

FUNDAMENTAL BUSINESS DATA VISUALIZATION NOTES

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Based on course material provided through King Mongkut's
University of Technology Thonburi (KMUTT)

All Learning Unit Documents

Course Introduction

Human interprets picture better than words

like plotting chart to look pattern

- Start by asking Question
- Understand data collection
 - transform data to proper data
 - data cleaning
- 3 Libraries

With data visualization → for users
→ for team

Introduction to Data Science for Business

Stages of Data Science

1. Data Acquisition & Understanding

- involves collecting raw data from various sources like databases, API, web scraping

3. Deployment

- used to make prediction and decision in REAL TIME

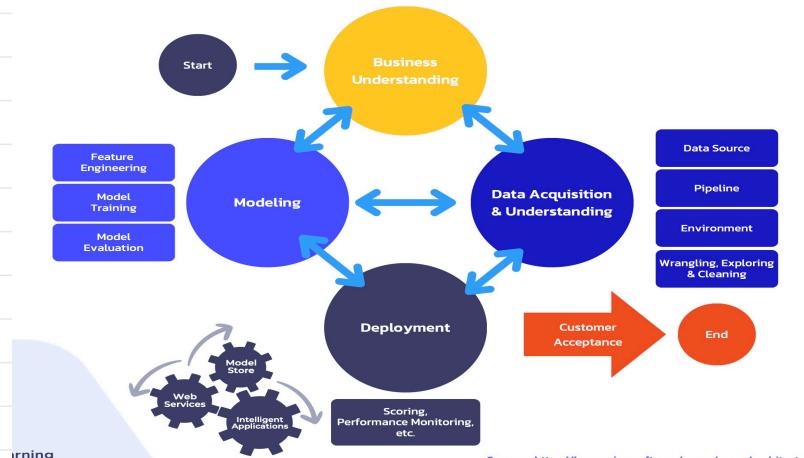
Data Modeling

- ##### 2.
- analyze and process data to create model that can identify pattern & prediction
 - involves STATISTICAL ANALYSIS

4. Customer Acceptance

- presented to stakeholders / end user for feedback

Stages of Data Science



Before data analysis, we need to understand Business

① What problem are we solving?

- ask the right questions
- find the right data

Business Understanding



Define Objectives

- Identify the business problem.
- Ask questions that define business goals achievable with data science.

Examples:

- How much will sales increase? (Regression)
- Which customer will churn? (Classification)
- Which products are similar? (Clustering)
- Is this transaction suspicious? (Anomaly Detection)
- What's the best product recommendation? (Recommendation)

Identify Data Sources

- Identify relevant data to answer your questions.
- Ensure data accurately reflects both the target outcome and related features.

Data Acquisition and Understanding

- prepare data before analyzing

Ingest the data

- get the data into the system

Explore the data

- check quality of data, ensure clean (data cleaning)

Set up the data pipeline

Modeling

Feature engineering

- process in which we transform raw data into features so that the model can understand

Model training

- test model and pick that solves problem accurately

Determine if your model is suitable for production

- test in real time

Deployment

Operationalize the model

transfer model to the special environment

Expose model with an API interface

API allows applications to easily talk to the model
and get predictions

Customer Acceptance

System Validation

Project handoff

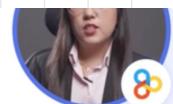
Topics

- What is Business Intelligence (BI)?
- Why is Data Visualization so important for BI?
- How can businesses use Data Visualization to make decisions?
- Trends of Data visualization

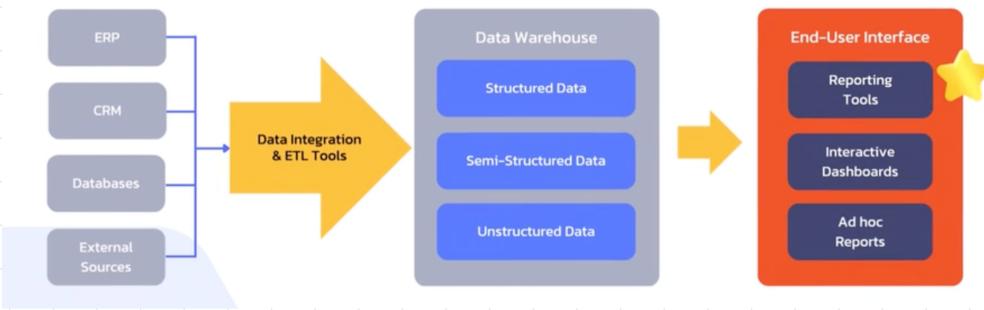
What is Business Intelligence (BI)

- tool to organize, analyze and understand data

BI takes raw numbers from convert to actionable insights



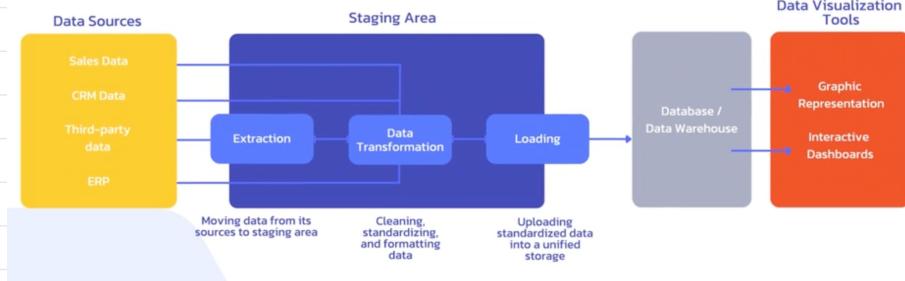
Business Intelligence Architecture (for Small Business)



Why data visualization Important?

