# Python Programming

## Unit 06 – Lecture 02: NumPy Functions (Stats, Sorting, Searching)

Tofik Ali

School of Computer Science, UPES Dehradun

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Repository: `https://github.com/tali7c/Python-Programming`

# Quick Links

Core Concepts Demo Interactive Summary

# Agenda

# Learning Outcomes

- Use important NumPy functions: `reshape`, `sum`, `mean`, `std`

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- Sort and search arrays
- Compute dot products and matrix multiplication

# Reshaping Arrays

```
a = np.arange(1, 10)
m = a.reshape((3, 3))
```

- Total elements must match (size stays same)

# Statistics

- `sum`, `mean`, `std`, `min`, `max`

```
print(m.sum(axis=0))   # column sums
print(m.sum(axis=1))   # row sums
```

# Statistics

- `sum`, `mean`, `std`, `min`, `max`
- Use `axis=` for row/column-wise operations

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# Sorting and Searching

- `np.sort`, `np.argsort`

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- `np.sort`, `np.argsort`
- `np.max`, `np.argmax`
- `np.where(condition)`

# Dot Product / Matrix Multiplication

```
a = np.array([1, 2, 3])
b = np.array([4, 5, 6])
print(a.dot(b))

M = np.arange(1, 10).reshape((3, 3))
print(M @ M)
```

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# Checkpoint 1

**Question:** What does `axis=0` mean in `sum(axis=0)` for a 2D array?

# Checkpoint 2

**Question:** What is the difference between `np.sort(a)` and `a.sort()`?

# Think-Pair-Share

Discuss:

- When should you use `reshape` in data analysis?

# Key Takeaways

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- `reshape` changes shape without changing data
- Axis-based operations compute row/column stats
- NumPy supports fast sorting/searching and linear algebra operations

# Exit Question

Name one NumPy function to generate a sequence of numbers.