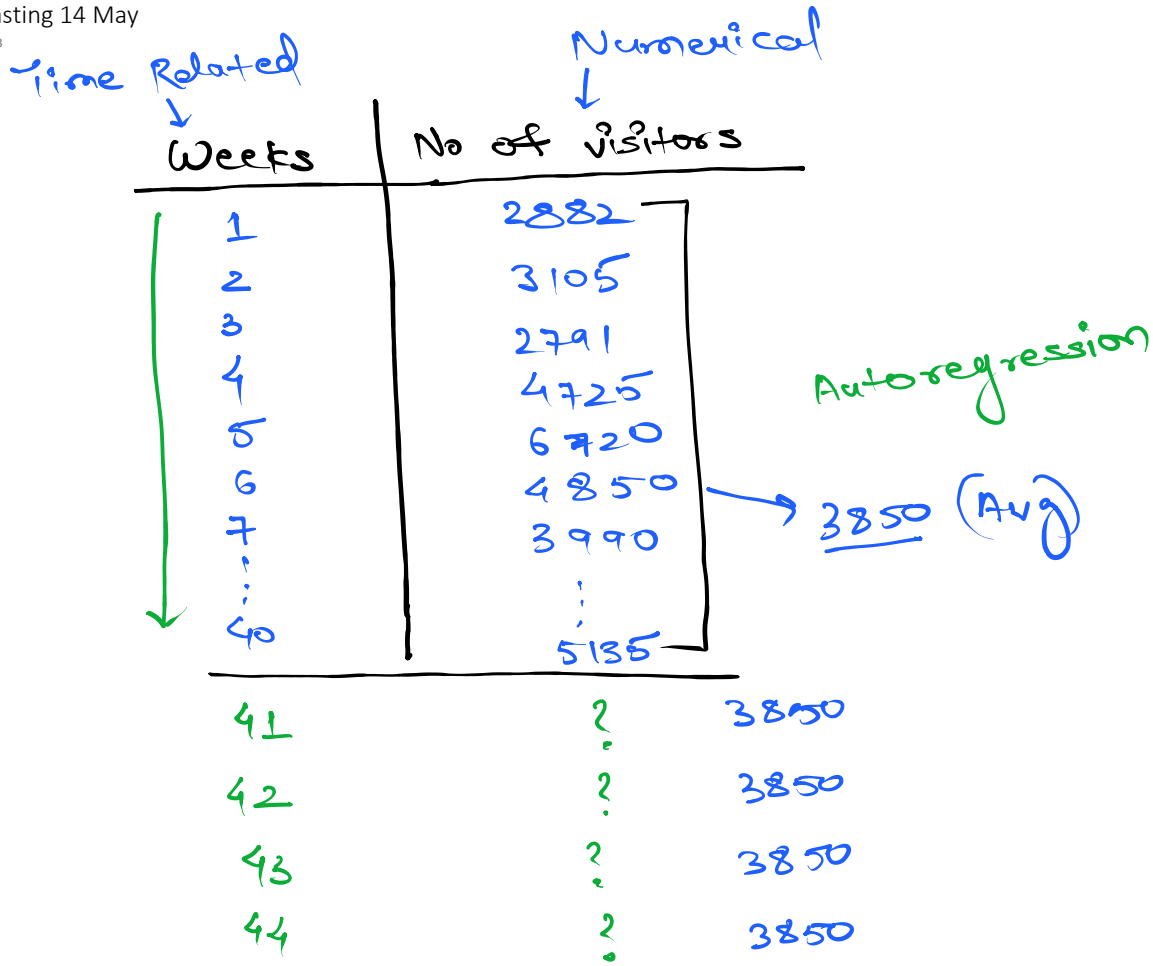
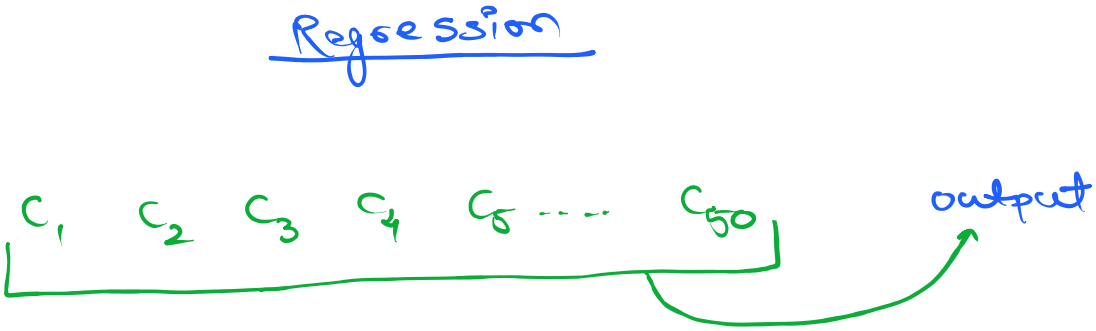
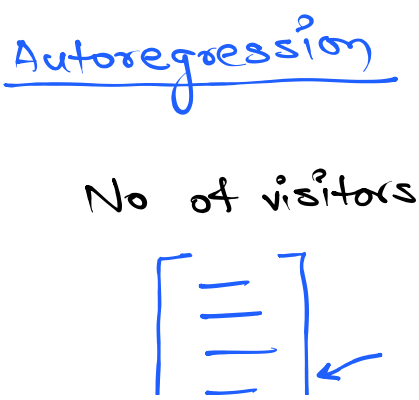
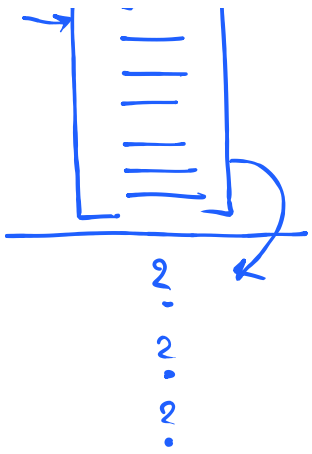
Time Series Forecasting 14 May

