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Python's AutoTS: Your Co-Pilot for Time Series Analysis

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ABSTRACT
AutoTS is a powerful automatic machine learning library designed specifically for automatic time series forecasting in Python. With its intuitive functionality and versatility, this library empowers users to effortlessly engage in various time series forecasting tasks, such as predicting stock prices for a specified number of days ahead. In this article, we present a comprehensive tutorial on utilizing the AutoTS library in Python. By following this guide, readers will gain insights into the library's capabilities, enabling them to harness its potential for accurate and efficient time series forecasting in their projects. Whether you are a seasoned data scientist or a beginner in the field, AutoTS offers a seamless and accessible solution for tackling complex time series analysis with ease.

Keywords:-*AutoTS, Automatic machine learning, Library, Python.*

AUTOTS IN PYTHON: A VERSATILE TIME SERIES FORECASTING LIBRARY
AutoTS, short for Automatic Time Series, is a robust machine learning library in Python specifically designed for time series forecasting tasks. By leveraging AutoTS, users can effortlessly predict future values in time series data, making it a valuable tool for diverse applications. In a recent experiment, I employed AutoTS to forecast Apple's stock prices for the next 10 days, and the results were remarkably accurate.

NOTEWORTHY FEATURES OF AUTOTS IN PYTHON
1. Model Selection: AutoTS streamlines the process of finding the most suitable time series forecasting model for your specific data type. This automated model selection ensures optimal performance without the need for manual intervention.

2. Univariate and Multivariate Support: Whether your time series data consists of a single variable (univariate) or multiple variables (multivariate), AutoTS adeptly handles both scenarios, providing a unified solution for various data formats.
3. Handling Messy Data: The library effectively manages messy data by efficiently handling missing values (NaNs) and addressing outliers, enhancing the overall data quality and forecasting accuracy.
4. Deployment-Ready Models: AutoTS equips users with deployable forecasting models, enabling seamless integration into real-world applications and systems.
While these features highlight the core functionalities of AutoTS, the library boasts additional capabilities for time series forecasting. To explore the full potential of this Python library, I recommend referring to its official documentation available here. Embrace

AutoTS to unlock powerful time series forecasting capabilities and elevate your data-driven decision-making processes.

AUTOTS IN PYTHON: A STEP-BY-STEP TUTORIAL

If you are new to utilizing the AutoTS Python library for time series forecasting, fret not! Installing it on your system is a breeze with a simple pip command: pip install autots. Once you have the library set up, let's delve into how you can harness the power of AutoTS for stock price prediction. To begin, we'll start by importing the essential Python libraries and the dataset required for the task:
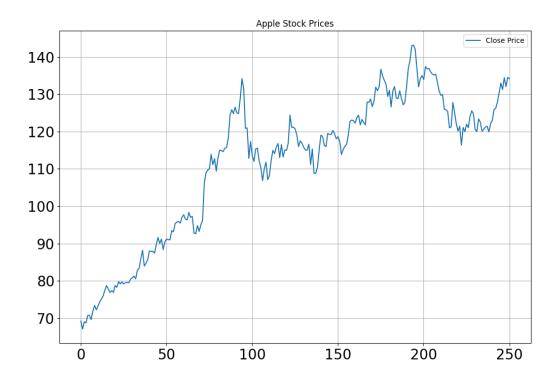
```
pip install autots

Collecting autots
  Downloading autots-0.5.8-py3-none-any.whl (713 kB)
                                      713.7/713.7 kB 6.2 MB/s eta 0:00:00
Requirement already satisfied: numpy>=1.14.6 in /usr/local/lib/python3.10/dist-packages (from autots) (1.22.4)
Requirement already satisfied: pandas>=0.25.0 in /usr/local/lib/python3.10/dist-packages (from autots) (1.5.3)
Requirement already satisfied: statsmodels>=0.10.0 in /usr/local/lib/python3.10/dist-packages (from autots) (0.13.5)
Requirement already satisfied: scikit-learn>=0.20.0 in /usr/local/lib/python3.10/dist-packages (from autots) (1.2.2)
Requirement already satisfied: python-dateutil>=2.8.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.25.0->autots) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.25.0->autots) (2022.7.1)
Requirement already satisfied: scipy>=1.3.2 in /usr/local/lib/python3.10/dist-packages (from scikit-learn>=0.20.0->autots) (1.10.1)
Requirement already satisfied: joblib>=1.1.1 in /usr/local/lib/python3.10/dist-packages (from scikit-learn>=0.20.0->autots) (1.3.1)
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from scikit-learn>=0.20.0->autots) (3.1.0)
Requirement already satisfied: patsy>=0.5.2 in /usr/local/lib/python3.10/dist-packages (from statsmodels>=0.10.0->autots) (0.5.3)
Requirement already satisfied: packaging>=21.3 in /usr/local/lib/python3.10/dist-packages (from statsmodels>=0.10.0->autots) (23.1)
Requirement already satisfied: six in /usr/local/lib/python3.10/dist-packages (from patsy>=0.5.2->statsmodels>=0.10.0->autots) (1.16.0)
Installing collected packages: autots
Successfully installed autots-0.5.8
```

```python
import pandas as pd
import matplotlib.pyplot as plt
data = pd.read_csv("Apple.csv")
```

