DATA SCIENCE COURSE TUTORIAL # 22

3.14 Nested For Loop and Nested While Loop

In Python, loops can be placed inside other loops. This is called a **nested loop**. It is commonly used when working with multi-level data such as lists within lists or for creating patterns.

Nested For Loop

A `for` loop inside another `for` loop.

Example:

```python
for i in range(3):
    for j in range(2):
        print("i:", i, "j:", j)
```

Output:

```
i: 0 j: 0
i: 0 j: 1
i: 1 j: 0
i: 1 j: 1
i: 2 j: 0
i: 2 j: 1
```

Nested While Loop

A `while` loop inside another `while` loop.

Example:

```python
i = 1
while i <= 3:
    j = 1
    while j <= 2:
        print("i:", i, "j:", j)
        j += 1
    i += 1
```

Output:

```
i: 1 j: 1
i: 1 j: 2
i: 2 j: 1
i: 2 j: 2
i: 3 j: 1
i: 3 j: 2                                          2 / 2
```

Usage of Nested Loops

- Working with **2D lists (matrix)**.
- Printing **patterns** (stars, numbers, shapes).
- Handling **complex data structures**.