Data Analysis and Visualization

Introduction to Data Analysis

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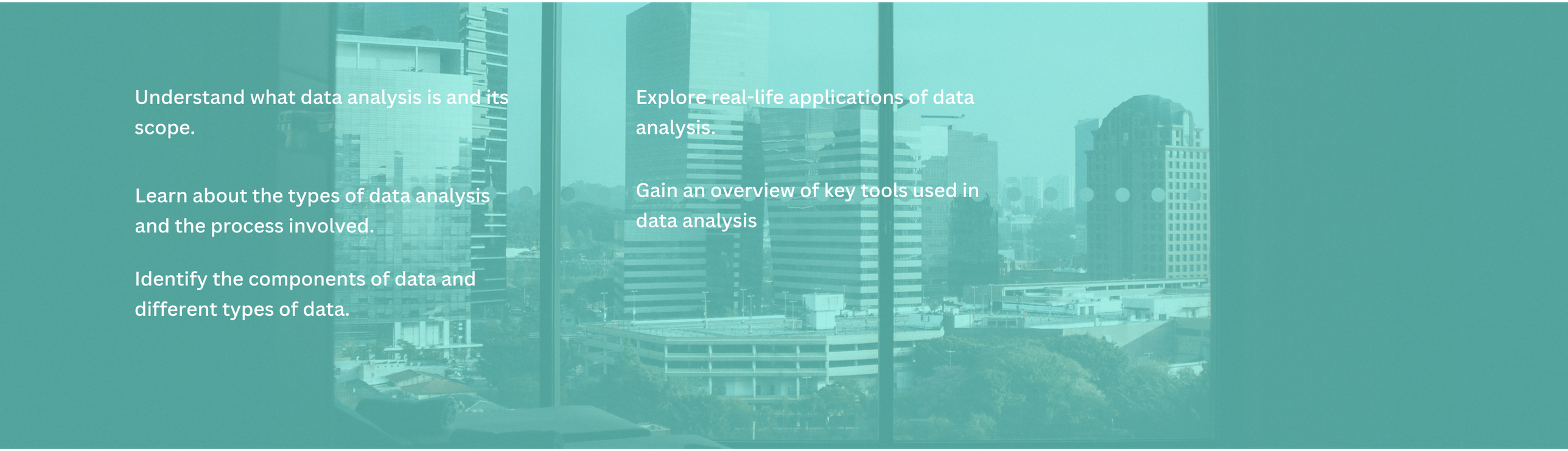
Data Scientist

Learning Objectives



Understand what data analysis is and its scope.

Learn about the types of data analysis and the process involved.

Identify the components of data and different types of data.

Explore real-life applications of data analysis.

Gain an overview of key tools used in data analysis

What is Data Analysis?

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Why is it important?

Helps in decision-making

Identifies patterns and trends.

Improves operational efficiency.

Data Analysis and Visualization

Types of Data Analysis

Descriptive Analysis

Summarizes past data (e.g., monthly sales report).

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Explains reasons for trends or patterns (e.g., why sales dropped).

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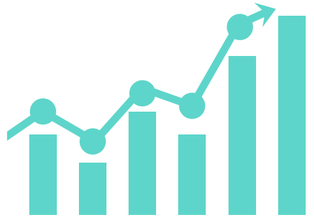
Predictive Analysis

Uses data to forecast future outcomes (e.g., predicting next month’s sales).



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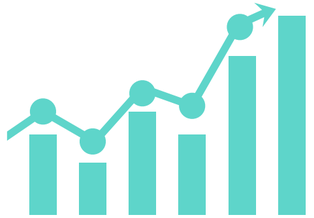


Diagnostic Analysis

Explains reasons for trends or patterns (e.g., why sales dropped).

Prescriptive Analysis

Recommends actions based on insights (e.g., marketing strategies).

Components of a Datum

The raw material of data analysis is data.

Component	Description	Example
Unit of Analysis	The entity being studied	Person, Product
Variable	Characteristics being measured	Age, Price
Value	Data points collected for each entity	25 years, $15

Types of Data

Quantitative Data: Numeric data (e.g., income, age).

Qualitative Data: Descriptive data (e.g., gender, feedback).

Types of Data

Aspect	Quantitative Data	Qualitative Data
Definition	Numeric data that can be measured or counted.	Descriptive data that captures qualities, characteristics, or categories.
Examples	Income, age, height, test scores.	Gender, customer feedback, color of products.
Nature	Objective and measurable.	Subjective and descriptive.
Representation	Numbers (e.g., 25, $50,000).	Words, labels, or categories (e.g., "Excellent," "Male").
Analysis Methods	Statistical techniques (e.g., averages, trends).	Thematic analysis, content analysis.
Outcome	Answers "How much?" or "How many?"	Answers "What type?" or "Why?"

