

Stock Price Prediction Using Machine Learning

Namratha Reddy Kaluvayee
SGVS Thribhuvan Kambhamettu

Importing Libraries in Jupyter Notebook

The screenshot shows a Jupyter Notebook interface with a dark theme. The top bar displays the title "Untitled4.ipynb (auto-q) - Jupyter" and the URL "localhost:8888/lab/workspaces/auto-q/tree/Untitled4.ipynb?". The left sidebar shows a file tree with several folders and files, with one file named "Untitled4.ipynb" selected. The main notebook area contains the following code:

```
[3]: !pip install yfinance

# After installation, you can import the packages
import numpy as np
import pandas as pd
import yfinance as yf
import matplotlib.pyplot as plt
from sklearn.preprocessing import MinMaxScaler

# Verify installation
print(f"yfinance version: {yf.__version__}")

Collecting yfinance
  Downloading yfinance-0.2.55-py2.py3-none-any.whl.metadata (5.8 kB)
Requirement already satisfied: pandas>=1.3.0 in /opt/anaconda3/lib/python3.12/site-packages (from yfinance) (2.2.2)
Requirement already satisfied: numpy>=1.16.5 in /opt/anaconda3/lib/python3.12/site-packages (from yfinance) (1.26.4)
Requirement already satisfied: requests>=2.31 in /opt/anaconda3/lib/python3.12/site-packages (from yfinance) (2.32.3)
Collecting multitasking>=0.0.7 (from yfinance)
  Downloading multitasking-0.0.11-py3-none-any.whl.metadata (5.5 kB)
Requirement already satisfied: platformdirs>=2.0.0 in /opt/anaconda3/lib/python3.12/site-packages (from yfinance) (3.10.0)
Requirement already satisfied: pytz>=2022.5 in /opt/anaconda3/lib/python3.12/site-packages (from yfinance) (2024.1)
Requirement already satisfied: frozendict>=2.3.4 in /opt/anaconda3/lib/python3.12/site-packages (from yfinance) (2.4.2)
Collecting peewee>=3.16.2 (from yfinance)
  Downloading peewee-3.17.9.tar.gz (3.0 MB)
    3.0/3.0 MB 13.5 MB/s eta 0:00:00a 0:00:01
Installing build dependencies ... done
Getting requirements to build wheel ... done
Preparing metadata (pyproject.toml) ... done
Requirement already satisfied: beautifulsoup4>=4.11.1 in /opt/anaconda3/lib/python3.12/site-packages (from yfinance) (4.12.3)
Requirement already satisfied: soupsieve>1.2 in /opt/anaconda3/lib/python3.12/site-packages (from beautifulsoup4>=4.11.1->yfinance) (2.5)
Requirement already satisfied: python-dateutil>=2.8.2 in /opt/anaconda3/lib/python3.12/site-packages (from pandas>=1.3.0->yfinance) (2.9.0.post0)
Requirement already satisfied: tzdata>=2022.7 in /opt/anaconda3/lib/python3.12/site-packages (from pandas>=1.3.0->yfinance) (2023.3)
Requirement already satisfied: charset-normalizer<4,>=2 in /opt/anaconda3/lib/python3.12/site-packages (from requests>=2.31->yfinance) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /opt/anaconda3/lib/python3.12/site-packages (from requests>=2.31->yfinance) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in /opt/anaconda3/lib/python3.12/site-packages (from requests>=2.31->yfinance) (2.2.3)
```

The notebook is running in a "Python [conda env:base]" kernel and is in "Idle" mode.

Here, we installed yfinance to check yahoo finance APIs

Downloading Historical Stock Price Eg: Apple Inc.

The screenshot shows a Jupyter Notebook interface with a sidebar on the left displaying a file tree and a main notebook area on the right.

File Tree:

- /
- a. 2mo ago
- D 3s ago
- D 5d ago
- D 6m ago
- M 24d ago
- M 6mo ago
- P last mo.
- P 6mo ago
- U 2mo ago 72 B
- U 12d ago 77 KB
- U yesterday 393.3 KB
- U yesterday 18.1 KB
- ✓ U 28m ago 196.8 KB
- 1. 2mo ago 0 B
- d 2mo ago 20.1 KB
- i.. 9d ago 2.1 KB
- i.. 2mo ago 13.9 KB
- i.. last mo. 20.3 KB

