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Project Title: Stock Market Trends with Time Series Analysis

Date: 22 JANUARY 2023

The purpose of doing this project

The purpose of creating this is to gain a better understanding of price fluctuations. By utilizing deep learning to forecast future price trends, it allows me to optimize my investment allocation. The goal is to enhance returns through a combination of personal analysis and predictions from this model, thereby reducing risks associated with investments.

Framework: Jupyter Notebooks and Streamlit

Import Library

```
1 %matplotlib inline
2 import yfinance as yf
3 import seaborn as sns
4 import numpy as np
5 import pandas as pd
6 import matplotlib.pyplot as plt
7 import mplfinance as mpf
8 from datetime import datetime, timedelta
9
10 import warnings
11 warnings.filterwarnings('ignore')
12 np.random.seed(42)
13
14 from sklearn.preprocessing import MinMaxScaler
15 from sklearn.model_selection import train_test_split
16 from sklearn.preprocessing import StandardScaler, MinMaxScaler
17 from sklearn.ensemble import RandomForestClassifier, GradientBoostingClassifier
18 from sklearn.linear_model import LogisticRegression
19 from sklearn.svm import SVC
20 from sklearn.metrics import accuracy_score
21 from sklearn.metrics import mean_absolute_percentage_error
22 from tensorflow.keras.models import load_model
23 from keras.models import Sequential, Model
24 from keras.layers import LSTM, Dense, Dropout, Input
25 from keras.optimizers import Nadam
```

Gold Futures Data Analysis

Gold Price History Data

	Date	Open	High	Low	Close	Adj Close	Volume
0	2004-01-05 00:00:00	415.7	422.5	422.5	424.4	424.4	20
1	2004-01-06 00:00:00	424.4	424.3	424.3	422.8	422.8	20
2	2004-01-07 00:00:00	423	423	423	421.9	421.9	20
3	2004-01-08 00:00:00	421.9	422	422	424	424	20
4	2004-01-09 00:00:00	424	423.9	423.9	426.4	426.4	20
5	2004-01-12 00:00:00	425.8	428.2	425.8	426.3	426.3	3
6	2004-01-13 00:00:00	425.4	425.9	423	423.7	423.7	12
7	2004-01-14 00:00:00	421.7	421.7	421.7	421.7	421.7	12
8	2004-01-15 00:00:00	421.8	422	422	408.4	408.4	12
9	2004-01-16 00:00:00	408.3	408.3	408.3	406.7	406.7	12

Data Types of Columns

	0
Date	datetime64[ns]
Open	float64
High	float64
Low	float64
Close	float64
Adj Close	float64
Volume	int64

Missing Values

	0
Date	0
Open	0
High	0
Low	0
Close	0
Adj Close	0
Volume	0

Summary Statistics

Handling Missing Values

Before handling missing values:
(5038, 7)

	Date	Open	High	Low	After handling missing values: (5038, 7)
count	5038	5,038	5,038	5,038	
mean	2014-01-14 13:22:01.953156096	1,242.5373	1,248.7903	1,235.90	
min	2004-01-05 00:00:00	375.8	375.8	37	
25%	2009-01-13 06:00:00	921.3	926.6	915.2	
50%	2014-01-14 12:00:00	1,269.8	1,274.65	1,264	
75%	2019-01-21 00:00:00	1,629.175	1,641.125	1,619.6	
max	2024-01-19 00:00:00	2,081.6001	2,130.2	2,06	
std	None	454.466	456.8983	451.9	

Summary Statistics:

	Date	Open	High	Low	Close	Adj Close	Volume
count	5038	5,038	5,038	5,038	5,038	5,038	5,038
mean	2014-01-14 13:22:01.953156096	1,242.5373	1,248.7903	1,235.9036	1,242.3982	1,242.3982	4,802.14
min	2004-01-05 00:00:00	375.8	375.8	375.8	374.8	374.8	
25%	2009-01-13 06:00:00	921.3	926.6	915.225	922.225	922.225	30
50%	2014-01-14 12:00:00	1,269.8	1,274.65	1,264.75	1,270.4	1,270.4	.
75%	2019-01-21 00:00:00	1,629.175	1,641.125	1,619.675	1,628.1	1,628.1	437
max	2024-01-19 00:00:00	2,081.6001	2,130.2	2,066.5	2,081.8999	2,081.8999	386,
std	None	454.466	456.8983	451.944	454.4234	454.4234	26,130.20

