Introduction:

Students‟ grading if not done properly it will affect their present and future opportunities. It is necessary that students‟ grading should be done in more fair and transparent manner. Reforms in education systems are necessary not just in curriculum but also in students‟ grading process. Content of curriculum are updated on regular basis. Recent technology is added as a part of curriculum so that students should get up-to-date knowledge about the new technologies. Education reforms should be significant as a part of educational policies. With the vision of education reforms we keep on updating our curriculum but there is less concerns about how to provide a fair and appropriate evaluation (grading) method to students. Evaluation system should be regularly reviewed and improved and should be fair and beneficial to all students.

They do not provide a means for representing the meaning of propositions expressed in a natural language when it is imprecise, and they do not provide a mechanism for inference in the cases where knowledge is represented symbolically along with its meaning.

As we can clearly see from the above discussion, developing a system for students' grading based on strict and rigid rules would not be a truthful process for students. Therefore, we need systems that will deal with knowledge, which is rather imprecise or incomplete as human routinely and subconsciously place things into classes whose meaning and significance are not well defined.

Soft computing techniques likes' Fuzzy logic helps us and save out time in this domain. Fuzzy logic provides a way of representing the behavior of systems which are either too complex or too imprecise.

Fuzzy logic is the logic underlying approximate, rather than exact, modes of reasoning**.** It is a form of many-valued logic in which the truth values of variables may be any real number between 0 and 1.

NEED OF FUZZY LOGIC:

- No need for a mathematical model.
- Provides a smooth transition between members and nonmembers.
- Relatively simple, fast and adaptive.
- Less sensitive to system fluctuations.

- Can implement design objectives, difficult to express mathematically, in linguistic or descriptive rules.
- It can control machines and consumer products.
- It may not give accurate reasoning, but acceptable reasoning.
- Fuzzy logic helps to deal with the uncertainty in engineering.

Background:

The conventional computer logic is incapable of manipulating data representing subjective or vague human ideas such as "an attractive person" or "pretty hot". Fuzzy logic, hence was designed to allow computers to determine the distinctions among data with shades of gray, similar to the process of human reasoning. It is unfair to judge a performance according to discrete values, a little difference in the input can change the result outputted by conventional computer

Logic or sometimes won't affect the output depending where in the range the values lies. So there's where fuzzy logic take the advantage as they do not judge according to the restricted values. In grading system fuzzy logic is a good idea to use as failure occurs in conventional computer logic when with a difference of 1 marks the grade of student can change which is quite unfair for the one scoring very near to a grade changer score.

- In our project we have used many packages like skfuzzy, numpy, matploitlib to help our project to work in much better way. In this we have also used many inbuilt functions such as
- ca = ctrl.Antecedent(np.arange(0, 26, 1), 'ca')
- ca.automf(3)
- rule1 = ctrl.Rule(mte['poor'] | ete['poor'] | att['poor'] | ca['poor'], cgpa['poor'])
- cgpa_ctrl = ctrl.ControlSystem([rule1, rule2, rule3, rule4])
- cgpa_cal = ctrl.ControlSystemSimulation(cgpa_ctrl)

About techniques:

Fuzzy Logic was proposed by Prof. Lotif Zadeh in 1965 as a means of representing or manipulating data that is not precise but rather fuzzy. Fuzzy set theory is use to solve problems involving the absence of sharply defined criteria. Because fuzziness and vagueness are common characteristics in many decision-making problems, good decision-making models should be able to tolerate vagueness or ambiguity. A Fuzzy set

has a membership function that allows various degrees of membership for the elements of a given set.

Fuzzy Controller: A fuzzy controller works similar to a conventional system: it accepts an input values, performs some calculations and generate an output value.

