100/(1+rs))
    return rsi

#calculate rsi for reliance
nifty50_data['Reliance_RSI'] = calculate_rsi(nifty50_data['RELIANCE.NS'])

fig=go.Figure()

fig.add_trace(go.Scatter(
    x=nifty50_data['Date'],
    y=nifty50_data['Reliance_RSI'],
    mode='lines',
    name='RSI'
))

fig.add_trace(go.Scatter(
    x=nifty50_data['Date'],
    y=[70] * len(nifty50_data['Date']),
    mode='lines',
    line=dict(color='red',dash='dash'),
    name='Overbought (70)'
))

fig.add_trace(go.Scatter(
    x=nifty50_data['Date'],
    y=[30] * len(nifty50_data['Date']),
```

```
    mode='lines',
    line=dict(color='green',dash='dash'),
    name='Underbought (30)'
))

fig.update_layout(
    title='RSI for RELIANCE.NS',
    xaxis_title='Date',
    yaxis_title='RSI',
    template='plotly_white',
    legend=dict(title='Legend')
)

fig.show()
```



SHARPE RATIO

[100]:
```
import numpy as np

#calculate average returns and volatility
mean_returns = daily_returns.mean()
volatility = daily_returns.std()

#assume a risk free rate
risk_free_rate = 0.04/252

#calculate sharp ratio
sharpe_ratio = (mean_returns-risk_free_rate)/volatility

table_data = pd.DataFrame({
    'Stock' : sharpe_ratio.index,
    'Sharpe_ratio' : sharpe_ratio.values.round(2)
})
```

```
fig = go.Figure(data=[go.Table(
    header=dict(values=['Stock', 'Sharpe Ratio'],
                fill_color='paleturquoise',
                align='left'),
    cells=dict(values=[table_data['Stock'], table_data['Sharpe_ratio']],
               fill_color='lavender',
               align='left')
)])

fig.update_layout(
    title='Sharpe_ratio for selected stocks',
    template='plotly_white'
)

fig.show()
```

Sharpe_ratio for selected stocks

Stock	Sharpe Ratio
RELIANCE.NS	-0.05
SBIN.NS	-0.17
TATAMOTORS.NS	-0.28

MONTE CARLO

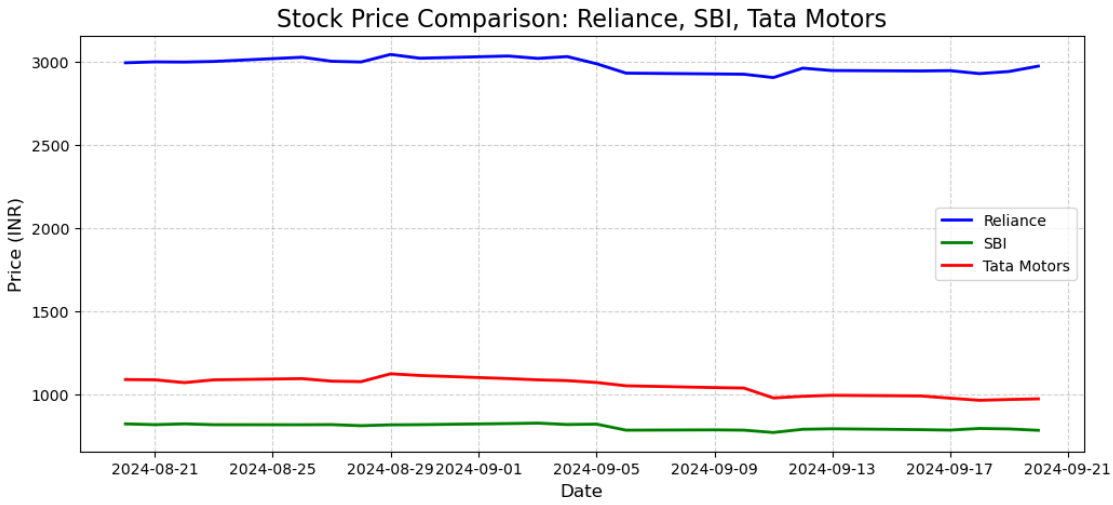
[103]:
```
num_simulations = 1000
num_days = 150
last_price = nifty50_data['RELIANCE.NS'].iloc[-1]
simulated_prices = np.zeros((num_simulations,num_days))
volatility = nifty50_data['RELIANCE.NS'].pct_change().std()

for i in range(num_simulations):
    simulated_prices[i,0] = last_price
    for j in range(1,num_days):
        simulated_prices[i,j]=simulated_prices[i,j-1]*np.exp(
            np.random.normal(0,volatility)
        )

fig=go.Figure()

for i in range(num_simulations):
```

```
    fig.add_trace(go.Scatter(
        x=list(range(num_days)),
        y=simulated_prices[i],
        mode='lines',
        line=dict(width=0.5),
        opacity=0.1,
        showlegend=False
    ))

fig.update_layout(
    title='Monte Carlo Simulation',
    xaxis_title='Days',
    yaxis_title='Simulated_Prices',
    template='plotly_white'
)

fig.show()
```

PRICE CHART

[105]:
```
import matplotlib.pyplot as plt

# Convert 'Date' to datetime for proper plotting
nifty50_data['Date'] = pd.to_datetime(nifty50_data['Date'])

# Filter the relevant columns
selected_data = nifty50_data[['Date', 'RELIANCE.NS', 'SBIN.NS', 'TATAMOTORS.
 ↪NS']]

# Plot the data
plt.figure(figsize=(12, 5))

plt.plot(selected_data['Date'], selected_data['RELIANCE.NS'], label='Reliance',␣
 ↪color='blue', linewidth=2)
plt.plot(selected_data['Date'], selected_data['SBIN.NS'], label='SBI',␣
 ↪color='green', linewidth=2)
plt.plot(selected_data['Date'], selected_data['TATAMOTORS.NS'], label='Tata␣
 ↪Motors', color='red', linewidth=2)

# Add chart details
plt.title("Stock Price Comparison: Reliance, SBI, Tata Motors", fontsize=16)
plt.xlabel("Date", fontsize=12)
plt.ylabel("Price (INR)", fontsize=12)
plt.legend()
plt.grid(True, linestyle="--", alpha=0.6)

# Display the chart
```

```
plt.show()
```



[106]:
```
import pandas as pd

# Rename the first column to 'Date' and convert it to a proper datetime format
nifty50_data.rename(columns={nifty50_data.columns[0]: "Date"}, inplace=True)
nifty50_data["Date"] = pd.to_datetime(nifty50_data["Date"])

# Filter only the column for Reliance (e.g., 'RELIANCE')
# Replace 'RELIANCE' with the exact ticker for Reliance in your dataset
reliance_data = nifty50_data[["Date", "RELIANCE.NS"]].dropna()

# Sort by Date (if not already sorted)
reliance_data = reliance_data.sort_values(by="Date")

# Calculate ROI
# Use the first and last closing prices
initial_price = reliance_data["RELIANCE.NS"].iloc[0]
final_price = reliance_data["RELIANCE.NS"].iloc[-1]
roi = ((final_price - initial_price) / initial_price) * 100

# Print the results
print(f"Initial Price of Reliance: {initial_price}")
print(f"Final Price of Reliance: {final_price}")
print(f"ROI for Reliance over the period: {roi:.2f}%")
```

```
Initial Price of Reliance: 2991.89990234375
Final Price of Reliance: 2971.85009765625
ROI for Reliance over the period: -0.67%
```

[ ]: