CI Final Exam
Date: 14/1/2019
Duration: 9h to 11h

Answer the exam in four different page sets: questions from 1 to 2, 3 to 5, 6 to 8, and 9 to 10. Do not forget to write your name in ALL the sheets.

1. It is known that CI techniques can be extremely useful when applied properly. Give conditions on a problem so that a CI technique is adequate or appropriate. If necessary, for comparison, give conditions so that a CI technique should not be attempted (or not in the first place).

2. List the advantages of a MLP over an RBF neural network; and then list the advantages of an RBF neural network over a MLP. Give brief, complete and well-founded lists. Focus on the advantages, not on describing each network separately.

3. What does the Back-propagation algorithm compute for MLPs? In which optimization scheme(s) can it be used?

4. Describe overfitting and briefly explain why it is a problem. Enumerate three techniques that, when learning with MLPs, will usually help to reduce overfitting.

5. Do standard Hopfield Networks with synchronous updates always converge to a vector? If not, what may happen?

6. Describe briefly the following three stochastic selection methods used in genetic algorithms: (i) standard roulette wheel, (ii) rank selection and (iii) tournament.

7. Show graphically how are the (i) crossover and (ii) mutation operators applied in genetic programming. You may also include some explanation text in your answer if you need it.

8. In evolution strategies, which are the three usual types of self-adaptive mutation and how is the strategy space (standard deviations and rotation angles) defined in each one of them? Illustrate the differences among the three methods using plots of equal probability mutation in the 2D case.

9. Give a definition of fuzzy logic system. Which are the two principal fuzzy rule-base systems? Explain their main components and how they perform the inference process.

10. Which are the main advantages of ANFIS? And the main disadvantage? Describe briefly a possible solution to palliate the disadvantage.