Types of analytics: descriptive, predictive, prescriptive

1. Descriptive Analytics

Descriptive analytics is the most basic and foundational type of analysis. Its primary purpose is to answer the question, **"What happened?"** It summarizes historical data to provide insights into past events and performance. This is all about looking at the past to understand the present.

- **Key Characteristics:**
  - Focuses on historical and real-time data.
  - Uses simple statistical methods like averages, percentages, and frequency counts.
  - Often involves data aggregation and data mining to identify trends and patterns.
  - The results are typically presented in an easily digestible format, such as reports, dashboards, and data visualizations (charts, graphs, etc.). .
- **Common Examples:**
  - **Sales Reports:** A report showing the total sales revenue by quarter, month, or product.
  - **Financial Statements:** Analyzing balance sheets and income statements to understand financial health.
  - **Social Media Metrics:** Tracking the number of likes, shares, followers, and engagement rates on social media platforms.
  - **Website Analytics:** Summarizing website traffic, bounce rates, and popular pages.
  - **HR Dashboards:** Visualizing employee turnover rates or average time to hire.

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2. Predictive Analytics

Predictive analytics is the next step up. It uses historical data and statistical models to answer the question, **"What is likely to happen?"** It identifies patterns and relationships in

data to make forecasts about future events and behaviors.

- **Key Characteristics:**
  - Relies on techniques like **regression analysis, machine learning, and time series forecasting**.
  - It doesn't predict a definite outcome but rather the **probability** of an outcome.
  - Requires a solid foundation of descriptive data to build accurate models.
  - The output is a prediction or a forecast that helps in proactive decision-making.
- **Common Examples:**
  - **Sales Forecasting:** Predicting next quarter's sales based on historical data, seasonality, and market trends.
  - **Customer Churn Prediction:** Identifying which customers are at risk of leaving so the company can intervene with retention strategies.
  - **Credit Risk Scoring:** Assessing a borrower's likelihood of defaulting on a loan based on their financial history.
  - **Preventive Maintenance:** Predicting when a piece of machinery is likely to fail so maintenance can be scheduled in advance.
  - **Fraud Detection:** Identifying unusual transaction patterns in real-time that suggest fraudulent activity.

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3. Prescriptive Analytics

Prescriptive analytics is the most advanced type of analytics. It goes beyond predicting what will happen and actually recommends a course of action. It answers the question, **"What should we do?"** or **"How can we make this happen?"** It combines descriptive and predictive insights with optimization and simulation techniques to suggest the best possible decision.

- **Key Characteristics:**
  - Uses complex algorithms, machine learning, and optimization models.
  - Considers multiple factors, constraints, and objectives to recommend an optimal solution.
  - Often involves A/B testing and simulations to compare different scenarios.
  - Aims to automate and enhance complex decision-making processes.
- **Common Examples:**
  - **Supply Chain Optimization:** Determining the most cost-effective and efficient shipping routes, or what to stock and where to stock it.
  - **Dynamic Pricing:** Automatically adjusting ticket or product prices in real-time based on demand, competitor prices, and inventory levels (e.g., airline tickets).

- **Marketing Campaign Optimization:** Recommending the ideal content and timing for an ad campaign to a specific customer segment to maximize conversion.
- **Inventory Management:** Recommending the optimal level of inventory to hold to meet future demand while minimizing carrying costs.