Mean Difference: 0.00 USD

Standard Deviation of Difference: 0.00 USD

Adjusted Close Price vs. Closed Market Price



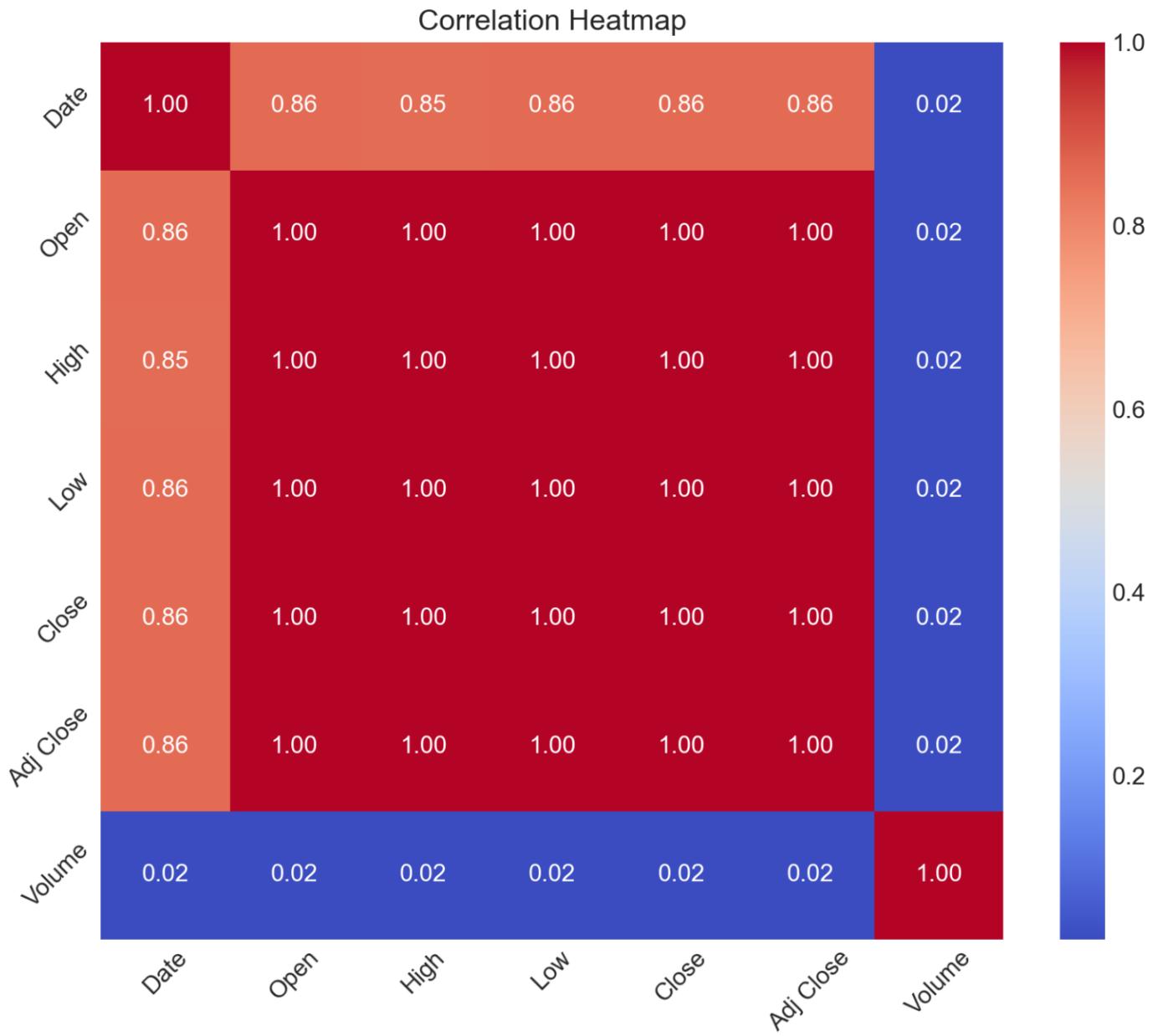
Standard Deviation of DataFrame and Standard Scaling

