



Course Name:	Data Analysis Laboratory (216H03L501)	Semester:	V
Date of Performance:	__19__ / 10__ / __25__	DIV/ Batch No:	D-2
Student Name:	Shreyans Tatiya	Roll No:	16010123325

TITLE: Perform a time series analysis on health care (AR/MA/ARIMA)

AIM: To perform forecasting using time series analysis

Expected OUTCOME of Experiment:

CO4: Perform Time series Analytics and forecasting

Books/ Journals/ Websites referred:

Students have to list.

Pre Lab/ Prior Concepts:

Students should have a basic understanding of: Time series Analytics and forecasting

Procedure:

Data set Used: Hospital_patients_datasets

Step1: Select and Load the dataset

Step2: Convert 'ScheduledDay' and 'AppointmentDay' to datetime format

Step 3: Forecasting Daily Attendance

Step4: Initialize Prophet model for forecasting

Step 5: Fit the model

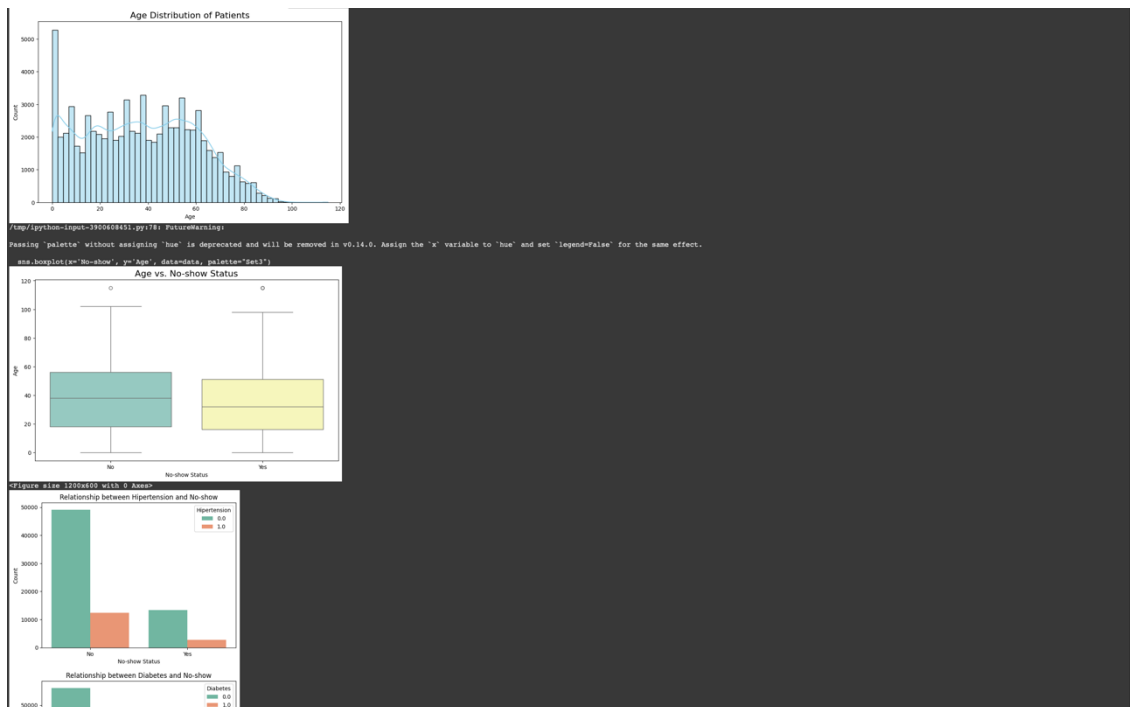
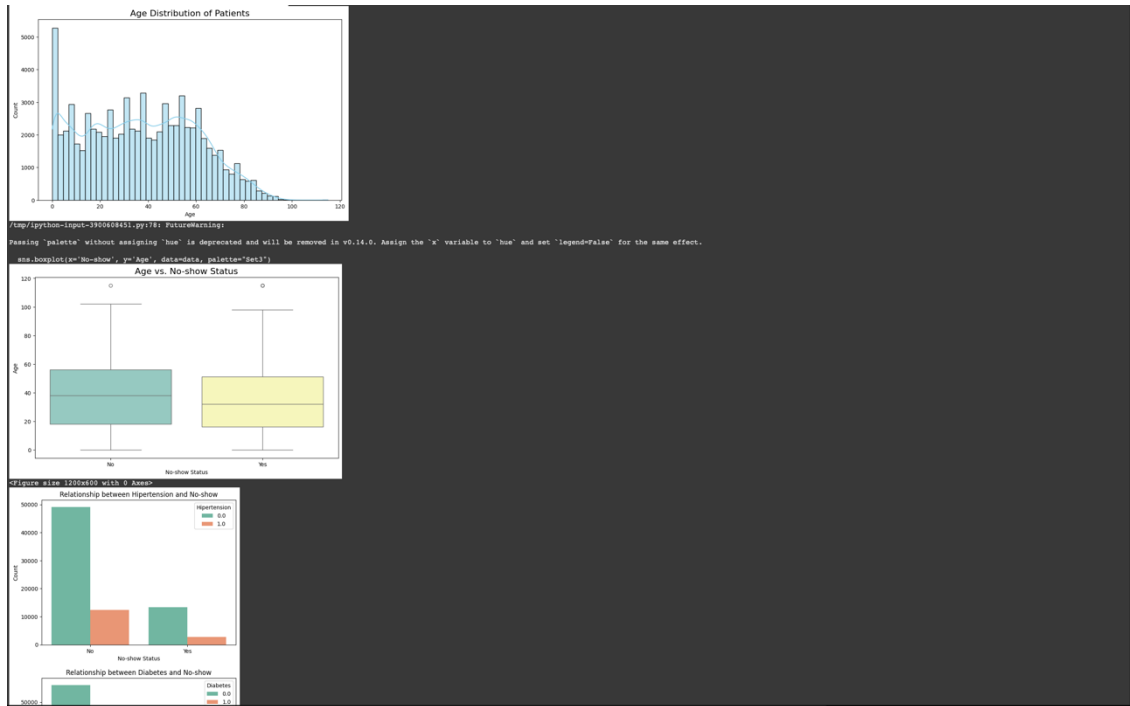
Step 6: Predict future attendance

