

Date: 30/03/2022 Ex No: 6	Implementation of fuzzy logic	Name: Mainak Chaudhuri Registration Number: RA1911027010039 Section: N1 Lab Batch: 1 Day Order: 2
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AIM:

To implement Fuzzy logic.

Description of the Concept or Problem given:

Implementation of fuzzy logic for a specific application

Manual Solution

Our Input would be of crisp input. Through fuzzification we load the fuzzy input into rule evaluation phase. Then we get out the fuzzy output. We then proceed to defuzzification and give out the crisp output.

Program Implementation [Coding]

```
#include <iostream>
#include <cmath>
#include <cstring>

const double cdMinimumPrice =0;
const double cdMaximumPrice =70;
using namespace std;
class CFuzzyFunction
{
protected :
double dLeft, dRight; char cType;
```

```
char* sName;
```

```
public:
```

```
CFuzzyFunction(){};
```

```
virtual ~CFuzzyFunction(){ delete [] sName; sName=NULL;}
```

```
virtual void setInterval(double l,double r)
```

```
{dLeft=l; dRight=r;}
```

```
virtual void setMiddle( double dL=0,
```

```
double dR=0)=0;
```

```
virtual void setType(char c)
```

```
{ cType=c;}
```

```
virtual void setName(const char* s)
```

```
{
```

```
sName = new char[strlen(s)+1]; strcpy(sName,s);
```

```
}
```

```
bool isDotInInterval(double t)
```

```
{
```

```
if((t>=dLeft)&&(t<=dRight))
```

```
return true;
```

```
else return false;
```

```
}
```

```
char getType(void)const{ return cType;}
```

```
void
```

```
getName() const
```

```
{
```

```
cout<<sName<<endl;
```

```
}
```

```
virtual double getValue(double t)=0;
```

```
};
```

```
class CTriangle : public CFuzzyFunction
```

```
{
```

```
private:
```

```
double dMiddle;
```

```

public:
void
setMiddle(double dL, double dR)
{
dMiddle=dL;
}

double getValue(double t)
{
if(t<=dLeft)
return 0; else if(t<dMiddle)
return (t-dLeft)/(dMiddle-dLeft); else if(t==dMiddle)
return 1.0; else if(t<dRight)
return (dRight-t)/(dRight-dMiddle); else
return 0;
}
};

```

```

class CTrapezoid : public CFuzzyFunction
{
private:
double dLeftMiddle, dRightMiddle;

```

```

public:
void
setMiddle(double dL, double dR)
{
dLeftMiddle=dL; dRightMiddle=dR;
}

```

```

double getValue(double t)
{
if(t<=dLeft) return 0;
else if(t<dLeftMiddle)
return (t-dLeft)/(dLeftMiddle-dLeft); else if(t<=dRightMiddle)
return 1.0; else if(t<dRight)
return (dRight-t)/(dRight-dRightMiddle); else
return 0;
}
};

```

```

int main(void)
{

```

```
CFuzzyFunction *FuzzySet[3];
FuzzySet[0] = new CTrapezoid; FuzzySet[1] = new CTriangle; FuzzySet[2]
= new CTrapezoid;
```

```
FuzzySet[0]->setInterval(-5,30); FuzzySet[0]->setMiddle(0,20);
FuzzySet[0]->setType('r'); FuzzySet[0]->setName("low_price");
```

```
FuzzySet[1]->setInterval(25,45); FuzzySet[1]->setMiddle(35,35);
FuzzySet[1]->setType('t'); FuzzySet[1]->setName("good_price");
```

```
FuzzySet[2]->setInterval(40,75); FuzzySet[2]->setMiddle(50,70);
FuzzySet[2]->setType('r'); FuzzySet[2]->setName("to_expensive");
```

```
double dValue; do
{
cout<<"\nInput the value->"; cin>>dValue;
```

```
if(dValue<cdMinimumPrice) continue; if(dValue>cdMaximumPrice)
continue;
```

```
for(int i=0; i<3; i++)
{
cout<<"\nThe dot="<<dValue<<endl; if(FuzzySet[i]-
>isDotInInterval(dValue))
cout<<"In the interval";
else
cout<<"Not in the interval";
cout<<endl;
```

```
cout<<"The name of function is"<<endl; FuzzySet[i]->getName();
cout<<"and the membership is=";
```

```
cout<<FuzzySet[i]->getValue(dValue);
```

```
}
```

```
}
```

```
while(true);
```

```
return EXIT_SUCCESS;
}
```

Screenshots of the Outputs

```
Input the value->15
```

```
The dot=15
```

```
In the interval
```

```
The name of function is  
low_price
```

```
and the membership is=1
```

```
The dot=15
```

```
Not in the interval
```

```
The name of function is  
good_price
```

```
and the membership is=0
```

```
The dot=15
```

```
Not in the interval
```

```
The name of function is  
to_expensive
```

```
and the membership is=0
```

```
Input the value->
```

**Signature of the
Student**

MAINAK CHAUDHURI