	0
Date	2112 days 23:12:11.356896672
Open	454.46598508781443
High	456.89831063874794
Low	451.94402033466736
Close	454.42341984262293
Adj Close	454.42341984262293
Volume	26130.262788567456

1.0

Correlation Matrix

	Date	Open	High	Low	Close	Adj Close	Volume
Date	1	0.8552	0.8543	0.8569	0.8555	0.8555	0.0217
Open	0.8552	1	0.9998	0.9998	0.9997	0.9997	0.0237
High	0.8543	0.9998	1	0.9997	0.9998	0.9998	0.0224
Low	0.8569	0.9998	0.9997	1	0.9998	0.9998	0.0247
Close	0.8555	0.9997	0.9998	0.9998	1	1	0.0234
Adj Close	0.8555	0.9997	0.9998	0.9998	1	1	0.0234
Volume	0.0217	0.0237	0.0224	0.0247	0.0234	0.0234	1



Gold Price Open Market vs. Closed Market

Gold Price Open Market vs. Closed Market



Gold Price Open Market vs. Closed Market - Year 2023

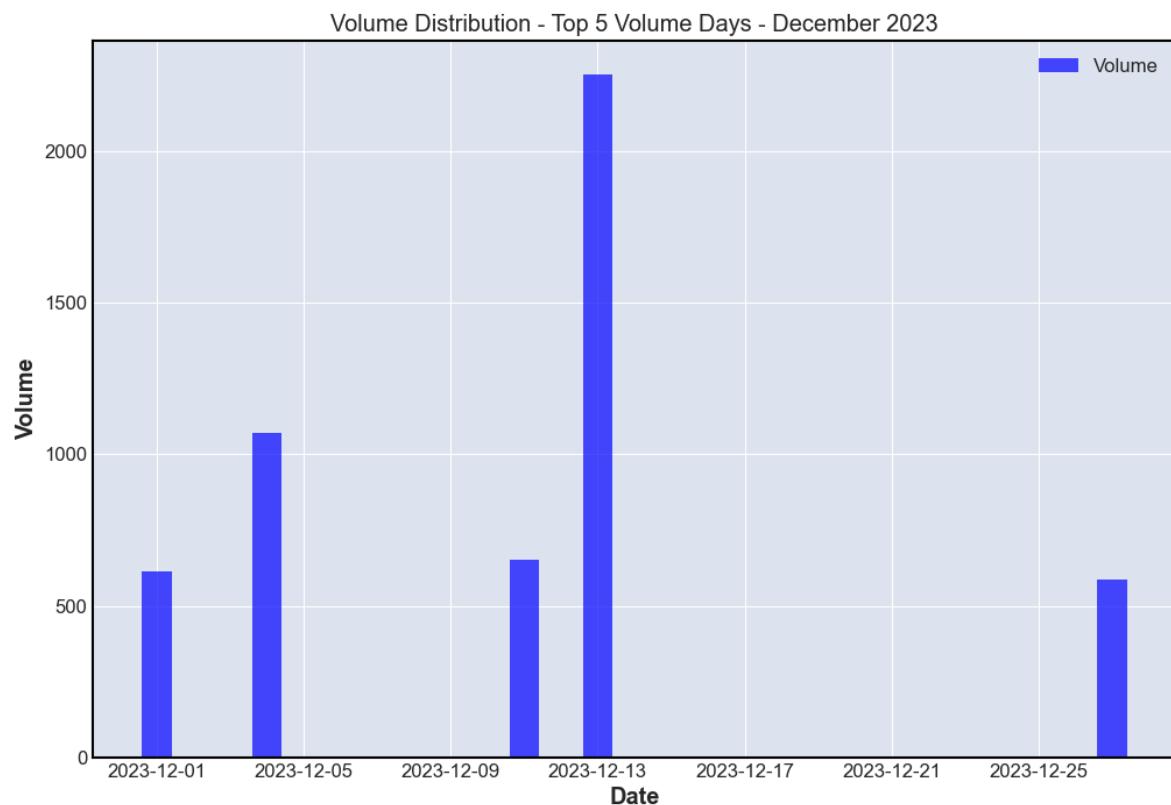


Candlestick Chart 2023

Candle Chart 2023



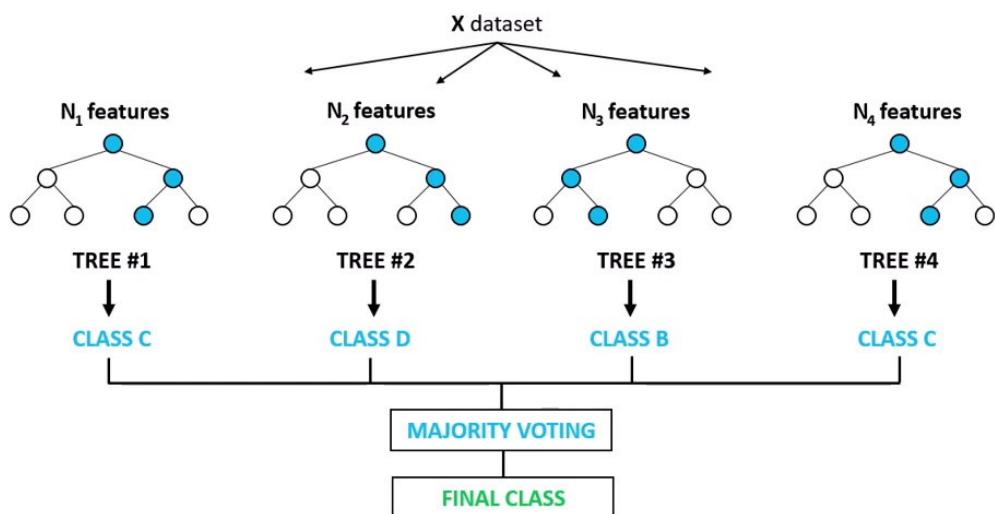
Volume Distribution - Top 5 Volume Days - December 2023