Preparing Data for Stock Price Prediction with AutoTS

We will be utilizing the stock price data of Apple, which we have downloaded from Yahoo Finance. Before we employ the AutoTS library for stock price prediction, it is essential to prepare the data and gain insights into the closing stock prices of Apple:

```python
data = data[["Date", "Close"]]

data["Date"] = pd.to_datetime(data.Date)

data["Close"].plot(figsize=(12, 8), title="Apple Stock Prices", fontsize=20, label="Close Price")

plt.legend()

plt.grid()

plt.show()
```

Apple Stock Prices

Now, it's time to delve into the exciting process of utilizing the AutoTS library for automatic time series forecasting. With its advanced capabilities and user-friendly interface, AutoTS streamlines the forecasting journey and delivers accurate predictions effortlessly. Let's get started:

```python
from autots import AutoTS
model = AutoTS(forecast_length=10, frequency='infer',
               ensemble='simple', drop_data_older_than_periods=200)
model = model.fit(data, date_col='Date', value_col='Close', id_col=None)
```

```
[LightGBM] [Warning] No further splits with positive gain, best gain: -inf
[LightGBM] [Warning] No further splits with positive gain, best gain: -inf
[LightGBM] [Warning] No further splits with positive gain, best gain: -inf
[LightGBM] [Warning] No further splits with positive gain, best gain: -inf
[LightGBM] [Warning] No further splits with positive gain, best gain: -inf
[LightGBM] [Warning] No further splits with positive gain, best gain: -inf

 4 - Ensemble with avg smape 4.77:
Model Number: 5 of 8 with model Ensemble for Validation 3
 5 - Ensemble with avg smape 3.79:
Model Number: 6 of 8 with model Ensemble for Validation 3
 6 - Ensemble with avg smape 5.05:
Model Number: 7 of 8 with model Ensemble for Validation 3
 7 - Ensemble with avg smape 4.09:
Model Number: 8 of 8 with model Ensemble for Validation 3
 8 - Ensemble with avg smape 4.15:
```

In the code section above, we've set the forecast_length parameter to 10, signifying the period for which we desire to predict Apple's stock prices. Consequently, the output will present the closing stock prices of Apple for the upcoming 10 days. Now, let's employ the predict function and examine the forecasted results:

```
prediction = model.predict()
forecast = prediction.forecast
print("Stock Price Prediction of Apple")
print(forecast)
```

```
Stock Price Prediction of Apple
                 Close
2021-04-19  135.642255
2021-04-20  135.549968
2021-04-21  135.826396
2021-04-22  136.500734
2021-04-23  137.430368
2021-04-26  136.906151
2021-04-27  134.911994
2021-04-28  134.889976
2021-04-29  135.471570
2021-04-30  133.322167
```

CONCLUSION

In this tutorial, we discovered the powerful capabilities of AutoTS, an automatic machine learning library in Python, designed for time series forecasting. With AutoTS, we effortlessly predicted Apple's stock prices, witnessing its effectiveness in handling messy data and choosing the best forecasting model.

This user-friendly library empowers data-driven decisions and holds immense potential for diverse time series analysis tasks. Embrace AutoTS to unlock valuable insights and accurate forecasts, propelling your forecasting endeavors to new heights.

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