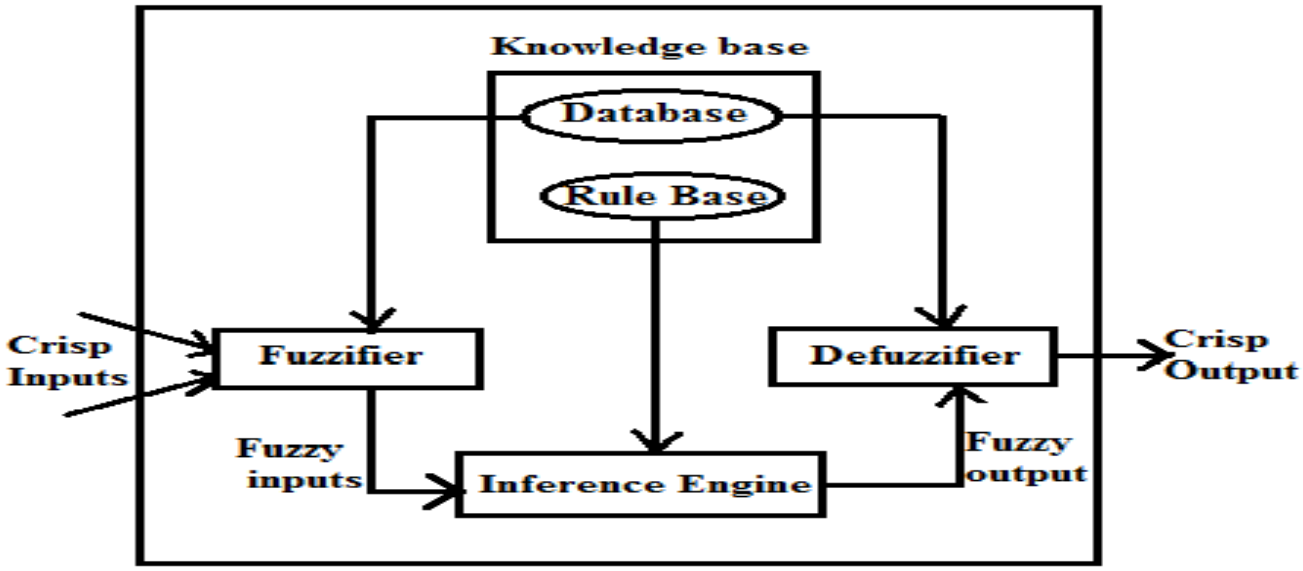
There are four main components of fuzzy system:

1. *Fuzzifier:* It translates crisp (real valued) inputs into fuzzy values. This is done by constructing the membership functions.

2. *Inference Engine:* That applies a fuzzy reasoning mechanism to obtain a fuzzy output.

3. *Defuzzifier:* Which translates this latter output into a crisp values.

4. *Knowledge Base:* It contains both fuzzy rules (rule base), and membership functions, known as the database.



About datasets:

The attribute used for expert system for student grading system in LPU is overall percentage of a student. According to the given input, Fuzzification, decision making and defuzzification will be done and we get grades as output.

Members:

The designing of the code where my contribution is making fuzzy logic which include the packages like skfuzzy, numpy, matploitlib.
In this part I have made a fuzzy logic which has given a crisp set and variables like CA, MTE, ETE, and Attendance where we used this values to make our fuzzy logic which helps students to get more accurate grade with my contribution on report.

The designing of the code where my contribution is to make all the calculation part of the marks including all the fuzzy sets where I have used all python variables, decision statements with help of skfuzzy packages which help making the program work with more accuracy with my contribution on report.

My main focus was on the part where we have to create the rules for our logic so that it may work under the given rules which help our program to work better and give us accurate output with my contribution on report and synopsis.

References:

1. https://www.ijser.org/paper/Fuzzy-Logic-based-Expert-System-for-Students-Performance.html

2. https://www.sciencedirect.com/science/article/pii/S1877050916325558

3. https://pythonhosted.org/scikit-fuzzy/auto_examples/plot_control_system_advanced.html