**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).