2019

COMPUTER AND INFORMATION SCIENCE

Paper : CISM - 402

(Elective - II : Cognitive Computing)

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer ***any five*** questions : 2×5

(a) What are the two limitations of human cognition system?

(b) What is Haptics?

(c) What is a pattern? Give a suitable example.

(d) How does the performance of an MLP vary with variation of the number of hidden neurons?

(e) What is auto-association (in connection to ANN)?

(f) In GA, what is a chromosome?

(g) Define support of a fuzzy set.

2. Answer ***any five*** questions : 4×5

(a) Compare and contrast Algorithmic Computing and Cognitive Computing.

(b) Draw relation between Artificial Intelligence and Cognitive Computing.

(c) Discuss on the aim of Cognitive Computing.

(d) How does "data explosion" demand a new world of computing?

(e) Discuss on features of human thinking process.

(f) What do you mean by "augmentation" of human expertise?

(g) Discuss on the characteristics of a cognitive system.

3. Answer ***any four*** questions :

(a) What is an agent? What is/are the difference(s) between an Intelligent Agent and Learning Agent? Describe the various components of a Learning Agent (system). 2+3+5

(b) What is learning? What are the different types of machine learning? Briefly describe reinforcement learning. 2+2+6

(c) Describe the architecture of an MLP. Discuss on back propagation learning algorithm using a flowchart. 2+8

(d) What are the advantages of genetic algorithm compared to other conventional search and optimization processes?

Assume, $f(x) = x^3 - 60 * x^2 + 900 * x + 100$, where x is an integer in [0, 31]. The task is to maximize f(x) (the optimal is x = 10). Assume the initial population P = {17, 21, 4, 28}. Using one-point crossover as the only genetic operator, what is the probability of finding the optimal solution? Explain your answer. 5+5

(e) Write down the differences between conventional set and fuzzy set.

Consider the fuzzy set "young". Define a suitable membership function (age : -4, 12). Define meaningful membership functions of two fuzzy sets "too young" and "more or less young" based on the membership function of "young". 4+6

(f) Briefly describe how various computing tools are used for enhancing the performance of an image processing task. 10