Varun Sagar
Theegala

10 PYTHON FUNCTIONS TO AUTOMATE & SIMPLIFY COMPLEX TASKS

Varun Sagar
Theegala

One of Python's greatest strengths lies in its **ability to automate repetitive tasks.**

Functions like **map(), filter(), lambda, and list comprehensions** streamline your code, making it **cleaner, faster, and more efficient**.

These functions enables you to **automate data transformations and repetitive workflows** with minimal effort, significantly enhancing your productivity.

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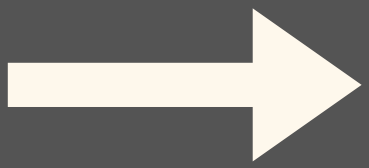
LET'S VISIT 10 FUNCTIONS & LIST COMPREHENSION THAT CAN AUTOMATE YOUR WORK



#1. map()

Apply a Function to Each Element

WHAT IT IS ?

Apply a function to each item in an iterable (e.g., list, tuple).

WHY IT MATTERS ?

Automates repetitive transformations across all elements, reducing the need for manual loops.

HOW TO IMPLEMENT ?

Use map() to transform data in one step.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
numbers = [1, 2, 3, 4, 5]
even_numbers = []
for num in numbers:
    if num % 2 == 0:
        even_numbers.append(num)
```

AFTER IMPLEMENTATION

```
numbers = [1, 2, 3, 4, 5]
even_numbers = list(filter(lambda x: x % 2 == 0, numbers))
```

#2 filter():

Select Items Based on Condition

WHAT IT IS ?

Filters elements of an iterable based on a condition.

WHY IT MATTERS ?

Automates filtering logic without needing verbose loops, keeping code concise.

HOW TO IMPLEMENT ?

Use filter() to keep elements that meet specific criteria.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
numbers = [1, 2, 3, 4, 5]
even_numbers = []
for num in numbers:
    if num % 2 == 0:
        even_numbers.append(num)
```

AFTER IMPLEMENTATION

```
numbers = [1, 2, 3, 4, 5]
even_numbers = list(filter(lambda x: x % 2 == 0, numbers))
```

#3 lambda

Write Anonymous Functions

WHAT IT IS ?

Creates small, unnamed functions on the fly for quick use.

WHY IT MATTERS ?

Allows for more compact, readable code without the need for full function definitions.

HOW TO IMPLEMENT ?

Use lambda for simple functions that you use only once or in combination with map() or filter().

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
def multiply_by_2(x):
    return x * 2
result = multiply_by_2(5)
```

AFTER IMPLEMENTATION

```
result = (lambda x: x * 2)(5)
```

#4

List Comprehensions

Simplify List Creation

WHAT IT IS ?

A concise way to create lists by transforming or filtering elements.

WHY IT MATTERS ?

List comprehensions combine looping, filtering, and transformation into one step, reducing the need for multiple lines of code.

HOW TO IMPLEMENT ?

Use list comprehensions for transforming lists in one line.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
numbers = [1, 2, 3, 4]
squared = []
for num in numbers:
    squared.append(num ** 2)
```

AFTER IMPLEMENTATION

```
numbers = [1, 2, 3, 4]
squared = [num ** 2 for num in numbers]
```

#5 reduce()

Reduce a Sequence to a Value

WHAT IT IS ?

Applies a function cumulatively to the items of an iterable, reducing it to a single value.

WHY IT MATTERS ?

Simplifies complex cumulative operations into one concise step.

HOW TO OPTIMISE ?

Use reduce() for tasks like summing or multiplying all elements in a list.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```python
from functools import reduce
numbers = [1, 2, 3, 4]
total = 0
for num in numbers:
    total += num
```

AFTER IMPLEMENTATION

```python
from functools import reduce
numbers = [1, 2, 3, 4]
total = reduce(lambda x, y: x + y, numbers)
```

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#6 zip()

Combine Iterables Element-wise

WHAT IT IS ?

Combine two or more iterables (e.g., lists, tuples) element-wise into a single iterable.

WHY IT MATTERS ?

Helps in merging data from multiple sources without using loops, making it easy to pair related data.

HOW TO OPTIMISE ?

Use zip() to iterate over multiple iterables at once.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```python
names = ["Alice", "Bob", "Charlie"]
ages = [25, 30, 35]
pairs = []
for i in range(len(names)):
    pairs.append((names[i], ages[i]))
```

AFTER IMPLEMENTATION

```python
names = ["Alice", "Bob", "Charlie"]
ages = [25, 30, 35]
pairs = list(zip(names, ages))
```

#7 enumerate()

Track Indexes in Loops

WHAT IT IS ?