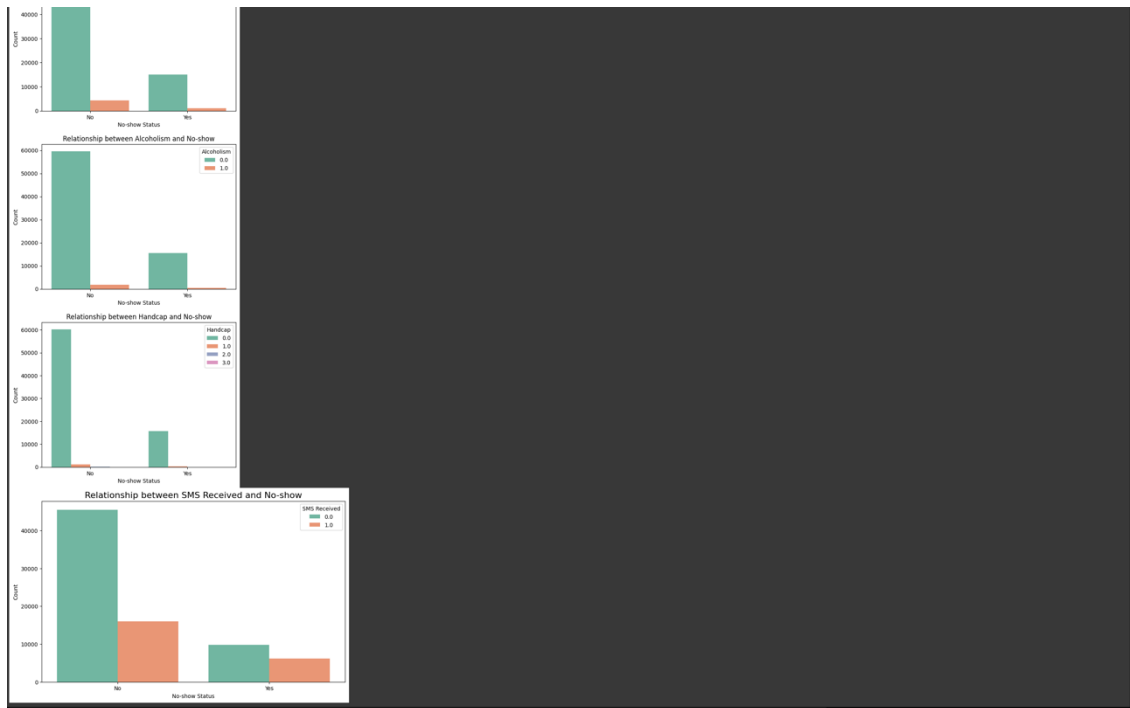
Step 7: Plot the forecast

Step 8: Exploratory Data Analysis Functions

Step 9: Running the analysis functions

<https://colab.research.google.com/drive/1pyUm4DQcKGOb2a3ghCsnVBUjieMt71j?usp=sharing>