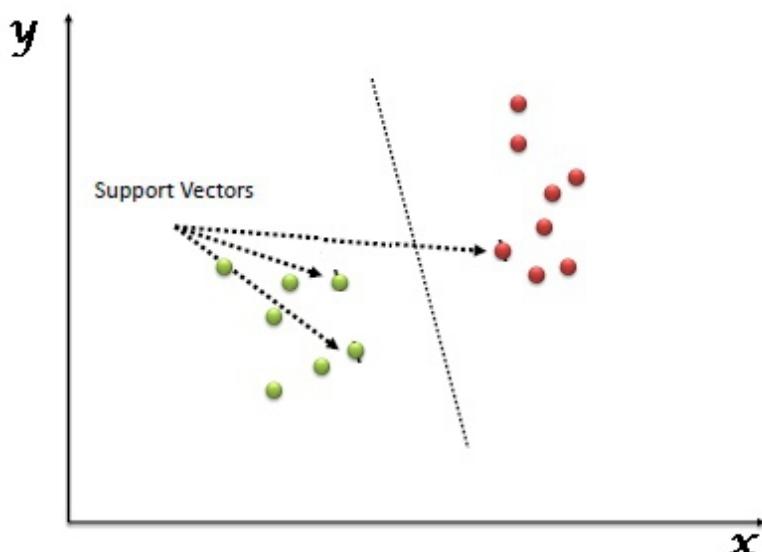
Machine Learning

RandomForestClassifier

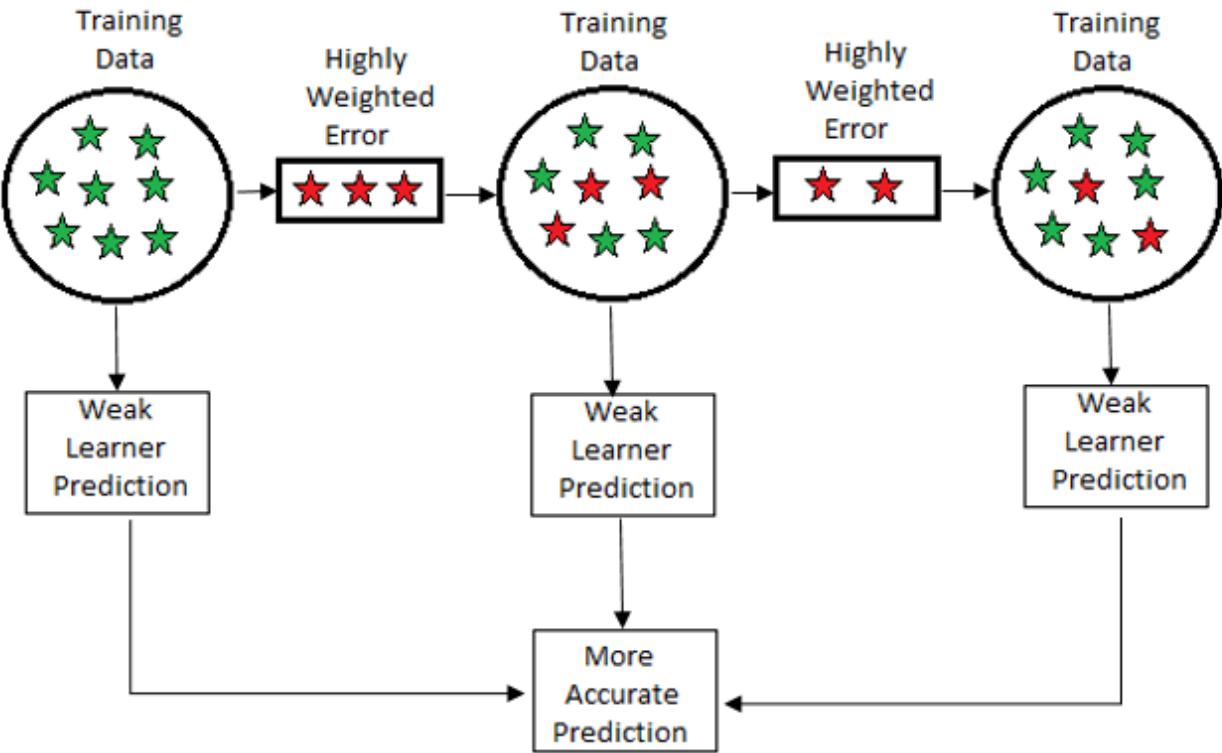