Returns an iterator that provides both the index and the value of each element in an iterable.

WHY IT MATTERS ?

Simplifies the task of tracking both the index and the element in loops, without manually managing counters.

HOW TO OPTIMISE ?

Use enumerate() when you need to access both the index and the element.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
items = ['apple', 'banana', 'cherry']
index = 0
for item in items:
    print(index, item)
    index += 1
```

AFTER IMPLEMENTATION

```
items = ['apple', 'banana', 'cherry']
for index, item in enumerate(items):
    print(index, item)
```

#8 sorted()

Sort Iterables Efficiently

WHAT IT IS ?

Sorts elements of an iterable, returning a new sorted list.

WHY IT MATTERS ?

Easily sorts any iterable, allowing you to order data without manually implementing sorting algorithms.

HOW TO OPTIMISE ?

Use sorted() to sort lists, tuples, or any iterable.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
numbers = [5, 2, 9, 1]
sorted_numbers = []
while numbers:
    smallest = min(numbers)
    sorted_numbers.append(smallest)
    numbers.remove(smallest)
```

AFTER IMPLEMENTATION

```
numbers = [5, 2, 9, 1]
sorted_numbers = sorted(numbers)
```

#9 any() and all()

Evaluate Conditions in Iterables

WHAT IT IS ?

any() returns True if any element in an iterable is True, and all() returns True if all elements are True.

WHY IT MATTERS ?

Simplifies checks across entire lists or iterables without writing loops for boolean checks.

HOW TO OPTIMISE ?

Use any() or all() to evaluate conditions in a collection of elements.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
ages = [22, 17, 19, 16]
has_minors = False
for age in ages:
    if age < 18:
        has_minors = True
        break
```

AFTER IMPLEMENTATION

```
ages = [22, 17, 19, 16]
has_minors = any(age < 18 for age in ages)
```

#10 collections.Counter()

Count Elements in an Iterable

WHAT IT IS ?

A quick and efficient way to count occurrences of elements in a list, tuple, or any iterable.

WHY IT MATTERS ?

Simplifies counting operations, which are commonly needed in data analysis, without manually iterating through the data.

HOW TO OPTIMISE ?

Use Counter() to count the frequency of elements in an iterable.

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LET'S WORK WITH AN EXAMPLE

BEFORE IMPLEMENTATION

```
items = ['apple', 'banana', 'apple', 'orange', 'banana']
item_count = {}
for item in items:
    if item in item_count:
        item_count[item] += 1
    else:
        item_count[item] = 1
```

AFTER IMPLEMENTATION

```
from collections import Counter
items = ['apple', 'banana', 'apple', 'orange', 'banana']
item_count = Counter(items)
```

TL;DR:

1. Use **map()** to apply functions to iterables.
2. Use **filter()** to filter elements based on conditions.
3. Write small, anonymous functions using lambda.
4. Use **list comprehensions** for concise list creation.
5. Use **reduce()** to reduce a sequence to a single value.
6. Use **zip()** to combine iterables element-wise.
7. Use **enumerate()** to track indexes in loops.
8. Use **sorted()** to efficiently sort iterables.
9. Use **any()** to check if any condition is met.
10. Use **Counter()** to count element instances in iterables.

REMEMBER

These Python functions **simplify repetitive tasks**, making your code more **efficient and easier to maintain.**

By implementing them, you'll not only **save time** but also **improve the readability** of your scripts.

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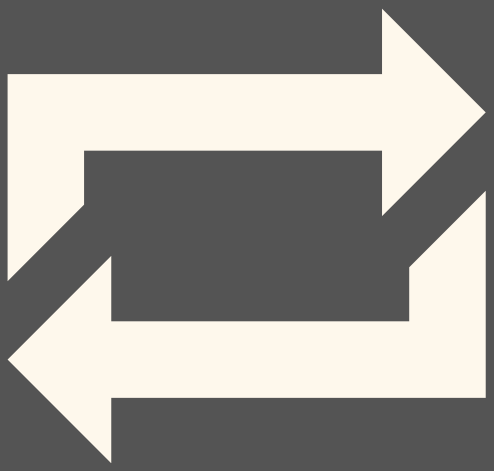

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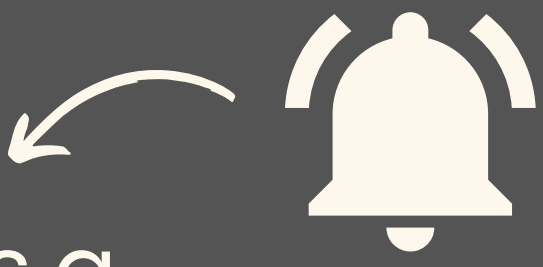

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