Notebook Content:

```
Requirement already satisfied: idna<4,>=2.5 in /opt/anaconda3/lib/python3.12/site-packages (from requests>=2.31->yfinance) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in /opt/anaconda3/lib/python3.12/site-packages (from requests>=2.31->yfinance) (2.2.3)
Requirement already satisfied: certifi>=2017.4.17 in /opt/anaconda3/lib/python3.12/site-packages (from requests>=2.31->yfinance) (2024.12.14)
Requirement already satisfied: six>=1.5 in /opt/anaconda3/lib/python3.12/site-packages (from python-dateutil>=2.8.2->pandas>=1.3.0->yfinance) (1.16.0)
Downloading yfinance-0.2.55-py2.py3-none-any.whl (109 kB)
Downloading multitasking-0.0.11-py3-none-any.whl (8.5 kB)
Building wheels for collected packages: peewee
  Building wheel for peewee (pyproject.toml) ... done
  Created wheel for peewee: filename=peewee-3.17.9-cp312-cp312-macosx_11_0_arm64.whl size=264338 sha256=7eb30334d24699ea838b7811d0b9b862118fd1f9fbda64c4aa736300cc25ac1b
  Stored in directory: /Users/sriganeshk/Library/Caches/pip/wheels/43/ef/2d/2c51d496bf084945ffd838b4cc8767b8ba1cc20eb41588831
Successfully built peewee
Installing collected packages: peewee, multitasking, yfinance
Successfully installed multitasking-0.0.11 peewee-3.17.9 yfinance-0.2.55
yfinance version: 0.2.55

[5]: # Download historical stock prices (e.g., Apple Inc.)
df = yf.download('AAPL', start='2015-01-01', end='2023-12-31')

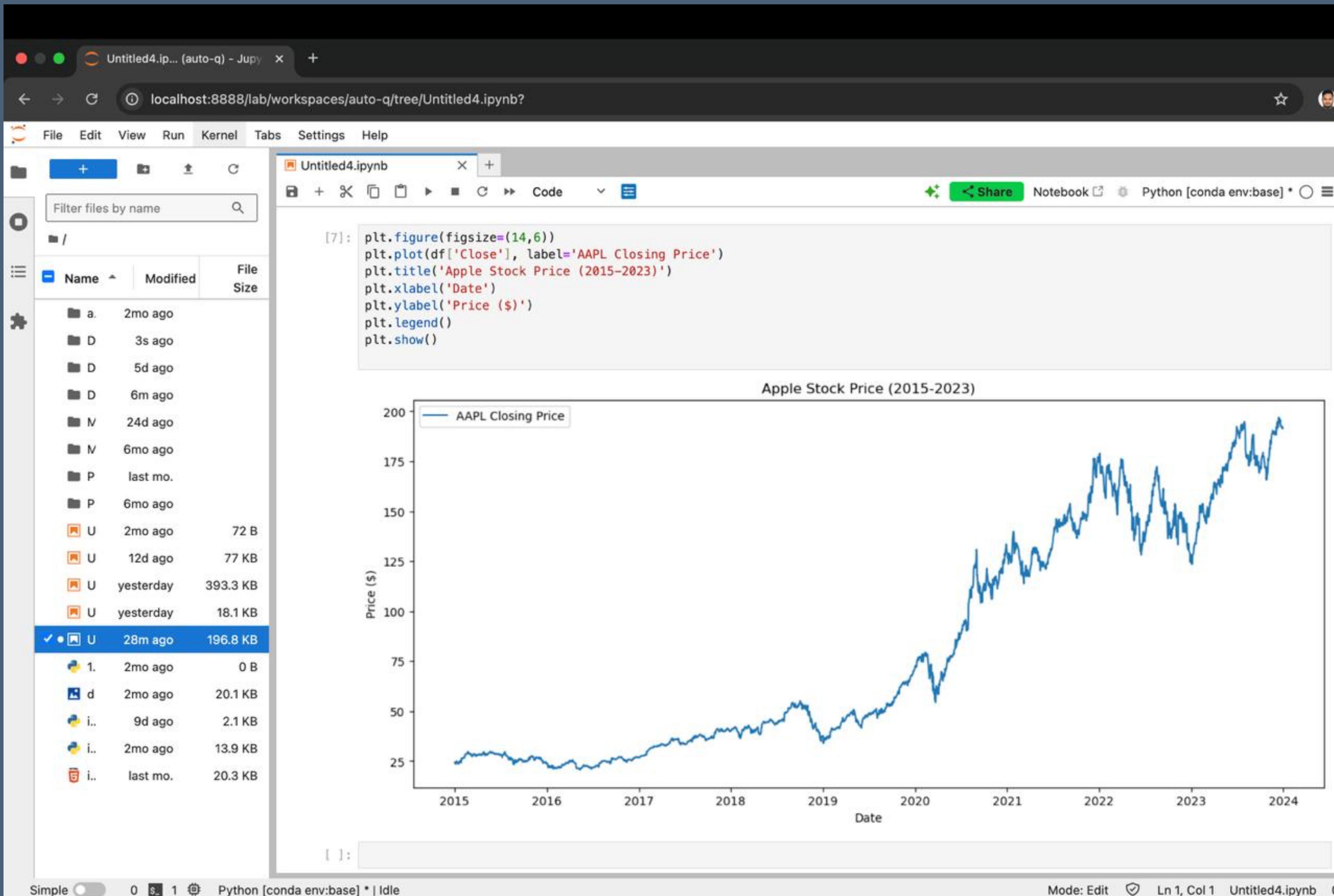
# Display first few rows
df.head()

YF.download() has changed argument auto_adjust default to True
[*****100*****] 1 of 1 completed
```

