

Python Set

Python Sets

- A set is an unordered collection of items. Every element is unique and must be immutable.
- However, the set itself is mutable. We can add or remove items from it.
- Sets can be used to perform mathematical set operations like union, intersection, symmetric difference etc.

Creating a Set

- ❑ A set is created by placing all the elements inside curly braces {}, separated by comma or by using the built-in function set().
- ❑ The elements can be of different types (integer, float, tuple, string etc.).
- ❑ But a set cannot have a mutable element, like [list](#), set or [dictionary](#), as its element.

```
#creating a set
numberSet = {1,2,3,4,3,2}
print(numberSet) |

#creating an empty set
emptySet = {} #This creates a dictionary
print(type(emptySet))

emptySet = set() #This creates a empty set
print(type(emptySet))
```

```
{1, 2, 3, 4}
```

```
<class 'dict'>
```

```
<class 'set'>
```

A set can contain elements of different type

```
# set of mixed datatypes
my_set = {1.0, "Hello", (1, 2, 3)}
print(my_set)
```

```
{1.0, 'Hello', (1, 2, 3)}
```

A set cannot contain lists.

```
set_with_lists = {[1,2,3]}
```

TypeError

We can convert a list to set
using set function

```
set_with_lists = set([1,2,3])
print(type(set_with_lists))
print(set_with_lists)
```

```
<class 'set'>
{1, 2, 3}
```

LIST

- ☐ append
- ☐ extend
- ☐ Insert
- ☐ Pop
- ☐ remove

SET

- ☐ add
- ☐ Update
- ☐ -----
- ☐ -----
- ☐ remove
- ☐ discard

Adding elements to set

- ❑ Sets are mutable. But since they are unordered, indexing have no meaning.
- ❑ We cannot access or change an element of set using indexing or slicing.
- ❑ We can add single element using the **add()** method and multiple elements using the **update()** method.
- ❑ The update() method can take [tuples](#), lists, [strings](#) or other sets as its argument.
- ❑ In all cases, duplicates are avoided.

```
my_set = set()    #empty set
my_set.update([9 , 12])
my_set.update((3,5))
my_set.update("SIKANDER")

print(my_set)
```

```
my_set.update(("INDIA" , "BHARAT"))
print(my_set)
```

```
my_set.update(4,5)
```

TypeError

{3, 5, 9, 'A', 12, 'N', 'E', 'S', 'D', 'R', 'I', 'K'}

Remove elements from a set

- A particular item can be removed from set using methods, discard() and remove().
- using discard() if the item does not exist in the set, it remains unchanged.
- But remove() will raise an error in such condition.

```
print (my_set)
```

```
{3, 5, 9, 12, 'INDIA', 'BHARAT'}
```

```
my_set.discard(12)
```

```
print(my_set)
```

```
{3, 5, 9, 'INDIA', 'BHARAT'}
```

```
my_set.discard(15)  
print(my_set)
```

```
{3, 5, 9, 'INDIA', 'BHARAT'}
```

```
print(my_set)  
my_set.remove(15)
```

```
{3, 5, 9, 'INDIA', 'BHARAT'}
```

KeyError

Set Membership Test

- We can test if an item exists in a set or not, using the **in** operator.

```
# initialize my_set
my_set = set("apple")

# check if 'a' is present
# Output: True
print('a' in my_set)

# check if 'p' is present
# Output: False
print('p' not in my_set)
```

True

False

Exercise 1. DIY

1. Given an list of elements, remove the duplicate elements?
2. Read a string and find the number of unique characters in it.

2 Read a string and find the number of unique characters in it.

```
data = "cranes varsity bangalore"
```

```
unique = set(data)
```

```
print("Number of unique characters =", len(unique))
```

```
print("List of unique characters = ", unique)
```

```
data = list(data)
```

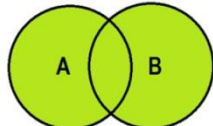
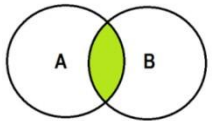
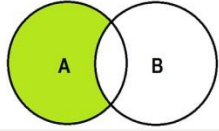
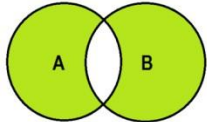
```
for ele in unique:
```

```
    data.remove(ele)
```

```
print("Repeated Characters " , set(data))
```

Python Set Operations

- Sets can be used to carry out mathematical set operations like union, intersection, difference and symmetric difference.
- We can do this with operators or methods.

Method	Operator	
union		
intersection	&	
difference	-	
symmetric_difference	^	

```
A = {1, 2, 3, 4, 5}
B = {4, 5, 6, 7, 8}

print('Union          = ' , A | B)
print('Intersection = ' , A & B)
print('Difference    = ' , A - B)
print('Symmetric Diff = ' , A ^ B)
```

```
Union          = {1, 2, 3, 4, 5, 6, 7, 8}
Intersection = {4, 5}
Difference    = {1, 2, 3}
Symmetric Diff = {1, 2, 3, 6, 7, 8}
```

```
studentList = {'danish', 'jaison', 'sangeetha', 'uma',  
               'amrutha', 'lohita', 'prasad', 'ashwathi'}  
  
placedStudList = ["uma", "danish", "amrutha"]  
  
notPlacedStudList = set(studentList) - set(placedStudList)  
print("Students yet to get job \n", notPlacedStudList)
```

```
batsmen = ["virat", "rohit", "dhawan", "dhoni", "pandya", "jadeja"]
bowlers = ["bhuvenashwar", "shami", "pandya", "jadeja", "kuldeep"]
allrounders = set(batsmen) & set(bowlers)

print("Batsmen : " , batsmen)
print("Bowlers : " , bowlers)
print("All rounders : " , allrounders)
```

```
tcs = ["uma", "danish", "amrutha"]
infosys = ["lohita", "danish", "ashwathi"]
wipro = ["sangeetha", "jaison", "prasad", "amrutha"]

placed = set(tcs) | set(infosys) | set(wipro)

print(placed)
print("Number of people placed = " , len(placed))
```

Set Mutation Operations

- We have seen the applications of *union*, *intersection*, *difference* and *symmetric difference* operations, but these operations do not make any changes or mutations to the set.
- **We can use the following operations to create mutations to a set:**

Method	Operator	
update	=	Update the set by adding elements from an iterable/another set.
intersection_update	&=	Update the set by keeping only the elements found in it and an iterable/another set.
Difference_update	-=	Update the set by removing elements found in an iterable/another set.
symmetric_difference_update	^=	Update the set by only keeping the elements found in either set, but not in both.

- Isdisjoint—This method will return True if two sets have a null intersection
- Issubset—This method reports whether another set contains this set
- Issuperset—This method will report whether this set contains another set

```
numbers = {1,2,3,4,5,6,7,8,9,10}  
odd = {1,3,5,7,9}  
even = {2,4,6,8,10}
```

```
print(odd.isdisjoint(even))      #True  
print(numbers.issuperset(odd))  #True  
print(odd.issuperset(numbers))  #False  
print(odd.issubset(numbers))    #True
```