- our brain grasp pictures easier than numbers
- easily spot pattern
- see the bigger picture
- significant numbers → opportunity / issue

Data Processing and ETL steps



By analyzing patterns and trends in visualized data, business can:

- ✓ Improve Operational Process
- ✓ Predict Future Trends



Example Trends of Data visualization



Emergence of High-Fidelity Digital Twins

Virtual model of physical object or system on stream to physical asset



Powerful Javascript Visualizations

Powerful JavaScript frameworks like React, Angular, Babylon.js, and Three.js are making it easier to create stunning 3D and immersive reality (VR) data visualizations.



Verticalized Data Visualization Offerings

Industry-specific insights

ex. Use to monitor performance of Robot

Data Visualization Technique

Topics

- Basic 2D Data Visualization
- Types of Connection
- 8 Common Chart types

Key of Data Visualization

1. Know your data

- what to show and how to use the chart to explain it

2. Types of connection

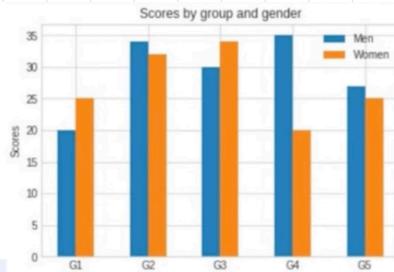
- Comparison
- Composition
- Relationship
- Distribution

8 Common chart Types

1. Bar Chart → Comparison Type

- comparing data units
- can be clustered or stack bars

* Use HORIZONTAL BARCHART for long data label



2. Pie chart → Composition

- composition of whole, percentage



3. Line Graph → Comparison, relationship

- change data over time
- can combine 1 or more line graph
- Useful for trends, pattern and make prediction



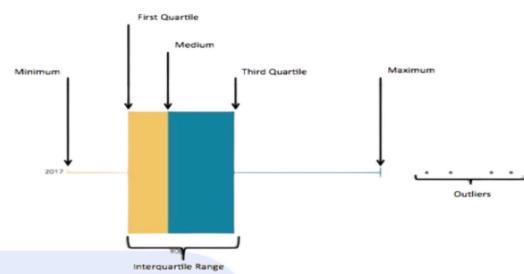
4. Box Plot → Distribution

- makes it easy to see data spread, skewness, variability & outliers

Shows:

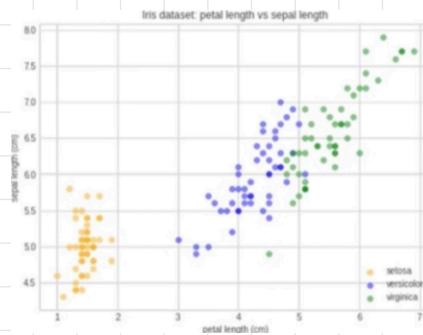
1. Minimum – lowest non-outlier value
2. Q1 (First Quartile) – 25% of data is below this
3. Median (Q2) – the midpoint of the data
4. Q3 (Third Quartile) – 75% of data is below this
5. Maximum – highest non-outlier value
6. Outliers – unusually high or low values (shown as small dots)

Together these form the box (Q1-Q3) and the whiskers (min-max), making it easy to see:



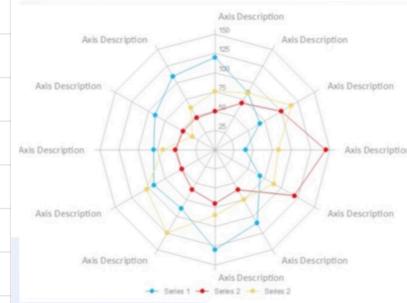
5. Scatter Plot → distribution

- shows dots.
- Use to show if there are
 - cluster
 - wider spread



6. Radar or Spider chart → distribution

- Compare multiple objects with different dimensions
- commonly used in
 - games, athlete stats, student performance



7. Density Map / dot map → distribution

↳ Geographical

- use dot or color density to represent the geographical distribution of data

Example use:

typhoon, covid-cases, location that sells best



8. funnel chart → Flow with Trends

- use how data move through a process in stages

A funnel chart typically displays:

1. A process with sequential stages
2. The number of items (customers, leads, tasks, etc.) at each stage
3. How many are lost or drop off between stages
4. The conversion rate from one stage to the next

The chart shape makes it visually clear where the biggest reductions happen.

What Makes Funnel Charts Valuable

- ✓ Immediate insight into conversion and loss
- ✓ Easy comparison of performance month to month
- ✓ Helps identify bottlenecks and areas needing improvement
- ✓ Supports forecasting (e.g., expected revenue from leads)



Overall Chart Types

Composition



Pie chart



Stacked column chart

Comparison



Column chart



Bar chart



Radar charts

Relationship



Line chart

Distribution



Scatter chart



Dot Map

Keys for Choosing the right chart

- 1 What you want your data to tell
- 2 Do you want to compare things, show trends, or show geographical patterns?

Introduction to Basic Python

Already have background in Python

Will be using Jupyter Notebook

Short Review