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RELATIONS BETWEEN UNDEFINED SETS AND OPERATIONS ON THEM

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Abstract
In this work, the concept of fuzzy set, mathematical theories based on these sets, their practical importance is highlighted. Relationships between fuzzy sets and actions performed on them are explained on the basis of specific examples.

Keywords : Uncertain collection , neutrosoph collection , collection characteristic function is uncertain collections between relationship , unclear collections on actions , belonging function .
Current in the day ambiguous (or neutrosoph) collections based on appear was uncertain logic , unclear probability theory and methods different issues modeling and design main standard methods turning around is going now uncertain to collections based on systems work they came out different in the fields efficient is used , including : medical diagnostic , technical diagnostic , financial management , personnel reserve management of images clarification , useful fossils Search for scams identify , computer networks management , technical processes management , transport management , logistics , from the Internet data search , radio communication and television and the hokazos . Above of the said It seems that it is unclear collections based on different issues , including classification the issue solve algorithm Create and program work exit current is considered To those who have been told circle theoretical concepts with [1-10, 21-24] literature through get to know can _
Current of the time the most important problems one information acceptance make , save , re work and is to use . But humanity of activity different in the fields very big and big complicated systems with to work right will come . Big and complicated systems with work own in turn to uncertainties take will come . That's why for full non-existent , uncertain information conditions enough level sure results giver methods work to exit right will come . Such a complex , full non-existent , uncertain information conditions issues of solving efficient methods one uncertain collections to the theory based on of methods is to use . Said directions according to done to work example as [11-19] cases show can _
It's unclear now collection concept about we will stop .
Unclear the concept of a set ("Fuzzy Sets"). the first in 1965 _ American scientist L. Zadeh in their work appear was _ Exactly his ideas based on " uncertainty " of mathematics "mathematics " direction appear is different _ to areas app be done started _ Current in the day uncertain collection of the concept common and private issues dedicated many article and books there is . The following information that's it sources based on let's light up .
Watching of the matter all objects own into receiver collection universal collection of matter is called and U is A defined as collection U of the collection something part collection let it be A collection given means U of the collection optional x element A to the collection belongs to or belongs to that it is not

determiner the rule given means _ That is $x \in A$ or $x \notin A$ from relationships which one true or lie determination possible was is a rule .

Collection given determiner of methods one his characteristic function is given . This function

$$\mu_A(x) = \begin{cases} 1, & x \in A, \\ 0, & x \notin A \end{cases}, \quad (x \in U)$$

A of the collection characteristic function is called

An example . $U = \{1,2,3,4,5,6,7,8,9,10\}$ - universal set , A - less than 7 from the thighs consists of part set , - B up to 7 small did not happen from the thighs consists of part collection let it be In that case A the collection characteristic function the following in appearance will be

$$\mu_A(x) = \begin{cases} 1, & x < 7, \\ 0, & x \geq 7. \end{cases}$$

B the collection characteristic function only the numbers 0 and 1 with expressing it won't happen . For example , this 1 and 2 on the ground B belongs to says will it be 3 is more than 7 is it small or until 7 small it's not to say is it possible said questions appear will be To these questions how answer to give Firstly issue to be placed dependent , secondly , subjective also has a character , that is issue who by it also depends on what is being solved .

Quoted in the example A We have a collection always seeing walked simple is a collection . B collection while uncertain collection is B considered the collection characteristic function in construction issue solver each one person U to the collection belongs to each element B to the collection How level belongs to that own his opinion differently means can _ That is x element B to the collection belonging level as $[0,1]$ to the interval belongs to optional thigh choose can _ If it $\mu_B(x) = 1$ is assumed x element B to the collection full to be considered relevant means _ $\mu_B(x) = 0$ if it is taken as x element B to the collection belongs to to be considered not means _ $\mu_B(x) = 0,5$ let's say x element B to the collection belongs to or belongs to that it is not in determining to the difficulty have that we are means _ $\mu_B(x) > 0,5$ take as x element B to the collection to take as relevant to take our inclination as $\mu_B(x) < 0,5$ while x element B to the collection belongs to to say no our inclination means _ So, $\forall x \in U$ element $[0,1]$ to the interval belongs to something thigh suitable puter $\mu_B(x): U \to [0,1]$ reflect (function) B the collection membership function _ _ _ is called

