Visual Perception for Population-Based Optimization

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1 Abstract

The main purpose of this project is to address the feasibility of porting the observer analogy into population-based optimizers (e.g. Particle Swarm Optimization or Differencial Evolution) and to assess the possible gains of applying the new resulting algorithms to clustering problems. The proposed approach is based on the study of the FPFCM algorithm, namely on the role of its focal point. Clustering of data aims at finding a meaningful insight on the structure of the data. The way this structure is perceived depends significantly on the position of the observer relatively to the data. In other words, it is not only dependent on the data itself and the distance measure between data elements, but it is also dependent on the point of observation from where the data is being perceived. With this project we intend to propose some possibilities to include such positional information as a feature of each of the individual solutions.

2 Objectives and Tasks

T1 To review the related literature

T2 To implement common population-based optimizers

T3 To include the observer analogy in the particles updating mechanism

T4 To compare the performance of the implemented algorithms

T5 To write up a MSc thesis and a scientific paper

3 Timetable

T1 1 month

T2 1 month

T3 3 months

T4 2 months

T5 2 months

4 Expected Results

- 1 journal paper
- 1 MSc thesis

5 References

- Fazendeiro, P. and Valente de Oliveira, J. A Fuzzy Clustering Algorithm with a Variable Focal Point. Proc. of IEEE World Congress on Computational Intelligence, WCCI 2008, Hong Kong, China, June, 2008.

- Fuzzy Clustering Based Parallel Cultural Algorithm, Jihane Alami , L. Benameur and Imrani International Journal of Soft Computing Year: 2007, Volume: 2, Issue: 4, Page No.: 562-571

- Parallel Fuzzy c- Means Clustering for Large Data Sets Terence Kwok, Kate Smith, Sebastian Lozano and David Taniar COMPUTER SCIENCE EURO-PAR 2002 PARALLEL PROCESSING Lecture Notes in Computer Science, 2002, Volume 2400/2002, 27-58