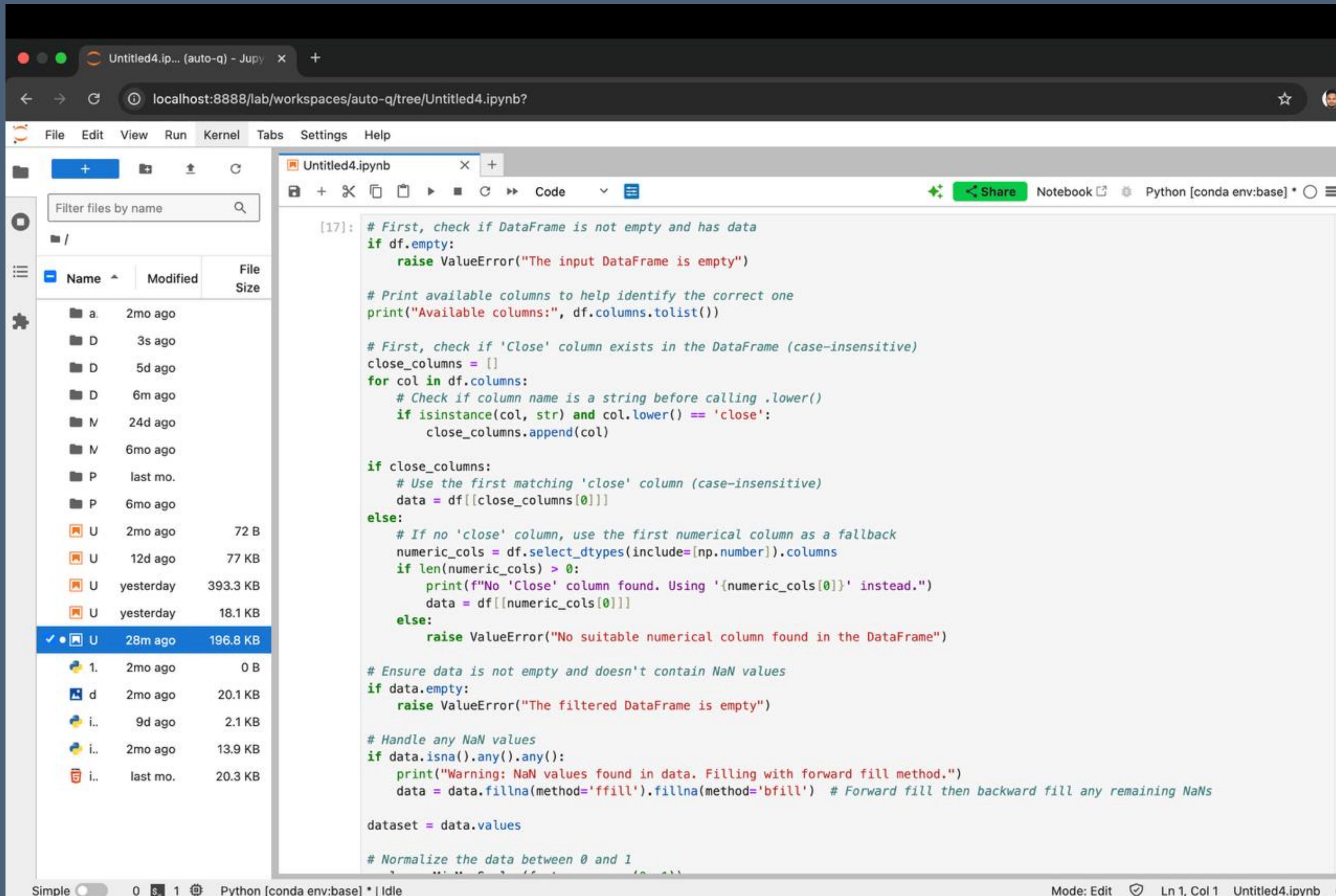
Data Output:

Date	Price	Close	High	Low	Open	Volume
Ticker	AAPL	AAPL	AAPL	AAPL	AAPL	
2015-01-02	24.320431	24.789800	23.879980	24.778677	212818400	
2015-01-05	23.635284	24.169164	23.448427	24.089082	257142000	
2015-01-06	23.637514	23.897780	23.274920	23.699800	263188400	
2015-01-07	23.968960	24.069062	23.735387	23.846612	160423600	
2015-01-08	24.889900	24.947738	24.180285	24.298185	237458000	

Visulisation



Checking The Dataframe



The screenshot shows a Jupyter Notebook interface with a sidebar on the left and a main code editor on the right.

Left Sidebar: Shows a file tree with the following contents:

- /
- a. 2mo ago
- D 3s ago
- D 5d ago
- D 6m ago
- N 24d ago
- N 6mo ago
- P last mo.
- P 6mo ago
- U 2mo ago 72 B
- U 12d ago 77 KB
- U yesterday 393.3 KB
- U yesterday 18.1 KB
- ✓ • □ U 28m ago 196.8 KB
 - 1. 2mo ago 0 B
 - d 2mo ago 20.1 KB
 - i.. 9d ago 2.1 KB
 - i.. 2mo ago 13.9 KB
 - i.. last mo. 20.3 KB

Right Main Area: Displays a Python code cell (cell 17) with the following content:

```
[17]: # First, check if DataFrame is not empty and has data
if df.empty:
    raise ValueError("The input DataFrame is empty")

# Print available columns to help identify the correct one
print("Available columns:", df.columns.tolist())

# First, check if 'Close' column exists in the DataFrame (case-insensitive)
close_columns = []
for col in df.columns:
    # Check if column name is a string before calling .lower()
    if isinstance(col, str) and col.lower() == 'close':
        close_columns.append(col)

if close_columns:
    # Use the first matching 'close' column (case-insensitive)
    data = df[[close_columns[0]]]
else:
    # If no 'close' column, use the first numerical column as a fallback
    numeric_cols = df.select_dtypes(include=[np.number]).columns
    if len(numeric_cols) > 0:
        print(f"No 'Close' column found. Using '{numeric_cols[0]}' instead.")
        data = df[[numeric_cols[0]]]
    else:
        raise ValueError("No suitable numerical column found in the DataFrame")

# Ensure data is not empty and doesn't contain NaN values
if data.empty:
    raise ValueError("The filtered DataFrame is empty")

# Handle any NaN values
if data.isna().any().any():
    print("Warning: NaN values found in data. Filling with forward fill method.")
    data = data.fillna(method='ffill').fillna(method='bfill') # Forward fill then backward fill any remaining NaNs

dataset = data.values

# Normalize the data between 0 and 1
```

The screenshot shows a Jupyter Notebook interface with a dark theme. The top bar displays the title "Untitled4.ipynb (auto-q) - Jupyter" and the URL "localhost:8888/lab/workspaces/auto-q/tree/Untitled4.ipynb?". The left sidebar contains a file tree with several files listed by name, modified time, and file size. The main area has two code cells.

