# Common Operations on Fuzzy Set with Example and Code

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**What is Fuzzy Set ?**

Fuzzy refers to something that is unclear or vague . Hence, Fuzzy Set is a Set where every key is associated with value, which is between 0 to 1 based on the certainity .This value is often called as degree of membership. Fuzzy Set is denoted with a Tilde Sign on top of the normal Set notation.

**Operations on Fuzzy Set with Code :**

**1. Union :**

Consider 2 Fuzzy Sets denoted by A and  B, then let’s consider Y be the Union of them, then for every member of  A and  B, Y will be:

degree\_of\_membership(Y)= max(degree\_of\_membership(A), degree\_of\_membership(B))

**EXAMPLE :**

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| # Example to Demonstrate the  # Union of Two Fuzzy Sets  A = dict()  B = dict()  Y = dict()    A = {"a": 0.2, "b": 0.3, "c": 0.6, "d": 0.6}  B = {"a": 0.9, "b": 0.9, "c": 0.4, "d": 0.5}    print('The First Fuzzy Set is :', A)  print('The Second Fuzzy Set is :', B)      for A\_key, B\_key in zip(A, B):      A\_value = A[A\_key]      B\_value = B[B\_key]        if A\_value > B\_value:          Y[A\_key] = A\_value      else:          Y[B\_key] = B\_value    print('Fuzzy Set Union is :', Y) |

**Output**

The First Fuzzy Set is : {'a': 0.2, 'b': 0.3, 'c': 0.6, 'd': 0.6}

The Second Fuzzy Set is : {'a': 0.9, 'b': 0.9, 'c': 0.4, 'd': 0.5}

Fuzzy Set Union is : {'a': 0.9, 'b': 0.9, 'c': 0.6, 'd': 0.6}

**2. Intersection :**

Consider 2 Fuzzy Sets denoted by A and  B, then let’s consider Y be the Intersection of them, then for every member of  A and  B, Y will be:

degree\_of\_membership(Y)= min(degree\_of\_membership(A), degree\_of\_membership(B))

**EXAMPLE :**

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| # Example to Demonstrate  # Intersection of Two Fuzzy Sets  A = dict()  B = dict()  Y = dict()    A = {"a": 0.2, "b": 0.3, "c": 0.6, "d": 0.6}  B = {"a": 0.9, "b": 0.9, "c": 0.4, "d": 0.5}    print('The First Fuzzy Set is :', A)  print('The Second Fuzzy Set is :', B)      for A\_key, B\_key in zip(A, B):      A\_value = A[A\_key]      B\_value = B[B\_key]        if A\_value < B\_value:          Y[A\_key] = A\_value      else:          Y[B\_key] = B\_value  print('Fuzzy Set Intersection is :', Y) |

**Output**

The First Fuzzy Set is : {'a': 0.2, 'b': 0.3, 'c': 0.6, 'd': 0.6}

The Second Fuzzy Set is : {'a': 0.9, 'b': 0.9, 'c': 0.4, 'd': 0.5}

Fuzzy Set Intersection is : {'a': 0.2, 'b': 0.3, 'c': 0.4, 'd': 0.5}

**3. Complement :**

Consider a Fuzzy Sets denoted by A  , then let’s consider Y be the Complement of it, then for every member of  A  , Y will be:

degree\_of\_membership(Y)= 1 - degree\_of\_membership(A)

**EXAMPLE :**

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| # Example to Demonstrate the  # Difference Between Two Fuzzy Sets  A = dict()  Y = dict()    A = {"a": 0.2, "b": 0.3, "c": 0.6, "d": 0.6}    print('The Fuzzy Set is :', A)      for A\_key in A:     Y[A\_key]= 1-A[A\_key]    print('Fuzzy Set Complement is :', Y) |

**Output**

The Fuzzy Set is : {'a': 0.2, 'b': 0.3, 'c': 0.6, 'd': 0.6}

Fuzzy Set Complement is : {'a': 0.8, 'b': 0.7, 'c': 0.4, 'd': 0.4}

**4. Difference :**   
Consider 2 Fuzzy Sets denoted by A and  B, then let’s consider Y be the Intersection of them, then for every member of  A and  B, Y will be:

degree\_of\_membership(Y)= min(degree\_of\_membership(A), 1- degree\_of\_membership(B))

**EXAMPLE :**

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| --- |
| # Example to Demonstrate the  # Difference Between Two Fuzzy Sets  A = dict()  B = dict()  Y = dict()    A = {"a": 0.2, "b": 0.3, "c": 0.6, "d": 0.6}  B = {"a": 0.9, "b": 0.9, "c": 0.4, "d": 0.5}    print('The First Fuzzy Set is :', A)  print('The Second Fuzzy Set is :', B)      for A\_key, B\_key in zip(A, B):      A\_value = A[A\_key]      B\_value = B[B\_key]      B\_value = 1 - B\_value        if A\_value < B\_value:          Y[A\_key] = A\_value      else:          Y[B\_key] = B\_value    print('Fuzzy Set Difference is :', Y) |

**Output**

The First Fuzzy Set is : {"a": 0.2, "b": 0.3, "c": 0.6, "d": 0.6}

The Second Fuzzy Set is : {"a": 0.9, "b": 0.9, "c": 0.4, "d": 0.5}

Fuzzy Set Difference is : {"a": 0.1, "b": 0.1, "c": 0.6, "d": 0.5}