**Chapter-1: Basics**

Time series has trends, seasons and cycles. They can be brought out by feature engineering [1].

Popular Time Series plots include –

Most common type of features are – 1) Time-step features, 2) Lag features

1. Tim-step features – are derived from time index. Example: dayofyear, days\_elapsed, etc. Most common is to feature engineer a variable called **time dummy** where first observation is 0 and next 1 and next 2 and so on. Order can be 1 or 2 or n(can possibly statsmodel library and DeterministicProcess function for this)
2. Lag features – let us model **serial dependence**.

How do we know if a feature is good or not?

There are several methods.

1. Plot y (ex: Sales) vs x (ex: Previous day sales). If you see correlation => good feature to include

**Chapter-2: Trend**

What does Trend represent? – long-term movement of mean. Trend is the slowest moving part of a series.

How the duration over which moving averages or trend are calculated are selected?

Answer: Take an average over a period longer than any seasonal period in series. First plot the data and then choose the window\_size.

**Chapter-3: Seasonality**

Repetitive pattern across days/weeks/months/years

Practical guidelines:

1. Always open and look csv. See what column is date type and set parse\_dates parameter
2. Learn seaborn or plotly to use properly for plotting
3. Check for missing dates
4. Handling missing values in Lag features – either 0, backfilling (filling with last known values) or drop nan rows.
5. Choose Trend order such that it follows Moving Average OR which results in highest R2score or least MSE or combination of latter two.

References:

[1] Linear Regression With Time Series, (n.d.). https://kaggle.com/code/ryanholbrook/linear-regression-with-time-series (accessed August 4, 2024).