1. Descriptive Analytics (Understanding Past Trends)

- **Goal:** Summarize historical data to identify patterns.
- **When to use:** If the business wants to understand *what happened* (e.g., sales trends, customer behavior).
- **Common Techniques:**
  - Aggregations (mean, median, mode, etc.)
  - Data visualizations (charts, graphs)
  - Clustering (e.g., segmenting customers)
  - Association rules (e.g., market basket analysis)
- **Example:**
  - A retail store wants to analyze last year's sales trends to see which products were most popular.

2. Predictive Analytics (Forecasting Future Outcomes)

- **Goal:** Use historical data to predict future events.
- **When to use:** If the business wants to answer *what will happen?*
- **Common Techniques:**
  - Regression models (Linear Regression, Logistic Regression)
  - Time series forecasting (ARIMA, Prophet)
  - Machine learning models (Decision Trees, Random Forests, Neural Networks)
- **Example:**
  - A bank wants to predict which customers are likely to default on loans.

3. Prescriptive Analytics (Recommending Actions)

- **Goal:** Suggest the best course of action based on predictions.
- **When to use:** If the business wants to know *what should we do?*
- **Common Techniques:**
  - Optimization models (Linear Programming)
  - Reinforcement learning
  - Decision-making algorithms (Monte Carlo simulations)
- **Example:**
  - A delivery company wants to optimize its routes to reduce fuel costs.

How This Helps in Choosing the Right Model

- **If your problem is about analyzing past trends**, you'll use descriptive methods like visualization, clustering, and statistics.
- **If you need to predict future outcomes**, you'll use machine learning models like regression, decision trees, or time-series analysis.
- **If you need to make decisions based on predictions**, you'll use optimization techniques or reinforcement learning.

Example Case:

Let’s say you’re working with an e-commerce company that wants to reduce customer churn.

- If the company wants to analyze past churn trends → **Descriptive analytics** (e.g., customer segmentation, retention rates).
- If the company wants to predict which customers will churn → **Predictive analytics** (e.g., logistic regression, random forests).
- If the company wants to know the best way to retain at-risk customers → **Prescriptive analytics** (e.g., recommending personalized discounts using an optimization model).