Above in the example given A and B totals for Created $\mu_A(x)$ and $\mu_B(x)$ functions table appearance as follows :

$x, (x \in U)$	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
$\mu_A(x)$	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**
$\mu_B(x)$	**0**	**0**	**0,5**	**0,6**	**0,8**	**0,9**	**0**	**0**	**0**	**0**

Many in the literature vague collections A in appearance is determined . Unclear collections elements $\langle x, \mu_A(x) \rangle$ couple in appearance is determined . Limited uncertain the collection $A = \{\langle x_1, \mu_A(x_1) \rangle, \langle x_2, \mu_A(x_2) \rangle, ..., \langle x_n, \mu_A(x_n) \rangle\}$ or $A = \{\langle x, \mu_A(x) \rangle\}$ in appearance is written . Unclear collections another in appearance There are also entries :

$A=\{(\mu_A(x_1),x_1),(\mu_A(x_2),x_2),\dots,(\mu_A(x_n),x_n)\}$,

$A=\{\mu_A(x_1)/x_1,\mu_A(x_2)/x_2,\dots,\mu_A(x_n)/x_n\}$

or

$$A=\left\{\frac{\mu_A(x_1)}{x_1}+\frac{\mu_A(x_2)}{x_2}+\dots+\frac{\mu_A(x_n)}{x_n}\right\},$$

$$A=\sum_{i=1}^{n}\mu_A(x_i)/x_i\ .$$

Continuously collections for $A=\int\limits_{x\in U}\mu_A(x)/x$.

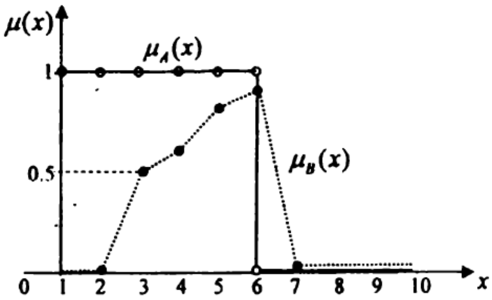
Quoted in writing fraction lines separator are lines , the + sign is also arithmetic action it's not , $\sum$, $\int$ characters are also unification in the sense of used _

Appropriateness of the function value positive will be elements union uncertain of the collection carrier is called and B_s is defined as For example , above in the example uncertain the collection carrier $B_s=0,5/3+0,6/4+0,8/5+0,9/6$ will be

If the relevance function when the value reaches 1 uncertain the set is called normal , if it does not reach 1, it is called subnormal . In the example B the set is subnormally uncertain is a collection .

Subnormal is ambiguous the collection all belonging function values his the most big to the value of being by sending normalization can _ B subnormal is ambiguous the collection if we normalize $B_{norm}=\frac{5}{9}/3+\frac{2}{3}/4+\frac{8}{9}/5+1/6$ will be

Some cases placed issue uncertain collections in expression its relevance of the function graph to bring comfortable is considered For example above $\mu_A(x)$ and $\mu_B(x)$ functions graph the following in the picture given .



It's unclear now collections behind relationships and they are on deeds with let's introduce .

One U universal to the collection belongs to being and belonging function $\mu_A(x)$ and $\mu_B(x)$ was two A and B uncertain collections given let it be

If $\forall x\in U$ for $\mu_A(x)\le\mu_B(x)$ inequality if done A B located at is called and $A\subset B$ is defined as

If $\forall x\in U$ for $\mu_A(x)=\mu_B(x)$ equality if done A B is equal to is called and $A=B$ is defined as

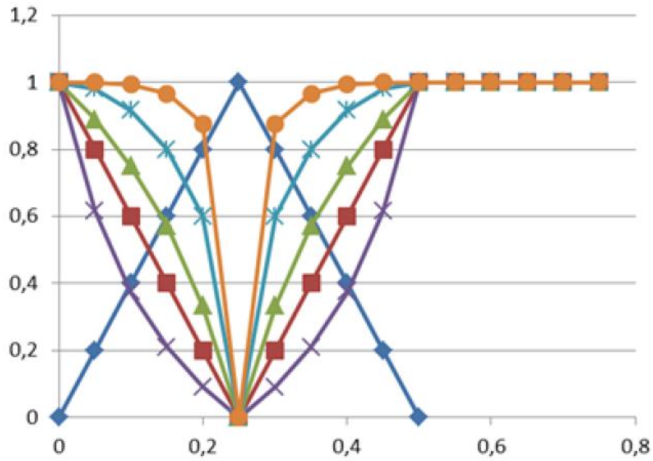
A uncertain the collection filler is $\overline{A}$ defined as and his one how many definitions there is :