Code Cell 1:

```
scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(dataset)

# Training data
training_data_len = int(np.ceil(len(scaled_data) * 0.8))

train_data = scaled_data[0:training_data_len, :]

# Make sure we have enough data points for the sequence length
sequence_length = 60
if len(train_data) <= sequence_length:
    raise ValueError(f"Not enough data points. Need more than {sequence_length} points.")

X_train = []
y_train = []

for i in range(sequence_length, len(train_data)):
    X_train.append(train_data[i-sequence_length:i, 0])
    y_train.append(train_data[i, 0])

# Convert to arrays
X_train, y_train = np.array(X_train), np.array(y_train)

# Reshape for LSTM input
X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], 1))

Available columns: [('Close', 'AAPL'), ('High', 'AAPL'), ('Low', 'AAPL'), ('Open', 'AAPL'), ('Volume', 'AAPL')]
No 'Close' column found. Using 'Close', 'AAPL' instead.
```

Code Cell 2:

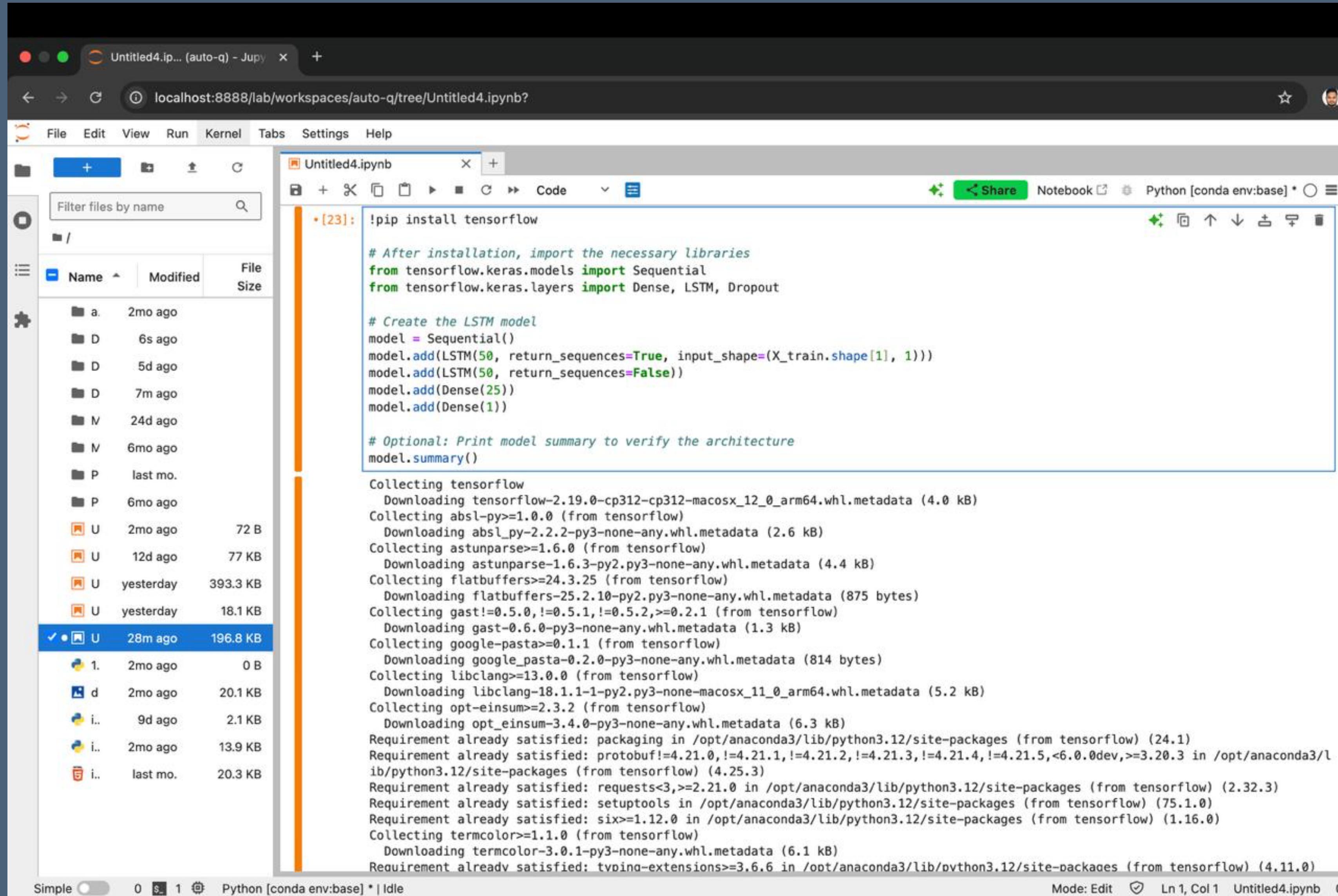
```
*[23]: !pip install tensorflow

# After installation, import the necessary libraries
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, LSTM, Dropout

# Create the LSTM model
model = Sequential()
model.add(LSTM(50, return_sequences=True, input_shape=(X_train.shape[1], 1)))
model.add(LSTM(50, return_sequences=False))
model.add(Dense(25))
```

At the bottom, there are buttons for "Simple", "Python [conda env:base] * | Idle", "Mode: Edit", "Ln 1, Col 1", and "Untitled4.ipynb 0".