Scales of Measurement

Qualitative

Nominal

Categories without order (e.g., gender, city names).

Ordinal

Ordered categories (e.g., satisfaction ratings: high, medium, low).

Quantitative

Interval

Numerical data without a true zero (e.g., temperature in Celsius).

Ratio

Numerical data with a true zero (e.g., weight, income)

Scales of Measurement

Scale	Description	Examples	Key Features
Nominal	Categories without a natural order.	Gender (Male, Female), City Names (Lagos, Abuja).	No ranking or ordering.
Ordinal	Ordered categories with a meaningful sequence.	Satisfaction (High, Medium, Low), Education Level (Primary, Secondary, Tertiary).	Ordered but differences aren't measurable.
Interval	Numerical data without a true zero point.	Temperature in Celsius, Time of Day.	Differences are measurable; no absolute zero.
Ratio	Numerical data with a true zero point.	Weight (50 kg), Income ($5,000).	True zero allows ratios (e.g., $10 is twice $5).

Process of Data Analysis

Define the problem or objective

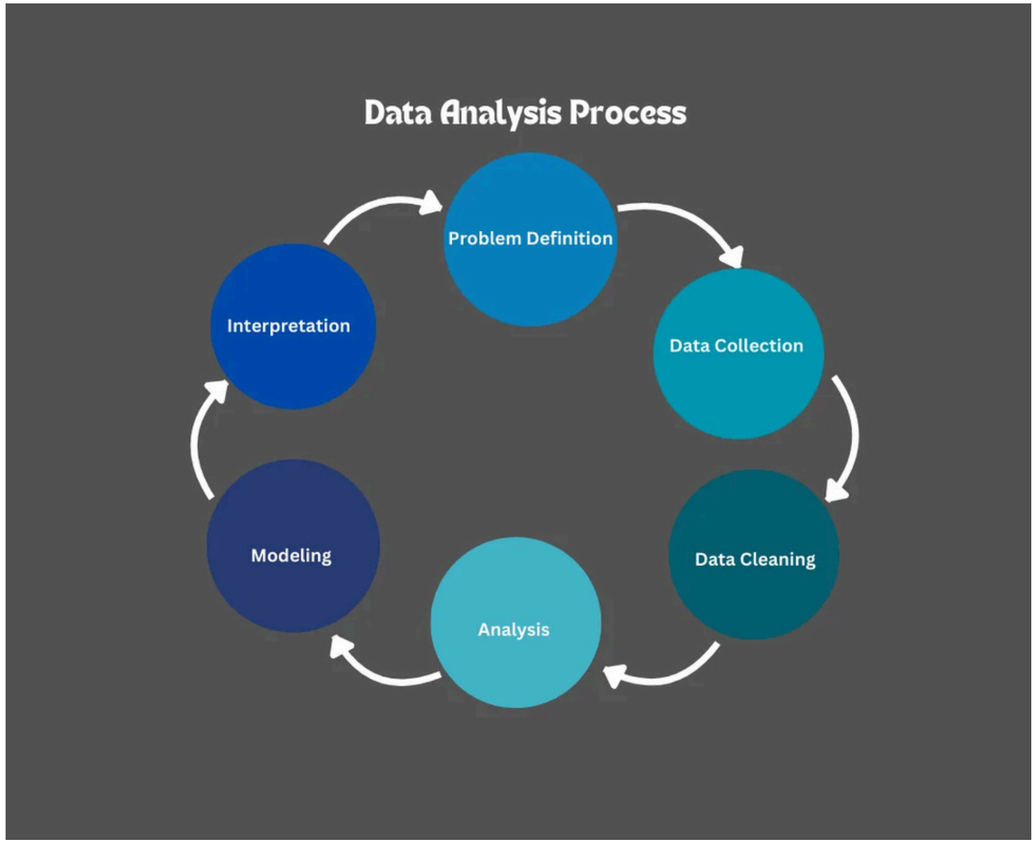
Data Collection

Data Cleaning

Analyze

Interpret results

Share insights



Applications of Data Analysis

Healthcare

Patient data analysis for better treatment.

Retail

Customer purchase analysis to improve sales.

Finance

Fraud detection and risk management.

Overview of Tools

Python

Excel

Data cleaning, visualization, and basic analysis.

SQL

Managing and querying large datasets.

Tableau

Creating interactive dashboards and visualizations.

Recap and Q&A

Key Points Covered

- What is data analysis?
- Types and scales of data.
- Real-life applications and tools.
- Activity and case study wrap-up.

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