Aim of the project:

- To decrease the chances of misjudgment in IV Fluid Resuscitation of patient in ICU.
- To increase accuracy of present method.
- To prepare a guideline for newcomers in this field.

Innovation in the project:

1) Maiden effort to use Fuzzy Mathematics in IV fluid Administration for the patients in Intensive Care Unit.
2) Reducing time interval and calculating amount of IV fluid by use of software based on this research work.(Software is being developed)
3) As an expert system it has captured knowledge of experts in the field. The knowledge base is developed with the help of expert doctors working on the patients in ICU.
4) Interdisciplinary project as it has used ideas in Mathematics and Medical Science and also experience of expert doctors.

ABSTRACT:

We have developed an expert system for administration of "Intravenous Fluid (IV Fluid)" for patient in ICU with the use of Fuzzy Logic. We have chosen 5 parameters on which the rate of IV fluid is decided viz. Mean Arterial Pressure, Urine Output, Pulse rate, Temperature & Body Mass Index (BMI). We discussed with experts while deciding these parameters. We have fixed our domain as people in age group 40 to 60 years & accordingly Gradations & rules for each parameter were decided with the help of experts in this field. We used Fuzzy Logic as the amount of IV fluid depends on the different combinations of values of these parameters and anatomy of the patients. Output is crisp value which provides conclusion. This is not Replacement for doctors or but for sure it can be supportive model for doctors.

❖ **CASE STUDY:-**

Suppose there is a patient of age 52 admitted because of some natural reason in ICU who is not diabetic having measured values of required parameters as follow:

I.	Temperature	– 96.3 F
II.	Systolic pressure	– 70 mm Hg
III.	Diastolic pressure	- 40 mm Hg
IV.	HUO	-84 ml/hr
V.	Pulse rate	– 53/min
VI.	Weight	- 74 kg
VII.	Height	-1.69 m

Thus now by formula we get MAP = 50 mm Hg

$$BMI=25.90\ kg/m^2$$

We'll now obtain the gradations for each parameter. To get optimum value we'll perform intersection operation on acquired fuzzy set. Suppose set A is our fuzzy set of inputted values, then

A= {0.76|T, 0.50|MAP, 1|HUO, 0.70|Pulse, 0.53|BMI}
Hence by using product rule,

Output = 0.76*0.50*1*0.70*0.53 = 0.14

This can be plotted on the graph of output as shown above in output graph. According to the rule mentioned in aggregation process we observe that the rate of fluid given should be NORMAL. But this is not crisp value, so to get crisp value De-Fuzzification process should be done. Thus after de-fuzzification we get a closed shaded region on output graph bounded between [8.28, 9.72]. The centroid of this region is a crisp value which is 9 drops/min (Indicated by Red arrow) is the rate of IV fluid implemented to the patient.

FUTURE PLANS

- To increase the number of parameters to increase the accuracy.
- To design a better Doctors friendly software.
- To generalize the project for the patient in any age group.