

Artificial Intelligence/Machine Learning UpSkills Notebook

From Basics to Real-World — Starts Your ML Journey

What Are Control Flow Statements?

- **Control flow statements** are special instructions in Python that control the order in which your code runs.
- They decide which block of code should run next, based on conditions or repetition.

Types of Control Flow Statements

① Conditional Statements

Conditional statements let your program make decisions by running different blocks of code based on whether a condition is True or False.

Types of Conditional Statements :

- **if statement**

Runs a block of code only if a given condition is True.

Example:

```
In [1]: x = 10
        if x > 5:
            print("x is greater than 5")
```

x is greater than 5

- **if-else Statement**

Runs one block of code if the condition is True, otherwise runs the else block.

Example:

```
In [2]: age = 16
        if age >= 18:
            print("You can vote.")
        else:
            print("You are not eligible to vote yet.")
```

You are not eligible to vote yet.

- **if-elif-else ladder**

Checks multiple conditions in order, and runs the block for the first True condition.

Example:

```
In [3]: marks = 75

        if marks >= 90:
            print("Grade A")
        elif marks >= 75:
            print("Grade B")
        elif marks >= 60:
```

```
print("Grade C")
else:
    print("Grade D")
```

Grade B

- **Nested if**

An if statement inside another if statement, useful for more detailed checks.

Example:

```
In [4]: num = 8

if num >= 0:
    if num % 2 == 0:
        print("Positive and even")
    else:
        print("Positive and odd")
else:
    print("Negative number")
```

Positive and even

Loops

Loops let your program repeat a block of code multiple times until a condition is met or over a sequence.

Types of loops :

- **While loop**

Repeats a block of code as long as a condition is True.

Example:

```
In [6]: count = 0

while count < 3:
    print("Count is:", count)
    count += 1
```

Count is: 0
Count is: 1
Count is: 2

- **for loop**

Repeats a block of code for each item in a sequence (like a list, tuple, string, or range).

Example:

```
In [7]: for i in range(1, 6):
        print(i)
```

1
2
3
4
5

- **Nested loops**

A loop inside another loop, useful for working with grids, tables, or patterns.

```
In [8]: for i in range(1, 4):
        for j in range(1, 4):
            print(f"i={i}, j={j}")
```

i=1, j=1
i=1, j=2
i=1, j=3
i=2, j=1
i=2, j=2
i=2, j=3
i=3, j=1
i=3, j=2
i=3, j=3

Loop Control Statements

Special statements that control how loops behave — they can stop a loop, skip steps, or do nothing.

Types of Loop Control Statements :

- **break**

Stops the loop immediately, even if the condition or sequence is not finished.

Example:

```
In [11... for i in range(10):  
        if i == 5:  
            break  
        print(i)
```

```
0  
1  
2  
3  
4
```

- **continue**

Skips the current iteration and moves to the next loop cycle.

Example:

```
In [12... for i in range(5):  
        if i == 2:  
            continue  
        print(i)
```

```
0  
1  
3  
4
```

- **pass**

Does nothing — it acts as a placeholder when a statement is required syntactically but no action is needed.

Example:

```
In [13... for letter in "Python":  
        if letter == "h":  
            pass # Placeholder, does nothing  
        else:  
            print("Current Letter:", letter)
```

```
Current Letter: P  
Current Letter: y  
Current Letter: t  
Current Letter: o  
Current Letter: n
```

The range() function

The range() function generates a sequence of numbers — it's often used with for loops.

Syntax:

range(stop)

range(start, stop)

range(start, stop, step)

Examples:

① Basic range:

```
In [18... for i in range(5):
```

```
print(i)
```

```
0  
1  
2  
3  
4
```

② Range with start and stop:

```
In [20... for i in range(2, 6):  
         print(i)
```

```
2  
3  
4  
5
```

③ Range with step:

```
In [21... for i in range(1, 10, 2):  
         print(i)
```

```
1  
3  
5  
7  
9
```

"else" Clauses on Loops

In Python, loops can have an else block that runs only if the loop finishes normally (not terminated by break).

Example:

```
In [23... for i in range(5):  
         print(i)  
     else:  
         print("Loop finished without break.")
```

```
0  
1  
2  
3  
4  
Loop finished without break.
```

With break:

```
In [24... for i in range(5):  
         if i == 3:  
             break  
         print(i)  
     else:  
         print("Loop finished without break.")
```

```
0  
1  
2
```

"match" Statement (Structural Pattern Matching)

The match statement (introduced in Python 3.10) is like a switch in other languages. It matches a value against patterns.

```
In [ ]: #Syntax:  
match variable:  
    case pattern1:  
        # Code block  
    case pattern2:  
        # Code block  
    case _:  
        # Default case
```

Example:

```
In [28... status_code = 404  
  
match status_code:  
    case 200:  
        print("OK")
```

```
case 404:
    print("Not Found")
case 500:
    print("Server Error")
case _:
    print("Unknown Status")
```

Not Found

Summary

In this notebook, you learned how Python controls the flow of a program using different tools:

❑ ❶ Conditional Statements

Use if, elif, else, and nested if to make decisions and run code only when certain conditions are true.

❑ ❷ Loops

Use while and for loops to repeat actions automatically.

Use nested loops to handle patterns or multiple layers of repetition.

❑ ❸ Loop Control Statements

break stops a loop early.

continue skips the current loop step and goes to the next one.

pass does nothing but keeps your code valid — useful as a placeholder.

❑ ❹ range() Function

Generates a sequence of numbers — useful with for loops.

❑ ❺ else with Loops

Runs only if the loop completes normally without break.

❑ ❻ match Statement

A modern way to handle multiple conditions with cleaner, pattern-based matching (like switch in other languages).

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