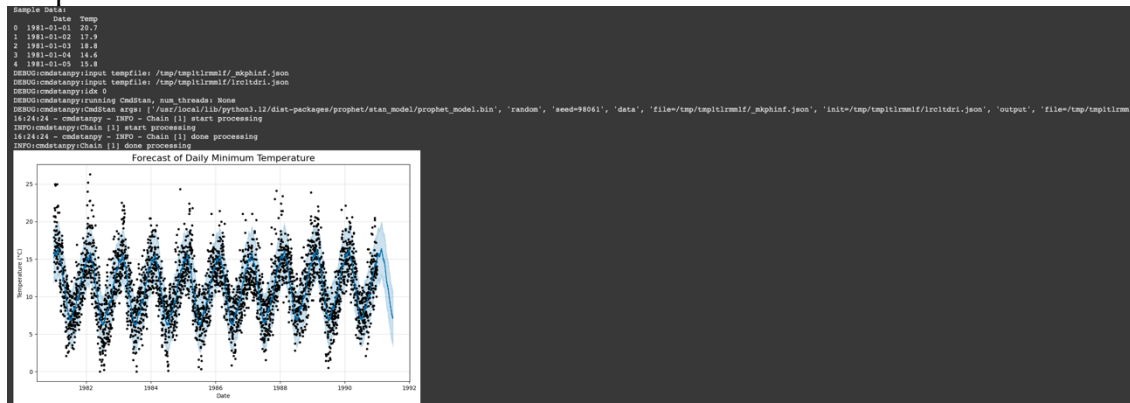


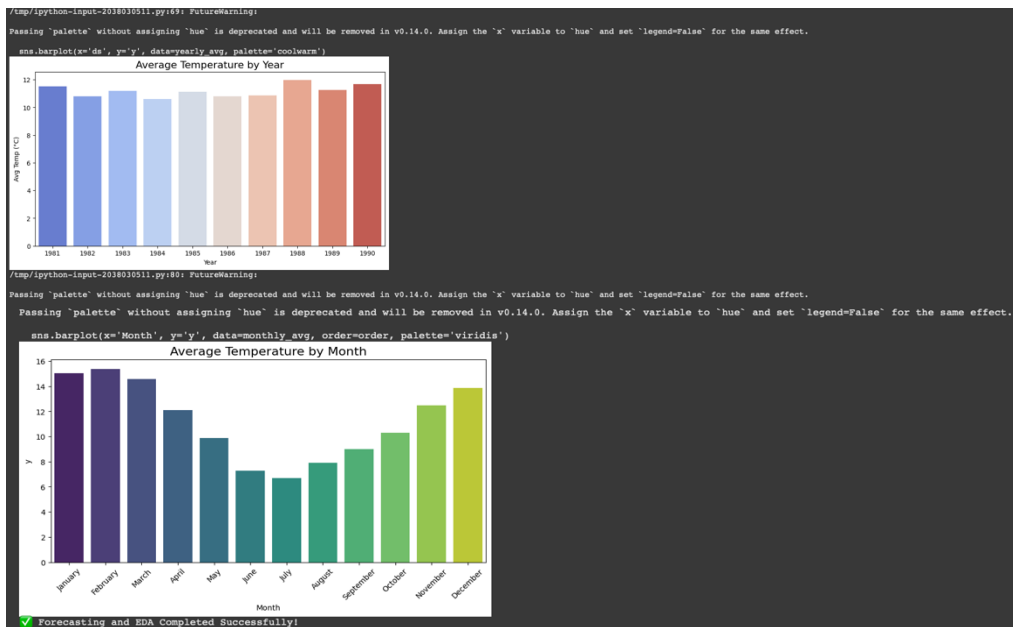
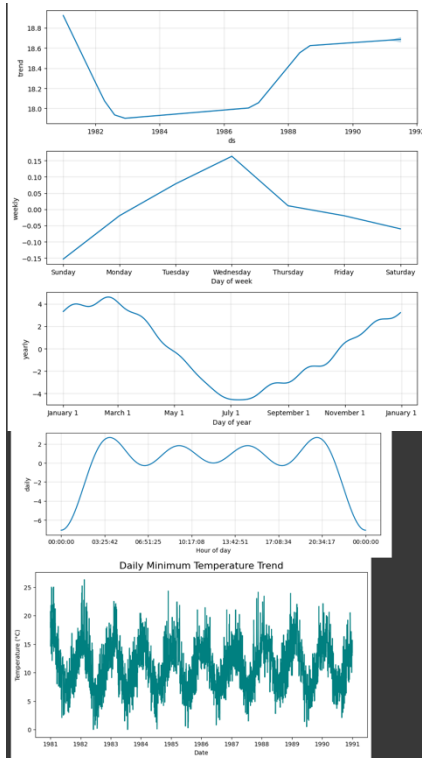


Implementation details: Daily Minimum Temperatures (Melbourne, Australia)

https://colab.research.google.com/drive/138KXR-7wHEct-VEKyS_jFoTN35ITc4r_?usp=sharing

Output:





Date: _____

Signature of faculty in-charge

Post Lab Descriptive Questions:

1. Explain the components of time series?

A time series has four main components:

- **Trend:** The long-term direction of data (upward, downward, or constant).
- **Seasonality:** Regular repeating patterns over fixed periods (e.g., daily, monthly, yearly).
- **Cyclic Variation:** Irregular rises and falls over longer, non-fixed periods (e.g., business cycles).
- **Irregular/Noise:** Random fluctuations or unexpected variations in data.

2. How do you handle seasonality in time series data? What methods or transformations can you apply?

To handle seasonality, you can:

- **Decompose** the series into trend, seasonality, and residuals.
 - **Seasonal differencing** (subtract current value from previous season's value).
 - **Use seasonal models** like **SARIMA** or **Prophet**, which automatically capture seasonality.
 - **Apply transformations** (e.g., log, square root) to stabilize seasonal variation.
3. What are some common metrics for evaluating forecasting models (e.g., MAE, RMSE, MAPE)?
- **MAE (Mean Absolute Error):** Average of absolute errors; easy to interpret.
 - **RMSE (Root Mean Square Error):** Penalizes larger errors more than MAE.
 - **MAPE (Mean Absolute Percentage Error):** Shows average percentage error; scale-independent.