1) Classic definition _ If $\forall x \in U$ for $\mu_{\overline{A}}(x) = 1 - \mu_A(x)$ equality if done $\overline{A}$ A of filler is called and $\overline{A} = \int_{x \in U} (1 - \mu_A(x)) / x$ is written as

2) Yager's definition . If $\forall x \in U$ for $\mu_{\overline{A}}(x) = \sqrt[w]{1 - \mu_A(x)^w}$, $-1 < w < \infty$ equality if done $\overline{A}$ A of filler is called ($w = 2$ quadratic in filler is called).

3) Sugeno definition . If $\forall x \in U$ for $\mu_{\overline{A}}(x) = \dfrac{1 - \mu_A(x)}{1 + w\mu_A(x)}$ equality if done $\overline{A}$ A of filler is called

The following in the picture uncertain the collection and his different definitions according to fillers belonging of functions graph lari quoted : - $\mu_A(x)$ given belonging function ; - $\mu_{\overline{A}}(x)$ classic definition according to ; - Sugeno definition according to $w = -0,5$ at; - Sugeno definition according to $w = 1,5$ at; - Yager definition according to $w = 2$ at; - Yager definition according to $w = 4$ at



L. Zade by two A and B uncertain collections of the intersection belonging function for $\mu_{A \cap B}(x) = \min\{\mu_A(x), \mu_B(x)\}$, $\forall x \in U$ formula proposal done _

Some in works [24] collections of the intersection belonging function for the following an alternative formula is also given $\mu_{A \cap B}(x) = \mu_A(x)\mu_B(x)$, $\forall x \in U$. This is done by the PROD operator (or makes sense multiplication) is also called .

A and B uncertain collections of the union belonging function for $\mu_{A \cup B}(x) = \max\{\mu_A(x), \mu_B(x)\}$, $\forall x \in U$ the formula is obtained .

Unification for the following an alternative formula is also used

$$\mu_{A \cup B}(x) = \mu_A(x) + \mu_B(x) - \mu_A(x) \cdot \mu_B(x), \ \forall x \in U .$$

Some at work union for of the formula another options are also given [25].

U continuously collection when A and B uncertain collections intersection and union for the following records are also used

$$A \cap B = \int_{x \in U} \min(\mu_A(x), \mu_B(x)) / x ; \ A \cup B = \int_{x \in U} \max(\mu_A(x), \mu_B(x)) / x .$$

Examples .

1) $U=\{1,2,3,...,10\}$, $A=0,8/3+1/5+0,6/6, B=0,7/3+1/4+0,5/6$ let it be A and B collections on actions do it

$$\overline{A}=(1-0)/1+(1-0)/2+(1-0,8)/3+(1-0)/4+(1-1)/5+(1-0,6)/6+(1-0)/7+$$
$$+(1-0)/8+(1-0)/9+(1-0)/10=1/1+1/2+0,2/3+1/4+0,4/6+1/7+1/8+1/9+1/10.$$

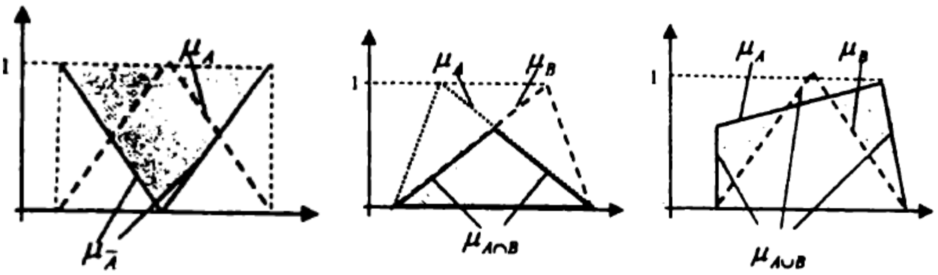
$$\overline{B}=1/1+1/2+0,3/3+1/5+0,5/6+1/7+1/8+1/9+1/10.$$

$$A\cap B=0,7/3+0,5/6.\ A\cup B=0,8/3+1/4+1/5+0,6/6.$$

$$\overline{A}\cap A=0,2/3+0,4/6\neq\varnothing;\ \overline{B}\cap B=1/1+1/2+0,7/3+1/4+1/5+0,5/6+1/7+1/8+1/9+1/10\neq U.$$

