NumPy Basics

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1. What is NumPy?

NumPy is a Python library used for numerical computations.
It provides support for arrays, matrices, and mathematical functions.

Example:

```
import numpy as np
a = np.array([1, 2, 3])
print(a)
```

2. Why is NumPy faster than Python lists?

NumPy is faster because:
It uses C and C++ internally
Stores data in continuous memory
Performs operations using vectorization.

Example:

Python List

```
lst = [1, 2, 3]
lst = [x + 2 for x in lst]
```

NumPy Array

```
import numpy as np
arr = np.array([1, 2, 3])
arr = arr + 2
```

3. What is an ndarray?

An ndarray (N-dimensional array) is the main data structure of NumPy.
It stores elements of the same data type in a structured format.

Example:

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

4. Difference between array and list

NumPy Array	Python List
Same data type	Different data types
Faster	Slower
Uses less memory	Uses more memory
Supports math operations	Limited math Supports

Example:

Python List

```
lst = [1, "apple", 3.5]
```

NumPy Array

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

5. What is broadcasting?

Broadcasting is a NumPy feature that allows operations on arrays of different shapes without copying data.

Example:

Adding a number to all elements of an array.

```
import numpy as np
arr = np.array([1, 2, 3])
result = arr + 5
print(result)
```