Wednesday, 14 May 2025 07:03









Ways of Time Series Forecasting →

Quantitative

→ Data available

→ Histocal patterns repeat mostly.

→ we can easily capture complex patterns through available data.

Qualitative

- No data available

- we have no idea about the historical pattern.

- We can't capture / identify the complex patterns because of unavailability of data.

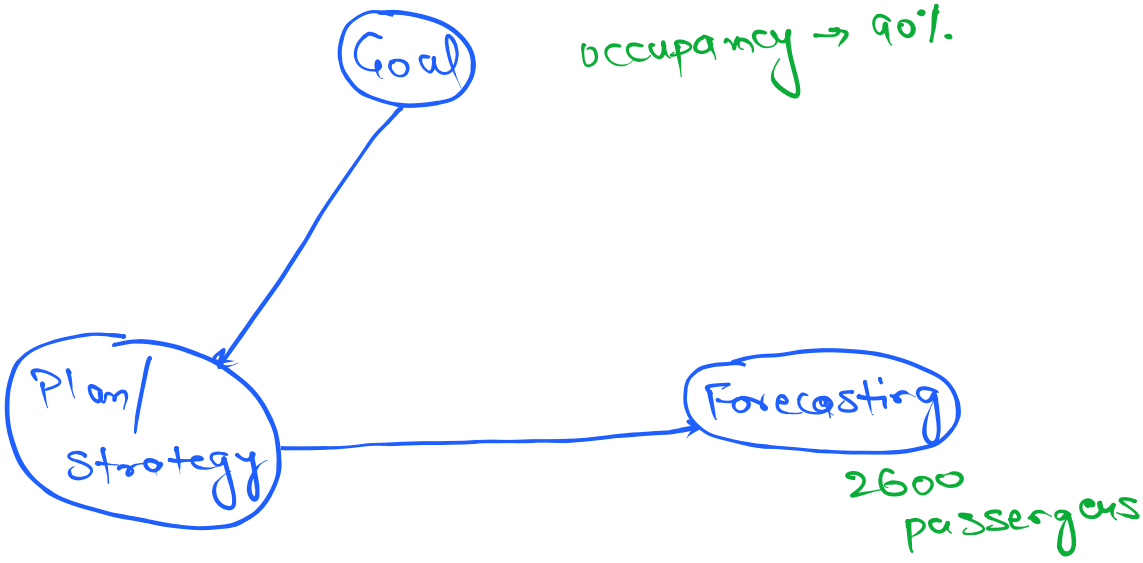
3 Components of Time Series Forecasting →

① Time Series Data.

② Time Series Analysis.

③ Time Series Forecasting.

Basic Terminologies



A1 : ~1000

A2 : ~2000

A3 : ~3000

Steps in Forecasting

→ Define the problem statement.

→ Collect the data

→ Analyze the data.

→ Build and evaluate the forecasting models.

Some caveats associated with Time-Series forecasting →

① The granularity rule: The more aggregate your forecasts are, the more accurate they will be.

② The frequency rule: Keep updating your forecasts regularly to capture any new trend/information that comes.

③ The Horizon Rule: When you have forecasted for many future weeks/months, your forecasts are more likely to be very accurate in the earlier weeks/months as compared to the later ones.

Three important characteristics of a time-series data:

① Relevant: Data should be relevant to our goal/objective.