Installing Tensorflow



The screenshot shows a Jupyter Notebook interface with a sidebar containing a file tree and a main code editor area.

File Tree:

- /
- a. 2mo ago
- D 6s ago
- D 5d ago
- D 7m ago
- N 24d ago
- N 6mo ago
- P last mo.
- P 6mo ago
- U 2mo ago 72 B
- U 12d ago 77 KB
- U yesterday 393.3 KB
- U yesterday 18.1 KB
- ✓ ● ■ U 28m ago 196.8 KB
 - 1. 2mo ago 0 B
 - d 2mo ago 20.1 KB
 - i.. 9d ago 2.1 KB
 - i.. 2mo ago 13.9 KB
 - i.. last mo. 20.3 KB

Code Editor:

```
*[23]: !pip install tensorflow

# After installation, import the necessary libraries
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, LSTM, Dropout

# Create the LSTM model
model = Sequential()
model.add(LSTM(50, return_sequences=True, input_shape=(X_train.shape[1], 1)))
model.add(LSTM(50, return_sequences=False))
model.add(Dense(25))
model.add(Dense(1))

# Optional: Print model summary to verify the architecture
model.summary()

Collecting tensorflow
  Downloading tensorflow-2.19.0-cp312-cp312-macosx_12_0_arm64.whl.metadata (4.0 kB)
Collecting absl-py>=1.0.0 (from tensorflow)
  Downloading absl_py-2.2.2-py3-none-any.whl.metadata (2.6 kB)
Collecting astunparse>=1.6.0 (from tensorflow)
  Downloading astunparse-1.6.3-py2.py3-none-any.whl.metadata (4.4 kB)
Collecting flatbuffers>=24.3.25 (from tensorflow)
  Downloading flatbuffers-25.2.10-py2.py3-none-any.whl.metadata (875 bytes)
Collecting gast!=0.5.0,!=0.5.1,!=0.5.2,>=0.2.1 (from tensorflow)
  Downloading gast-0.6.0-py3-none-any.whl.metadata (1.3 kB)
Collecting google-pasta>=0.1.1 (from tensorflow)
  Downloading google_pasta-0.2.0-py3-none-any.whl.metadata (814 bytes)
Collecting libclang>=13.0.0 (from tensorflow)
  Downloading libclang-18.1.1-1-py2.py3-none-macosx_11_0_arm64.whl.metadata (5.2 kB)
Collecting opt-einsum>=2.3.2 (from tensorflow)
  Downloading opt_einsum-3.4.0-py3-none-any.whl.metadata (6.3 kB)
Requirement already satisfied: packaging in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (24.1)
Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<6.0.0dev,>=3.20.3 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (4.25.3)
Requirement already satisfied: requests<3,>=2.21.0 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (2.32.3)
Requirement already satisfied: setuptools in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (75.1.0)
Requirement already satisfied: six>=1.12.0 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (1.16.0)
Collecting termcolor>=1.1.0 (from tensorflow)
  Downloading termcolor-3.0.1-py3-none-any.whl.metadata (6.1 kB)
Requirement already satisfied: tensorflow-extensions>=3.6.6 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (4.11.0)
```

Simple 0 \$ 1 ⚡ Python [conda env:base] * | Idle Mode: Edit ✓ Ln 1, Col 1 Untitled4.ipynb 0

Untitled4.ipynb (auto-q) - Jupyter

localhost:8888/lab/workspaces/auto-q/tree/Untitled4.ipynb?

File Edit View Run Kernel Tabs Settings Help

Untitled4.ipynb

Code Share Notebook Python [conda env:base]

Filter files by name

Name Modified File Size

a.	2mo ago	
D	8s ago	
D	5d ago	
D	7m ago	
M	24d ago	
M	6mo ago	
P	last mo.	
P	6mo ago	
U	2mo ago	72 B
U	12d ago	77 KB
U	yesterday	393.3 KB
U	yesterday	18.1 KB
✓ U	28m ago	196.8 KB
i.	2mo ago	0 B
d	2mo ago	20.1 KB
i..	9d ago	2.1 KB
i..	2mo ago	13.9 KB
i..	last mo.	20.3 KB

Downloading grpcio-1.71.0-cp312-cp312-macosx_10_14_universal2.whl.metadata (3.8 kB)

Collecting tensorboard~=2.19.0 (from tensorflow)

 Downloading tensorboard-2.19.0-py3-none-any.whl.metadata (1.8 kB)

Collecting keras>=3.5.0 (from tensorflow)

 Downloading keras-3.9.2-py3-none-any.whl.metadata (6.1 kB)

Requirement already satisfied: numpy<2.2.0,>=1.26.0 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (1.26.4)

Requirement already satisfied: h5py>=3.11.0 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow) (3.11.0)

Collecting ml-dtypes<1.0.0,>=0.5.1 (from tensorflow)

 Downloading ml_dtypes-0.5.1-cp312-cp312-macosx_10_9_universal2.whl.metadata (21 kB)

Requirement already satisfied: wheel<1.0,>=0.23.0 in /opt/anaconda3/lib/python3.12/site-packages (from astunparse>=1.6.0->tensorflow) (0.44.0)