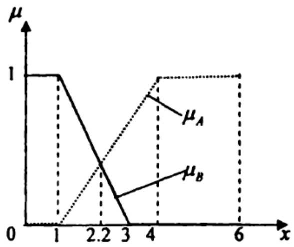
$\overline{A}\cap A\neq\varnothing$ and $\overline{B}\cap B\neq U$ the fact that uncertain to collections special is the case .

The following in pictures A and B uncertain collections on of deeds geometric image given



2) $U=[0,6]$ in the collection $A=$"x ning qiymatlari katta", $B=$"x ning qiymatlari kichik" said uncertain collections given being _ A and B uncertain of collections belonging function and graph as follows let it be

$$\mu_A(x)=\begin{cases}0, \text{ agar } 0\le x<1,\\ \dfrac{x-1}{3}, \text{ agar } 1\le x\le 4,\\ 1, \text{ agar } 4<x\le 6.\end{cases} \text{ and } \mu_B(x)=\begin{cases}1, \text{ agar } 0\le x<1,\\ \dfrac{3-x}{2}, \text{ agar } 1\le x\le 3,\\ 0, \text{ agar } 3<x\le 6.\end{cases}$$

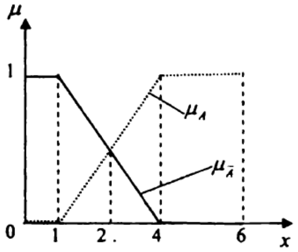


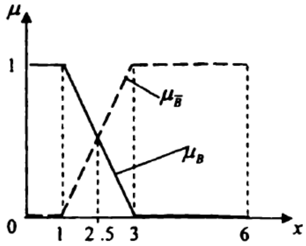
A and B uncertain collections on one how much actions we will do it .

1) A and B of collections filler in finding $\overline{A}=\int\limits_{x\in U}(1-\mu_A(x))/x$ from the formula if we use , belonging function and graph as follows will be

$$\mu_{\overline{A}}(x)=\begin{cases}1-0, \text{ agar } 0\le x<1,\\ 1-\dfrac{x-1}{3}, \text{ agar } 1\le x\le 4,\\ 1-1, \text{ agar } 4<x\le 6.\end{cases}=\begin{cases}1, \text{ agar } 0\le x<1,\\ \dfrac{4-x}{3}, \text{ agar } 1\le x\le 4,\\ 0, \text{ agar } 4<x\le 6.\end{cases}$$

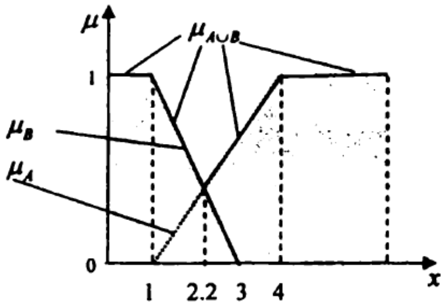
$$\mu_{\overline{B}}(x)=\begin{cases}1-1, \text{ agar } 0\le x<1,\\ 1-\dfrac{3-x}{2}, \text{ agar } 1\le x\le 3,\\ 1-0, \text{ agar } 3<x\le 6.\end{cases}=\begin{cases}0, \text{ agar } 0\le x<1,\\ \dfrac{x-1}{2}, \text{ agar } 1\le x\le 3,\\ 1, \text{ agar } 3<x\le 6.\end{cases}$$





As a result $\overline{A}=\int_0^1 1/x+\int_1^4 \frac{4-x}{3}/x,\ \overline{B}=\int_1^3 \frac{x-3}{2}/x+\int_3^6 1/x$ will be