Random Forest Classifier



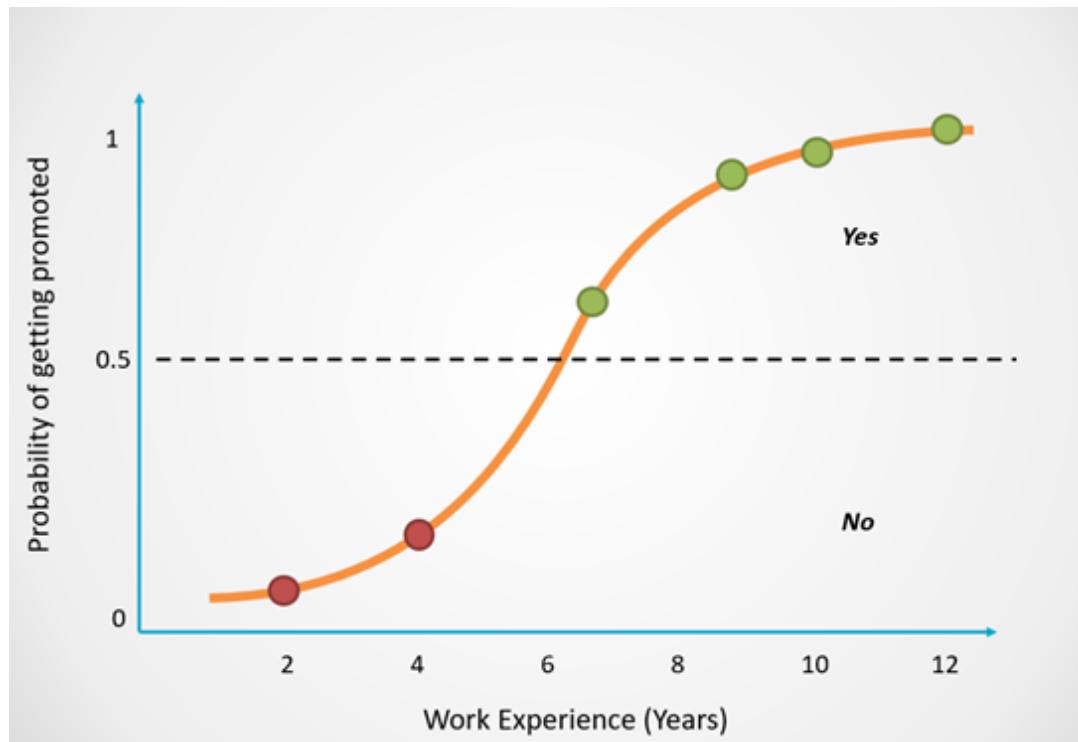
Support Vector Machine (SVM)