Requirement already satisfied: rich in /opt/anaconda3/lib/python3.12/site-packages (from keras>=3.5.0->tensorflow) (13.7.1)

Collecting namex (from keras>=3.5.0->tensorflow)

 Downloading namex-0.0.8-py3-none-any.whl.metadata (246 bytes)

Collecting optree (from keras>=3.5.0->tensorflow)

 Downloading optree-0.15.0-cp312-cp312-macosx_11_0_arm64.whl.metadata (48 kB)

Requirement already satisfied: charset-normalizer<4,>=2 in /opt/anaconda3/lib/python3.12/site-packages (from requests<3,>=2.21.0->tensorflow) (3.3.2)

Requirement already satisfied: idna<4,>=2.5 in /opt/anaconda3/lib/python3.12/site-packages (from requests<3,>=2.21.0->tensorflow) (3.7)

Requirement already satisfied: urllib3<3,>=1.21.1 in /opt/anaconda3/lib/python3.12/site-packages (from requests<3,>=2.21.0->tensorflow) (2.2.3)

Requirement already satisfied: certifi>=2017.4.17 in /opt/anaconda3/lib/python3.12/site-packages (from requests<3,>=2.21.0->tensorflow) (2024.12.14)

Requirement already satisfied: markdown>=2.6.8 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow~>2.19.0->tensorflow) (3.4.1)

Collecting tensorboard-data-server<0.8.0,>=0.7.0 (from tensorflow~>2.19.0->tensorflow)

 Downloading tensorboard_data_server-0.7.2-py3-none-any.whl.metadata (1.1 kB)

Requirement already satisfied: werkzeug>=1.0.1 in /opt/anaconda3/lib/python3.12/site-packages (from tensorflow~>2.19.0->tensorflow) (3.0.3)

Requirement already satisfied: MarkupSafe>=2.1.1 in /opt/anaconda3/lib/python3.12/site-packages (from werkzeug>=1.0.1->tensorboard~>2.19.0->tensorflow) (2.1.3)

Requirement already satisfied: markdown-it-py>=2.2.0 in /opt/anaconda3/lib/python3.12/site-packages (from rich->keras>=3.5.0->tensorflow) (2.2.0)

Requirement already satisfied: pygments<3.0.0,>=2.13.0 in /opt/anaconda3/lib/python3.12/site-packages (from rich->keras>=3.5.0->tensorflow) (2.15.1)

Requirement already satisfied: mdurl~>0.1 in /opt/anaconda3/lib/python3.12/site-packages (from markdown-it-py>=2.2.0->rich->keras>=3.5.0->tensorflow) (0.1.0)

 Downloading tensorflow-2.19.0-cp312-cp312-macosx_12_0_arm64.whl (252.7 MB)

 252.7/252.7 MB 12.3 MB/s eta 0:00:0000:0100:01

 Downloading absl_py-2.2.2-py3-none-any.whl (135 kB)

 Downloading astunparse-1.6.3-py3-none-any.whl (12 kB)

Simple 0 \$ 1 ⚡ Python [conda env:base] * | Idle Mode: Edit ✓ Ln 1, Col 1 Untitled4.ipynb 0

Untitled4.ipynb (auto-q) - Jupyter

localhost:8888/lab/workspaces/auto-q/tree/Untitled4.ipynb?

File Edit View Run Kernel Tabs Settings Help

Untitled4.ipynb

Code Share Notebook Python [conda env:base]

Filter files by name

Name Modified File Size

- a. 2mo ago
- D 9s ago
- D 5d ago
- D 7m ago
- M 24d ago
- M 6mo ago
- P last mo.
- P 6mo ago
- U 2mo ago 72 B
- U 12d ago 77 KB
- U yesterday 393.3 KB
- U yesterday 18.1 KB
- ✓ U 28m ago 196.8 KB
- i. 2mo ago 0 B
- d 2mo ago 20.1 KB
- i.. 9d ago 2.1 KB
- i.. 2mo ago 13.9 KB
- i.. last mo. 20.3 KB

