Introduction to Soft Computing

Assignment 3

TYPE OF QUESTION: MCQ

Number of questions: 10 Total mark: 10 × 1 = 10

QUESTION 1:

Which of the following statement is True for Mamdani approach?

a. It is characterized by high accuracy and low interpretability.
b. It is characterized by low accuracy and low interpretability.
c. It is characterized by high accuracy and high interpretability.
d. It is characterized by low accuracy and high interpretability.

Correct Answer: d

Explanation: The detailed description can be found in Week 3 Lecture material – Page no 10.

QUESTION 2:

What is the responsibility of fuzzy inference engine?

a. Convert inputs into appropriate fuzzy sets.
b. Form the rules of fuzzy rule base.
c. Evaluate the control rule stored in a fuzzy rule base.
d. Convert fuzzy output in crisp value.

Correct Answer: c

Explanation: The fuzzified measurements are used by the fuzzy inference engine to evaluate the control rules stored in the fuzzy rule base. The detailed description can be found in Week 3 Lecture material – Page no. 9.

QUESTION 3:

Which of the following is not a part of a general fuzzy logic controller?

a. Fuzzification module
b. Fuzzy inference engine
c. Sensor
d. Rule base

Correct Answer: c
Explanation: The sensors are used to measure the inputs. It is not a part of the fuzzy logic controller.

QUESTION 4:

Calculate the minimum value of $f(x,y) = 2x^2 + y^2 + 8x + 15$.

a. -7
b. 9
c. -9
d. 7

Correct Answer: d
Explanation: Given, $f(x,y) = 2x^2 + y^2 + 8x + 15$

Now, $\partial f/\partial x = 4x + 8$ and $\partial f/\partial y = 2y$

Putting, $\partial f/\partial x$ and $\partial f/\partial y = 0$ we get, $(x,y) = (-2,0)$

Now, $r = \partial^2 f/\partial x^2 = 4 > 0$ and $t = \partial^2 f/\partial y^2 = 2$ and $s = \partial^2 f/\partial x \partial y = 0$

hence, $rt - s^2 = 8 > 0$ and $r > 0$

hence. $f(x,y)$ has minimum value at $(-2,0)$, which is $f(x,y) = 8 - 16 + 15 = 7$.

QUESTION 5:

Which statement is not true for the Genetic Algorithm?

a. GA is an iterative process.
b. It is a searching technique.
c. The solution is guaranteed.
d. Working cycle with/without convergence.

Correct Answer: c
Explanation: In GA methods, the exact solution is not necessarily guaranteed. Usually, terminated with a local optimum.

QUESTION 6:

Which is not a GA operation?

a. Decoding
b. Convergence
c. Crossover
d. Mutation

Correct Answer: a
Explanation: The detailed description can be found in Week 3 Lecture material- Page no 96.

QUESTION 7:

Which of the following is false about the Steady state genetic algorithm (SSGA)?

a. Generation gap is large
b. Performs better when the population size is small
c. Premature convergence may result
d. It is susceptible to stagnation

Correct Answer: a

Explanation: In SSGA, Generation gap is small. Only two offspring are produced in one generation.

QUESTION 8:

Which of the following statements is not true about various operations of genetic algorithm?

a. Crossover operation creates diverse set of next solution
b. Fitness evaluation checks the goodness of a particular solution
c. The convergence is checked by using the termination criteria
d. Mutation is not applied for genetic algorithms

Correct Answer: d
Explanation: Option a, b and c are true. In GAs, mutation is used to explore other solutions. The detailed description can be found Week 3 Lecture material – Page no 96.

QUESTION 9:

Which of the following statements is true about Simple Genetic Algorithm (SGA)?

a. Low computation cost
b. Has non-overlapping generations
c. The best individual may appear in any iteration.
d. Performs better when initial population size is small.

Correct Answer: c
Explanation: SGA is computationally heavy, and has overlapping generations as only fraction of individuals is replaced. It performs better when initial population size is large.
The detailed description can be found Week 3 Lecture material – Page no 100.

QUESTION 10:

The last step of a fuzzy logic controller system is?

a. Fuzzification of inputs
b. Rule strength computation
c. Rule base creation
d. Defuzzification of the fuzzy output

Correct Answer: d

Explanation: In the last step of the fuzzy control system, the fuzzy output is defuzzified and its crisp value is determined for the output to take decision. The detailed description can be found in Week 3 Lecture material – Page no 47

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