PRESENTATION

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AGENDA

- 5 Quick MCQs
- NumPy Introduction
- Key Components
- ndarray Basics
- 4–5 Core Concepts + Practice
- Reference Notebooks

Quiz Time

QUICK REVISION QUIZ (MCQS & TRUE/FALSE)

1️⃣ What is the primary data type in Pandas?

- A) List
- B) Dictionary
- C) DataFrame
- D) Tuple

QUICK REVISION QUIZ (MCQS & TRUE/FALSE)

2️⃣ Which function is used to read a CSV file into Pandas?

- A) pd.load_csv()
- B) pd.read_csv()
- C) pd.import_csv()
- D) pd.open_csv()

QUICK REVISION QUIZ (MCQS & TRUE/FALSE)

3 What does df.head(5) do?

- A) Displays the last 5 rows
- B) Displays the first 5 rows
- C) Shows column names
- D) Returns the shape of the DataFrame

QUICK REVISION QUIZ (MCQS & TRUE/FALSE)

4 Which method removes missing values from a DataFrame?

- A) dropna()
- B) fillna()
- C) replace_na()
- D) remove_na()

QUICK REVISION QUIZ (MCQS & TRUE/FALSE)

5 What is the default axis for df.sum()?

- A) 0 (Column-wise)
- B) 1 (Row-wise)
- C) -1 (Entire DataFrame)
- D) No default axis

Introduction to NumPy

INTRODUCTION TO NUMPY

📌 What is NumPy?

Core: ndarray object for N-dimensional data

Highlights:

- Vectorized operations
- Broad ecosystem support (SciPy, Pandas, etc.)
- Memory efficiency vs. Python lists

KEY COMPONENTS

- **Arrays**: np.array(), np.zeros(), np.ones(), np.arange(), np.linspace()
- **Data Types**: dtype
- **Shape & Reshape**: .shape, .reshape(), .ravel()
- **Broadcasting**: Automatic expansion of dimensions

NUMPY NDARRAYS

📌 What is a N-dimensional array object?

- **Definition**: N-dimensional array object
- **Attributes**: shape, ndim, size, dtype

```
import numpy as np
arr = np.array([[1,2],[3,4]])
print(arr.shape)  # (2,2)
```

CONCEPT 1 – CREATING ARRAYS

📌 **Methods:**

np.array(), np.zeros(), np.ones(), np.arange(), np.linspace()

Practice:

1. Create a 1D array of numbers 0 to 9.
2. Create a 2D 3x3 array of all ones.

CONCEPT 2 – INDEXING & SLICING

📌**Indexing: arr[0], arr[1, 2]**

- **Slicing**: arr[1:3], arr[:, 0:2]

Practice:

- Slice the first 2 rows and 2 columns of a 4x4 array.
- Extract the last row of a 2D array.

CONCEPT 3 – ARITHMETIC & BROADCASTING

📌**Arithmetic: arr1 + arr2, arr * 3**

- **Broadcasting:** Automatically aligns shapes for operations

Practice:

- Multiply a 2D array by a 1D array (check broadcasting).
- Add a scalar to every element in a 1D array

CONCEPT 4 – RESHAPING & TRANSPOSING

📌**Reshape: arr.reshape(new_shape)**

- **Transpose:** arr.T

Practice:

- Reshape a 1D array into 2D form.
- Transpose a 2D matrix and compare shapes.

CONCEPT 5 – AGGREGATIONS

📌**Common Functions:** np.sum(), np.mean(), np.min(), np.max(), np.std()
Axis Control:axis=0 (columns), axis=1 (rows)

Practice:

- Compute the mean across rows.
- Find the max element in each column.

REFERENCE NOTEBOOKS

- Notebook 1: NumPy Basics (creation, shape, dtype)
- Notebook 2: Indexing & Slicing
- Notebook 3: Broadcasting & Arithmetic
- Notebook 4: Reshaping & Aggregations

THANK YOU