

Exercise I: Course and analysis questions

- 1) What is the principle of fuzzy logic? Explain the distinction between it and classical logic.
- 2) What is the main difference between the probability and fuzzy logic?
- 3) What is the reason that fuzzy logic has rapidly become one of the most successful technology for developing sophisticated control systems? When not to use fuzzy logic?
- 4) Give at least 3 famous applications of fuzzy logic.
- 5) What is the sequence of steps taken in designing a fuzzy logic controller?

Correction

1) What is the principle of fuzzy logic? Explain the distinction between it and classical logic.

Fuzzy logic is a concept of 'certain degree'. Boolean logic is a subset of fuzzy logic.

Fuzzy logic is a form of many-valued logic which deals with reasoning that is approximate rather than fixed and exact. Compared to traditional binary sets (where variables may take on true or false values), fuzzy logic variables may have a truth value that ranges in degree between 0 and 1.

2) What is the main difference between the probability and fuzzy logic?

Probability is ADDITIVE, means all its values must add up to one. This is main difference between fuzzy logic and probability. Although both probability and fuzzy logic contain values between the range of 1 and 0, fuzzy logic tells the extent of a specific member function, whereas probability gives the frequency, hence all values of its set must add up to one.

3) What are the reasons that fuzzy logic has rapidly become one of the most successful technologies for developing sophisticated control systems? When not to use fuzzy logic?

- Fuzzy logic is conceptually easy to understand.
- Fuzzy logic is flexible.
- Fuzzy logic is tolerant of imprecise data.
- Fuzzy logic can model nonlinear functions of arbitrary complexity.
- Fuzzy logic can be built on top of the experience of experts.
- Fuzzy logic can be blended with conventional control techniques.
- Fuzzy logic is based on natural language.

4) Give at least 3 famous applications of fuzzy logic.

- Nissan – fuzzy automatic transmission, fuzzy anti-skid braking system
- CSK, Hitachi – Hand-writing Recognition
- Sony - Hand-printed character recognition
- Ricoh, Hitachi – Voice recognition.

5) What is the sequence of steps taken in designing a fuzzy logic controller?

- Following is the sequence for the designing a fuzzy logic machine:
Fuzzification->Rule Evaluation->Defuzzification
when designing a fuzzy logic, we first have to define the fuzzy sets and make appropriate member function. The rule evaluation comes in which matches the sets to its corresponding rules.