② Accurate: Data should be accurate in terms of capturing the timestamps and the related observations.

③ Long Enough: Data should be long enough [illegible] this is important

to forecast accuracy ...

to identify all the patterns in the past.

Basic Approaches for Time Series Forecastings →

① Naive Approach →

Forecasted value = Last observed value

② Simple Average Approach

③ Moving Average Approach

④ weighted moving average approach.

x_1	x_2	x_3	x_4	x_5
2000	2100	1980	3150	2950

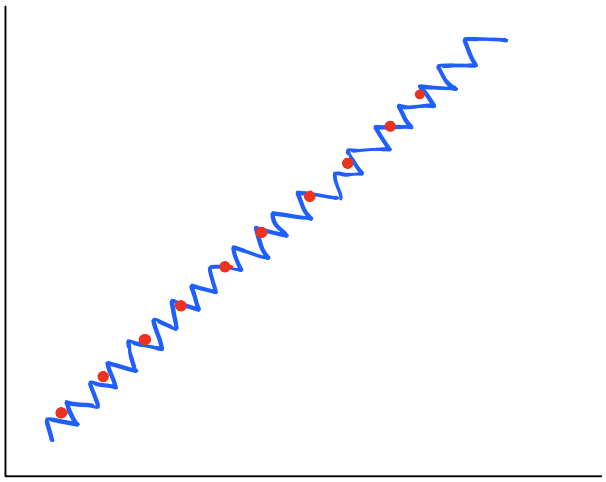
$$\text{Avg} = \frac{x_1 + x_2 + x_3 + x_4 + x_5}{5}$$

$$\text{weighted avg} = \frac{w_1 x_1 + w_2 x_2 + w_3 x_3 + w_4 x_4 + w_5 x_5}{5}$$

Homework (30%) - Score: 85
- Quizzes (20%) - Score: 90
- Final Exam (50%) - Score: 80
- Multiply each score by its respective weight:
- Homework: (85 \times 0.3 = 25.5)
- Quizzes: (90 \times 0.2 = 18)
- Final Exam: (80 \times 0.5 = 40)
- Multiply each score by its respective weight:
- Homework: (85 \times 0.3 = 25.5)
- Quizzes: (90 \times 0.2 = 18)
- Final Exam: (80 \times 0.5 = 40)

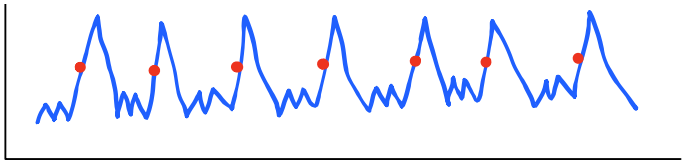
Some examples of a Time Series data plot →

Upward Trend + Seasonality

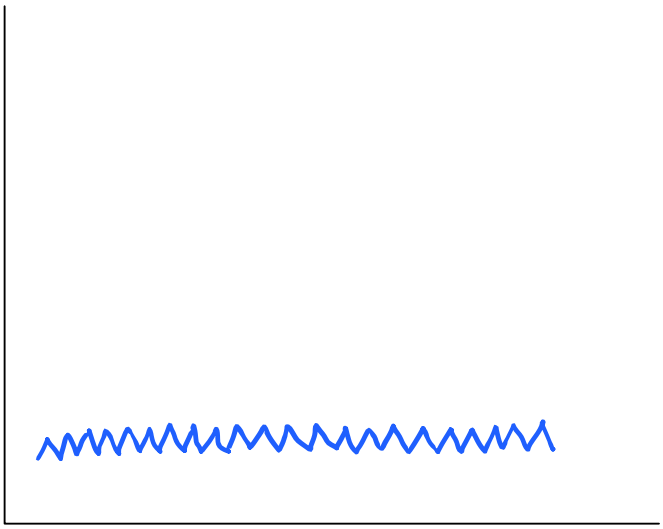


varying mean + Constant variance → Non-stationary Time Series Data.

No Trend + Seasonality



Constant Mean
&
varying variance
→ Non-stationary Data.



No Trend
+
Seasonality

Constant Mean
&
Constant variance
→ Stationary Data.

Every Time Series Algorithm; requires the data given to it to be 'Stationary'.

If the data is "Non-Stationary", then we perform necessary transformation on the

data to make it Stationary:

Time Series Transformations →

① Differencing → To be used when your data has varying mean but constant variance.

Varying mean + Constant variance —Diff→ Constant Mean + Constant Variance

② Box-Cox Transformation → To be used when your data has constant mean but varying variance.

Constant Mean + varying variance —BCT→ Constant Mean + Constant variance

③ Box-Cox Transformation + Differencing