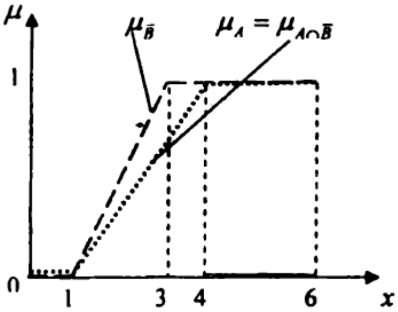
2) A and B of collections union in the calculation $A\bigcup B=\int_{x\in U}\max\left(\mu_A(x),\mu_B(x)\right)/x$ from the formula we use In that case do not merge belonging function and graph as follows will be



$$\mu_{A\bigcup B}(x)=\begin{cases}\max(1,0)=1, & \text{agar } 0\le x<1,\\ \max\left(\dfrac{x-1}{3},\dfrac{3-x}{2}\right)=\dfrac{3-x}{2}, & \text{agar } 1\le x<2,2,\\ \max\left(\dfrac{x-1}{3},\dfrac{3-x}{2}\right)=\dfrac{x-1}{3}, & \text{agar } 2{,}2\le x\le 4\\ \max(1,0)=1, & \text{agar } 4<x\le 6.\end{cases}=\begin{cases}1, & \text{agar } 0\le x<1,\\ \dfrac{3-x}{2}, & \text{agar } 1\le x<0,2,\\ \dfrac{x-1}{3}, & \text{agar } 2{,}2\le x\le 4\\ 1, & \text{agar } 4<x\le 6.\end{cases}$$

As a result $A\bigcup B=\int_0^1 1/x+\int_1^{2,2}\frac{3-x}{2}/x+\int_{2,2}^4\frac{x-1}{3}/x+\int_4^6 1/x$ will be

3) A and $\overline{B}$ of collections intersection in the calculation $A\bigcap \overline{B}=\int_{x\in U}\min\left(\mu_A(x),\mu_{\overline{B}}(x)\right)/x$ from the formula we use In that case do not merge belonging function and graph as follows will be

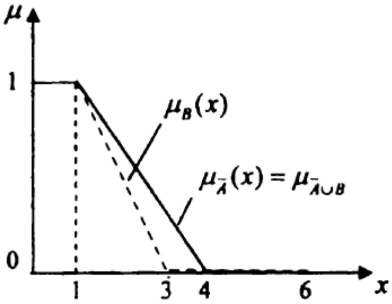


$$\mu_{A\cap\overline{B}}(x)=\begin{cases}\min(0,0)=0, & \text{agar } 0\le x<1,\\ \min\left(\dfrac{x-1}{3},\dfrac{x-2}{2}\right)=\dfrac{x-1}{3}, & \text{agar } 1\le x<3,\\ \min\left(\dfrac{x-1}{3},1\right)=\dfrac{x-1}{3}, & \text{agar } 3\le x\le 4\\ \min(1,1)=1, & \text{agar } 4<x\le 6.\end{cases}=\begin{cases}0, & \text{agar } 0\le x<1,\\ \dfrac{x-1}{3}, & \text{agar } 1\le x\le 4\\ 1, & \text{agar } 4<x\le 6.\end{cases}=\mu_A(x)$$

So, $A\subseteq\overline{B}$ that it was for $\mu_A(x)=\mu_{A\cap\overline{B}}(x)$ and $A\bigcap\overline{B}=A$.

4) $\overline{A}$ and B of collections union we count .

Don't unite belonging function and graph as follows will be



$$\mu_{\overline{A}\cup B}(x)=\begin{cases}\max(1,1)=1, & \text{agar } 0\le x<1,\\ \max\left(\dfrac{4-x}{3},\dfrac{3-x}{2}\right)=\dfrac{4-x}{3}, & \text{agar } 1\le x<3,\\ \max\left(\dfrac{4-x}{3},1\right)=\dfrac{4-x}{3}, & \text{agar } 3\le x\le 4\\ \max(0,0)=0, & \text{agar } 4<x\le 6.\end{cases}=\begin{cases}1, & \text{agar } 0\le x<1,\\ \dfrac{4-x}{3}, & \text{agar } 1\le x\le 4\\ 0, & \text{agar } 4<x\le 6.\end{cases}=\mu_{\overline{A}}(x)$$

Demak, $B\subseteq\overline{A}$ bo\`lgani uchun $\mu_B(x)\le\mu_{\overline{A}}(x)$ va $\overline{A}\bigcup B=\overline{A}$.

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