GradientBoostingClassifier

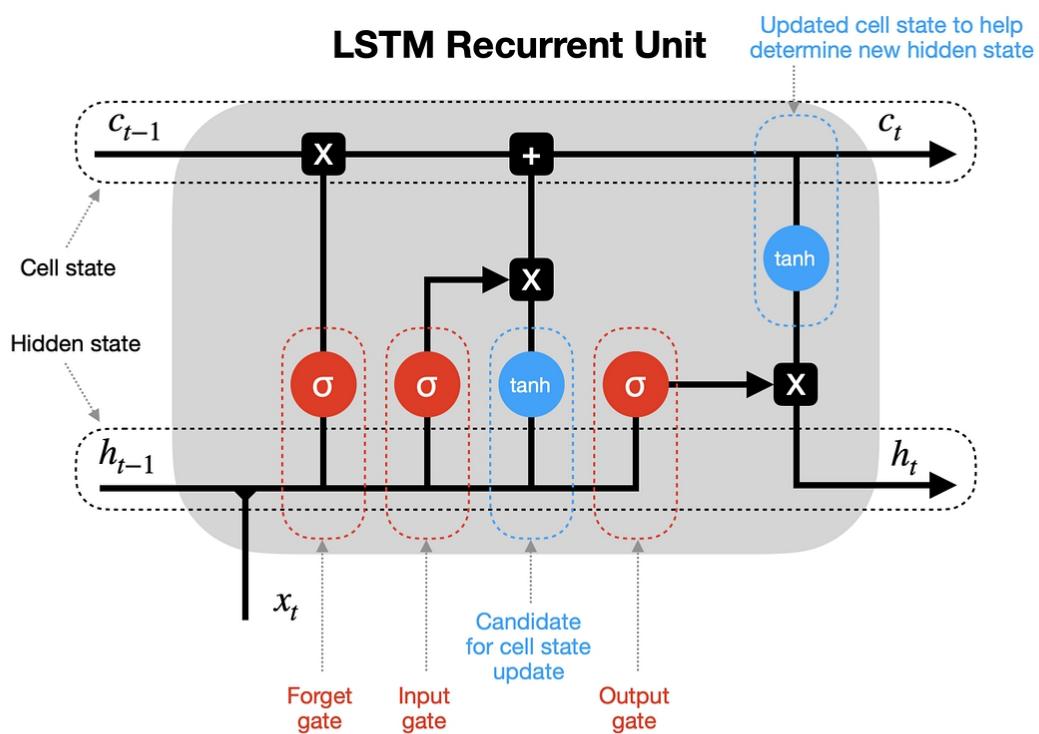


Logistic Regression



Long Short-Term Memory (LSTM)

LONG SHORT-TERM MEMORY NEURAL NETWORKS



All Model Accuracy

Random Forest Accuracy: 69.35%
SVM Accuracy: 52.08%
Gradient Boosting Accuracy: 64.78%
Logistic Regression Accuracy: 78.57%
LSTM model Accuracy: 98.34%

Enter the date to visualize:

2024/01/01

Model loaded successfully.

The price is expected to go Down by 0.48%



The price is expected to go Down by 0.48%