Downloading tensorflow-2.19.0-cp312-cp312-macosx_12_0_arm64.whl (252.7 MB)
252.7/252.7 MB 12.3 MB/s eta 0:00:000:0100:01
Downloading absl_py-2.2.2-py3-none-any.whl (135 kB)
Downloading astunparse-1.6.3-py2.py3-none-any.whl (12 kB)
Downloading flatbuffers-25.2.10-py2.py3-none-any.whl (30 kB)
Downloading gast-0.6.0-py3-none-any.whl (21 kB)
Downloading google_pasta-0.2.0-py3-none-any.whl (57 kB)
Downloading grpcio-1.71.0-cp312-cp312-macosx_10_14_universal2.whl (11.3 MB)
11.3/11.3 MB 10.7 MB/s eta 0:00:00a 0:00:01
Downloading keras-3.9.2-py3-none-any.whl (1.3 MB)
1.3/1.3 MB 10.5 MB/s eta 0:00:00
Downloading libclang-18.1.1-1-py2.py3-none-macosx_11_0_arm64.whl (25.8 MB)
25.8/25.8 MB 9.5 MB/s eta 0:00:000:0100:01m
Downloading ml_dtypes-0.5.1-cp312-cp312-macosx_10_9_universal2.whl (670 kB)
670.4/670.4 kB 9.6 MB/s eta 0:00:00
Downloading opt_einsum-3.4.0-py3-none-any.whl (71 kB)
Downloading tensorboard-2.19.0-py3-none-any.whl (5.5 MB)
5.5/5.5 MB 10.5 MB/s eta 0:00:00a 0:00:01
Downloading termcolor-3.0.1-py3-none-any.whl (7.2 kB)
Downloading tensorboard_data_server-0.7.2-py3-none-any.whl (2.4 kB)
Downloading namex-0.0.8-py3-none-any.whl (5.8 kB)
Downloading optree-0.15.0-cp312-cp312-macosx_11_0_arm64.whl (342 kB)
Installing collected packages: namex, libclang, flatbuffers, termcolor, tensorboard-data-server, optree, opt-einsum, ml-dtypes, grpcio, google-pasta, gast, astunparse, absl-py, tensorboard, keras, tensorflow
Successfully installed absl-py-2.2.2 astunparse-1.6.3 flatbuffers-25.2.10 gast-0.6.0 google-pasta-0.2.0 grpcio-1.71.0 keras-3.9.2 libclang-18.1.1 ml-dtypes-0.5.1 namex-0.0.8 opt-einsum-3.4.0 optree-0.15.0 tensorboard-2.19.0 tensorboard-data-server-0.7.2 tensorflow-2.19.0 termcolor-3.0.1
`/opt/anaconda3/lib/python3.12/site-packages/keras/src/layers/rnn/rnn.py:200: UserWarning: Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as the first layer in the model instead.
super().__init__(**kwargs)`

Model: "sequential"

Layer (type)	Output Shape	Param #
lstm (LSTM)	(None, 60, 50)	10,400
lstm_1 (LSTM)	(None, 50)	20,200
dense (Dense)	(None, 25)	1,275
dense_1 (Dense)	(None, 1)	26

Simple 0 \$ 1 ⌂ Python [conda env:base] * | Idle Mode: Edit ✓ Ln 1, Col 1 Untitled4.ipynb 0

Untitled4.ip... (auto-q) - Jupyter

localhost:8888/lab/workspaces/auto-q/tree/Untitled4.ipynb

File Edit View Run Kernel Tabs Settings Help

Untitled4.ipynb

[25]:

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, LSTM, Dropout, Input

# Create the LSTM model using the recommended approach
model = Sequential([
    # Start with an Input layer that specifies the shape
    Input(shape=(X_train.shape[1], 1)),

    # Add LSTM layers
    LSTM(50, return_sequences=True),
    LSTM(50, return_sequences=False),

    # Add Dense layers
    Dense(25),
    Dense(1)
])

# Optional: Print model summary to verify the architecture
model.summary()

# Compile the model
model.compile(optimizer='adam', loss='mean_squared_error')

# Train the model
# Note: You might want to adjust epochs and batch_size based on your dataset
model.fit(X_train, y_train, batch_size=32, epochs=10)
```

Model: "sequential_1"

Layer (type)	Output Shape	Param #
lstm_2 (LSTM)	(None, 60, 50)	10,400
lstm_3 (LSTM)	(None, 50)	20,200
dense_2 (Dense)	(None, 25)	1,275
dense_3 (Dense)	(None, 1)	26

Simple 0 s_ 1 Python [conda env:base] * | Idle Mode: Edit 0 Ln 1, Col 1 Untitled4.ipynb 0

Creating Test Data

The screenshot shows a Jupyter Notebook interface with a dark theme. The left sidebar displays a file tree with various files and folders, including a file named 'Untitled4.ipynb' which is currently selected. The main area contains two code cells.

Code Cell 25:

```
Total params: 31,901 (124.61 KB)
Trainable params: 31,901 (124.61 KB)
Non-trainable params: 0 (0.00 B)

Epoch 1/10
55/55 1s 14ms/step - loss: 0.0337
Epoch 2/10
55/55 1s 13ms/step - loss: 4.1239e-04
Epoch 3/10
55/55 1s 14ms/step - loss: 3.1783e-04
Epoch 4/10
55/55 1s 14ms/step - loss: 3.0047e-04
Epoch 5/10
55/55 1s 13ms/step - loss: 2.8363e-04
Epoch 6/10
55/55 1s 13ms/step - loss: 2.7040e-04
Epoch 7/10
55/55 1s 13ms/step - loss: 2.6189e-04
Epoch 8/10
55/55 1s 13ms/step - loss: 2.5349e-04
Epoch 9/10
55/55 1s 14ms/step - loss: 2.8878e-04
Epoch 10/10
55/55 1s 13ms/step - loss: 2.5514e-04

[25]: <keras.src.callbacks.history.History at 0x3091c2510>
```

Code Cell 27:

```
# Create test data
test_data = scaled_data[training_data_len - 60:, :]
X_test = []
y_test = dataset[training_data_len:, :]

for i in range(60, len(test_data)):
    X_test.append(test_data[i-60:i, 0])

X_test = np.array(X_test)
X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], 1))

