Analytics Concept in Modern Age

P1 : A BRIEF OF STATISTICS

☐ Statistics:
A branch of mathematics dealing with data collection, Organization, analysis, interpretation and presentation.

☐ Scope of Statistical theory:
→ Data collection
→ Summarizing data
→ Interpreting data
→ Modelling
→ Applied Statistical inference.

☐ Operational definitions is of terms of data:
→ Variable: A characteristic of an item or individual.
→ Data: The set of individual values associated with a variable.

☐ Types of data:
i). Nominal : Name, SAP_ID, etc
ii). Ordinal : Grades, Rank, etc
iii). Internal : Temperature
iv). Ratio : Height, weight

☐ Statistical model :
It is a mathematical model that embodies a set of statistical assumptions concerning the generation of sample data. It often represents the data generating process.

Model in general: (Properties of model)
→ a representation of real system, idea or object.
→ captures the most important features
→ Can be a written or verbal description, a visual displays, a mathematical formula, or a Spreadsheet representation.
→ Mainly the equations used in ML, AI & many more.

☐ Decision model:
- used to understand, analyze or facilitate decision making.
→ Descriptive decision models: describe relationships

$$Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + \text{-----} b_n x_n$$

$Y \to$ dependent variable
$x_i \to$ independent variable
$b_0 \to$ intercept
$b_i \to$ coefficients
$n \to$ no. of observations

P2 : INTRODUCTION TO ANALYTICS

☐ **Data Science:**
A multi-disciplinary field that combines skills in software engineering and statistics with domain experience to support analysis of large datasets, ultimately uncovering value for an organization and communicating that value to stakeholders.

☐ **Data Analytics:**
Analytics is the use of data, information technology, statistical analysis, quantitative methods, and mathematical models to help managers gain improved insight about their business operations and make better fact based decisions.
Business analytics is a subset of data analytics.

☐ **Application of Business Analytics:**
→ Management of customer relationship
→ Financial and marketing activities
→ Supply chain management
→ Human resource planning.
→ Pricing decision
→ Sport team game strategies.

☐ **Importance of Business Analytics:**

→ There is a strong relationship of BA with:
  - profitability of business
  - revenue of business
  - shareholder return

→ Enhances understanding of data

→ Vital for business to remain competitive.

→ Enables creation of informative report.

☐ **Scope of BA:**

→ Descriptive analytics:
  - uses data to understand past & present
  - eg: data visualization
  - helps us understand the output from predictive and prescriptive analysis

→ Predictive analysis:
  - Regression analysis, ML and neural networks

→ Prescriptive analytics:
  - most often related to optimization
  - For eg: use of linear programming to for yield management of p from perishable goo
  - used for allocation of scarce resources.

Model:
  - Optimization
  - Objective function - eg: that minimize or maximize
  - Constraints - limitations
  - Optimal sol: - value at min or max point.

P3 : MACHINE LEARNING

Machine learning is a branch of AI that automates building of systems that learn iteratively from data, identify hidden patterns and & predict future results with minimum human intervention.

☐ Types of ML algos :

~~Supervised~~
~~→ Regression~~
~~→ Decision tree~~
~~→~~

i). Supervised : category in which we feed labeled data to ML model
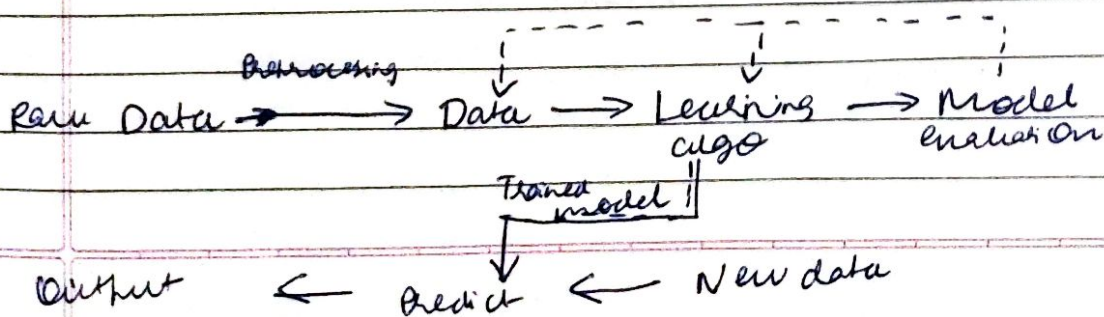- Regression
- classification

ii). Unsupervised : category in which we feed only input data without labels.
- Clustering
- Association

iii). Semi supervised : category that uses both labeled data & unlabelled data.

☐ Flow of ML process :

Raw Data → ~~Processing~~ Data → Learning algo → Model evaluation

Trained model

Output ← Predict ← New data

☐ Applications of ML:
→ Fraud detection
→ Target acquisition
→ NLP
⇒ Real time AD placements
→ Credit scoring
→ Customer segmentation.

P4 : ARTIFICIAL INTELLIGENCE :
The science of training computers to perform tasks that typically require human intelligence to complete.

☐ Applications of AI :
→ Banking
   - Fraud detection
   - Credit analysis
   - Automated Financial advisers
→ ~~to~~ Government :
   - Smart cities
   - Security intelligence
   - Facial recognition
→ Health & life science
   a - Diagnostics
   - Biomedical imaging
   - Health monitor
→

☐ Deep learning:
Type of ML based on artificial neural networks used in recognizing speech, identifying objects in images and more.

☐ Reinforcement learning:
- discovers through trial and error which action yields the greatest reward.
- Often used in robotics, gaming & navigation.