

Artificial Intelligence/Machine Learning UpSkills Notebook

From Basics to Real-World — Starts Your ML Journey

Agenda — Variables and Data Types in Python

In this notebook, you will learn:

What is a Variable?

- Meaning and purpose of variables
- How to declare and use them in Python

Variable Naming Rules

- Valid names and best practices

Basic Data Types

- `int` (integers)
- `float` (decimals)
- `str` (strings)
- `bool` (True/False)
- `NoneType` (represents nothing)

Using `type()` to check data type

Type Conversion

- Changing from one type to another (`int()` , `float()` , `str()`)

Dynamic Typing in Python

- How Python allows changing a variable's type

Code Examples for each topic

Summary & Best Practices

Goal: By the end of this notebook, you'll confidently understand how variables and data types work in Python!

What is a Variable?

A **variable** is a name that refers to a value stored in the computer's memory.

In Python, you **do not need to declare** the data type — Python figures it out automatically.

Naming Rules for Variables

- Names are **case-sensitive** (`name` and `Name` are different).
- Must start with a **letter** or underscore `_`.
- Cannot start with a digit.
- Can contain letters, numbers, or underscores.
- Should not use **Python keywords** (`if` , `else` , `for` , etc.)

Example: Declaring Variables

```
In [1]: # Assigning variables
name = "Alice"
age = 25
height = 5.6
is_student = True

print(name)
print(age)
print(height)
print(is_student)
```

```
Alice
25
5.6
True
```

Basic Data Types in Python

Python has **built-in data types**.

The most common are:

- **int** → Integer numbers

```
In [7]: # Example of an integer
number = 10
print(number)
print(type(number))
```

```
10
<class 'int'>
```

- **float** → Decimal numbers

```
In [6]: # Example of a float
price = 19.99
print(price)
print(type(price))
```

```
19.99
<class 'float'>
```

- **str** → String (text)

```
In [8]: # Example of a string
name = "Alice"
print(name)
print(type(name))
```

```
Alice
<class 'str'>
```

- **bool** → Boolean (`True` or `False`)

```
In [9]: # Example of a boolean
is_sunny = True
print(is_sunny)
print(type(is_sunny))
```

```
True
<class 'bool'>
```

- **NoneType** → Special type to represent **nothing**

```
In [10]: # Example of NoneType
result = None
print(result)
print(type(result))
```

```
None
<class 'NoneType'>
```

Checking Types

Example: Checking Types

```
In [11... # Using type() function
print(type(name))    # str

<class 'str'>
```

```
In [12... print(type(age))    # int

<class 'int'>
```

```
In [13... print(type(height)) # float

<class 'float'>
```

```
In [14... print(type(is_student)) # bool

<class 'bool'>
```

Type Conversion

You can **convert** one data type to another:

- `int()` → to integer
- `float()` → to float
- `str()` → to string
- `bool()` → to boolean

Example: Type Conversion

```
In [15... num_str = "123"
print(num_str, type(num_str))

123 <class 'str'>
```

```
In [16... num_int = int(num_str)
print(num_int, type(num_int))

123 <class 'int'>
```

```
In [17... num_float = float(num_str)
print(num_float, type(num_float))

123.0 <class 'float'>
```

```
In [18... # Converting number to string
age_str = str(age)
print(age_str, type(age_str))

25 <class 'str'>
```

Dynamic Typing

Python is **dynamically typed**: you can change a variable's type by assigning a new value.

Example: Dynamic Typing

```
In [19... value = 10 # int
print(value, type(value))

10 <class 'int'>
```

```
In [20... value = "Ten" # now str
print(value, type(value))

Ten <class 'str'>
```

```
In [21... value = 10.5 # now float
print(value, type(value))

10.5 <class 'float'>
```

Summary

- Variables store data in memory.
- Data types define what kind of data is stored.

- Use `type()` to check the type.
- Python handles types automatically — you can reassign variables to different types.

**** Keep practicing by creating your own variables and testing their types!****

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