Exploratory Data Analysis (EDA)

Before building any sophisticated model, we need to do EDA first.

EDA is the first step in your data analysis. You take a broad look at patterns, trends, outliers, unexpected results and so on in your existing data, using visual and quantitative methods to get a sense of the story this tells. You're looking for clues that suggest your logical next steps, questions or areas of research.

- Dataset summary
- Missing data
- Basic Statistics
- Basic graphs
- Basic relationship

https://www.sisense.com/blog/exploratory-data-analysis/

Some of the tasks in EDA

- Spotting mistakes and missing data
- Mapping out the underlying structure of the data
- Identifying the most important variables
- Listing anomalies and outliers
- Test a hypotheses / check assumptions related to a specific model
- Establish a parsimonious model (one that can be used to explain the data with minimal predictor variables)
- Estimate parameters and figuring out the associated confidence intervals or margins of error.

Data Cleansing (Garbage in Garbage out, 80/20 rules)

Most data scientists spend only 20 percent of their time on actual data analysis and 80 percent of their time finding, cleaning, and reorganizing huge amounts of data

- Duplicate data removed
- Missing values need to be filled (or handled)
- Data elements should be comparable (similar units)
- Continuous values may need to be binned
- Outlier data need to be removed
- Ensure dataset has no systematic biases for the phenomena under analysis
- Be sure dataset has enough information density

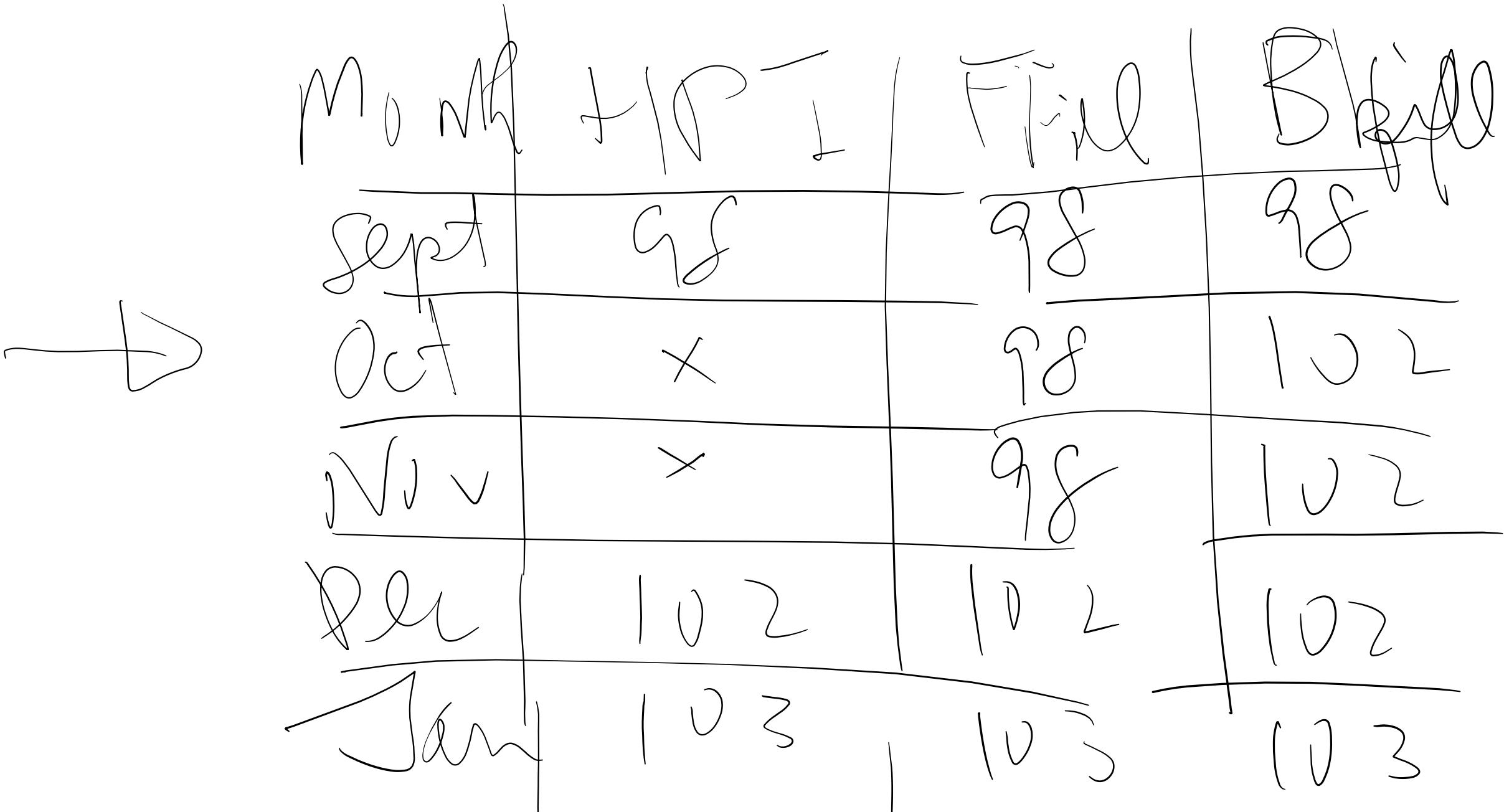
How to handle missing values

- Deletion
  - Pro: most easy way and no ambiguity
  - Con: can apply only if we have enough data, may introduce systematic bias

- Imputation
  - Use Mean, Median or Mode
    - Pro: Easy to understand, ok most of the time
    - Con: may introduce systematic bias

  - For Time Series data,
    - Use last observed data (forward fill) (df.fillna(method='ffill'))
    - Use latest available data (backward fill) (df.fillna(method='bfill'))

  - More advanced method such as use nearest neighbor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How to handle missing values

There is no silver bullet

That’s why a critical mind is important

Other aspects of Exploratory Data Analysis

Ask the right questions

The goal of EDA is to explore and develop a high-level intuition and understanding of the data before we dive into any more sophisticated models

Exploratory Data Analysis

Learning by doing