Evolutionary Computation

Academic Year: (2023 / 2024)   **Review date: 24/05/2023 11:45:31**

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: SAEZ ACHAERANDIO, YAGO

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Average programming skills

OBJECTIVES

Understand the fundamentals of evolutionary computing, be able to identify in which cases it can be effective and acquire the knowledge to choose and design the appropriate technique to a given problem, commonly, search and optimization problems (among others).

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to evolutionary computation
2. General concepts of evolutionary algorithms: initialization, stop, genetic operators, insertion and replacement strategies.
3. Evolutionary computation techniques: genetic algorithms, evolutionary strategies, genetic programming, others.
4. Problem solving through evolutionary techniques. Problems with multiple solutions, with several objectives, with restrictions, coevolution.
5. Mathematical foundations

LEARNING ACTIVITIES AND METHODOLOGY

Formation activities

AF1 - Theoretical class
AF2 - Practical classes
AF3 - Theoretical and practical classes
AF5 - Tutorials
AF6 - Group work
AF7 - Individual student work
AF8 - Partial and final exams -> Presentations and/or partial and final dissertations

teaching methodology

MD1 - Presentations in the teacher's class with the support of computer and audiovisual media, in which the main concepts of the subject are developed and the bibliography is provided to complement the learning of the students.
MD2 Critical reading of texts recommended by the professor of the subject: articles, reports, videos, tutorials, etc., either for later discussion in class, or to broaden and consolidate knowledge of the subject.
MD3 Resolution of practical cases, problems, etc. raised by the teacher individually or in groups
MD5 Preparation of work and reports individually or in groups

ASSESSMENT SYSTEM

% end-of-term-examination/test: 0

% of continuous assessment (assigments, laboratory, practicals…):   100

SE1 (5%) - Participation in class and in the forums of the subject
SE2 (90%) - Individual or group work carried out during the course
  + Jobs:
    - (15%) Practice Genetic Algorithms
    - (20%) Practice Evolutionary Strategies
    - (60%) Teamwork

In the extraordinary call, the evaluation will be carried out entirely by means of a face-to-face exam that may be oral and/or written.

BASIC BIBLIOGRAPHY

- D. Floreano, C. Mattiussi Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies, MIT Press, 2008

- E. Talbi Metaheuristics: From Design to Implementation, Wiley, 2009