# Predictions
predictions = model.predict(X_test)
predictions = scaler.inverse_transform(predictions)
```

At the bottom of the interface, there are status indicators: 'Simple' mode is selected, the kernel is 'Python [conda env:base] * | Idle', and the notebook is 'Untitled4.ipynb' with 0 changes.

Untitled4.ip... (auto-q) - Jupyter

localhost:8888/lab/workspaces/auto-q/tree/Untitled4.ipynb?

File Edit View Run Kernel Settings Help

Untitled4.ipynb

15/15 0s 8ms/step

[37]: # Instead of:
valid['Predictions'] = predictions

Use .loc to avoid the SettingWithCopyWarning
valid.loc[:, 'Predictions'] = predictions

Alternatively, if you want to ensure you're working with a copy:
valid = valid.copy()
valid['Predictions'] = predictions

plt.figure(figsize=(14,6))
plt.title('Model - Actual vs Predicted')
plt.xlabel('Date')
plt.ylabel('Close Price USD (\$)')
plt.plot(train['Close'])
plt.plot(valid[['Close', 'Predictions']])
plt.legend(['Train', 'Actual', 'Predicted'])
plt.show()

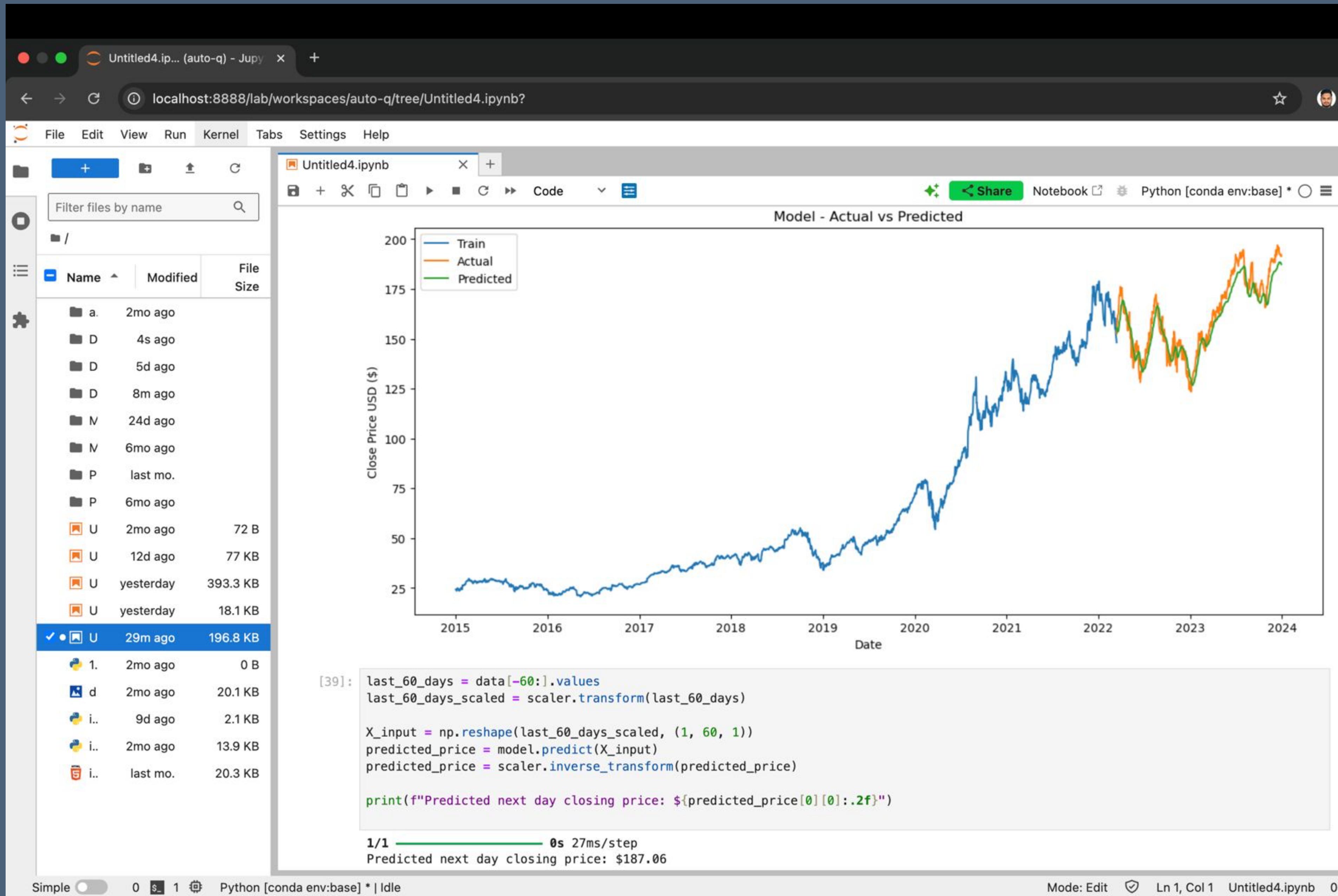
Model - Actual vs Predicted

Close Price USD (\$)

Train (Blue Line)
Actual (Orange Line)
Predicted (Green Line)

Simple 0 s 1 Python [conda env:base] * | Idle Mode: Edit 0 Ln 1, Col 1 Untitled4.ipynb 0

The screenshot shows a Jupyter Notebook interface. On the left, there's a file browser with a list of files and a sidebar with various icons. The main area contains a code cell with Python code for plotting actual vs predicted values. Below the code is a line plot titled 'Model - Actual vs Predicted' showing 'Close Price USD (\$)' over time. The plot includes three lines: 'Train' (blue), 'Actual' (orange), and 'Predicted' (green). The x-axis is labeled 'Date' and the y-axis is labeled 'Close Price USD (\$)'. The plot shows a general upward trend with some fluctuations.



Namratha Reddy Kaluvayee

Linkedin: www.linkedin.com/in/namratha-kaluvayee

S G V S Thribhuvan Kambhamettu

Linkedin: www.linkedin.com/in/thribhuvankambhamettu