2110742 Evolutionary Computation

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Class meeting: Tue/Thur 10:30-12:00, Eng. Bld.4, 19-16.

This class discusses evolutionary computation in all aspects. Many established topics in this field will be studied: Genetic algorithms, Genetic programming, Evolution strategies. Advanced topics such as Estimation of distribution algorithms and multiple objective optimisation are included. Theory as well as practical aspects are emphasized.

How the class is conducted?
Because the nature of the topics is the study of algorithms, it renders itself suitable for experimentation. Weekly assignment requires students to run the experiment based on the algorithm in the lecture. It is a graduate class, so students are expected to do a lot of self-study. Individual studies are designed to let students study a specific topic in depth. The results are presented in the group discussion as well as submission of written reports.

weekly lecture
1 Probabilistic algorithms
2 Genetic algorithms
3 Theoretical basis
4 Genetic operators
5 Genetic programming
6 Schema theorem for GP
7 Evolution strategies
8 Estimation of distribution algorithms
9 EDA 2
10 Multiple objective optimisation
11 Group discussion 1
12 Group discussion 2
13 Group discussion 3
14 Summary

Assessment
homework   20
individual study   30
final exam   50

 Text
1. Mitchell, M., An introduction to genetic algorithms, MIT press, 1996.
2. Goldberg, D., The design of innovation, Kluwer pub, 2002.
3. Holland, J. H., Adaptation in natural and artificial systems, MIT press, 1992.
4. Koza, J., "Genetic Programming Vol 1, 2, 3", MIT Press, 1992, 1994, 1999.
5. Goldberg, D., Genetic algorithms, Addison-Wesley, 1989.
6. Banzhaf, W., Nordin, P., Keller, R. and Francone, F., Genetic Programming: An Introduction, Morgan Kaufmann, 1998.
7. Winter, G., Periaux, J., Galan, M., Cuesta, P. (eds), Genetic algorithms in engineering and computer science, John Wiley, 1995.