PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

Functional Programming - Filter

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Filter() Function

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•Filter function filters the given sequence with the help of a function that tests each element in the sequence to be true or not.

•There are cases where we want to remove a few elements of the input iterable. Then we make use of the filter function.

•Syntax: filter(*function*, *sequence/iterable*)

•***function:*** function that tests if each element of a sequence is true or not.

•***sequence:*** The sequence which needs to be filtered, it can be sets, lists, tuples, or containers of any iterators.

•***Returns:*** an iterator that is already filtered.

Filter() Function

The filter function has the following characteristics.

- Input : an iterable of some number of elements (say n)
- Output: a lazy iterable of 0 to n elements (between 0 and n)
- Elements in the output: apply the callback on each element of the iterable – if the function returns true, then the input element is selected otherwise the input element is rejected.

Examples

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Example 1: Program to list the marks which are greater than 70

```
marks = [55, 78, 90, 87, 65, 45]

def myFunc(m):
  if m <70 :
    return False
  else:
    return True

Distinction = list(filter(myFunc, marks))print(list(filter(lambda x: True if x>=70 else False, [55, 78, 90, 87, 65, 45])))
print("Students with marks greater than 70 are",Distinction)
```

Output:

Students with marks greater than 70 are [78, 90, 87]

Examples

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Example 2: Function that filters vowels

```
def fun(char):
    letters = ['a', 'e', 'i', 'o', 'u']
    if (char in letters):
        return True
    else:
        return False

characters = ['h', 'e', 'l', 'l', 'o', 'w', 'o', 'r','l','d']
 vowels = list(filter(fun, characters))
print('The filtered letters are:',vowels)
```

Output

```
The filtered letters are: ['e', 'o', 'o']
```

Examples

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Example 3 –Use of lambda function to filter out the odd and even numbers from a list.

```
sequence = [0,1, 1, 2, 3, 5, 8,19]
# result contains list of odd numbers
result = filter(lambda x: x % 2 != 0, sequence)
print("The odd number list is",list(result))

# result contains list of even numbers
result = filter(lambda x: x % 2 == 0, sequence)
print("The even number list is",list(result))
```

Output:

```
The odd number list is [1, 1, 3, 5, 19]
The even number list is [0, 2, 8]
```

Examples

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Example 4: Function to check whether a number is a multiple of 3 using Lambda function in filter function

```
#def is_multiple_of_3(num):
    return num % 3 == 0

# Create a list of numbers to filter
numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
result = list(filter(lambda x: is_multiple_of_3(x), numbers))
print("The list of multiples of 3 is", result)
```

Output:

The list of multiples of 3 is [3, 6, 9]

Examples

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Example 5 : To pickup all words whose length exceeds 5 using map,filter and Lambda function.

```
Names=[ 'Ram', 'Tejas', 'Aditya', 'Ravi', 'Dinesh', 'Raghu' ]
 #finds all names whose length exceeds 5 and converts them to uppercase
print(list(map(str.upper, filter(lambda name : len(name) > 5, Names))))
```

Output:

```
['ADITYA', 'DINESH']
```

THANK YOU

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