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COS 710 Assignment 2

- Date Due: **22nd April 2013**
- Submission Procedure: **Upload via the CS Website**
- Submission Format: **zip or tar + gzip/bzip2 archive**

1 Introduction

This assignment will require you to investigate the use of short-term memory as well as the tuning of the parameter in the Lumer-Faieta clustering model.

2 Background

Short-term memory was shown by Lumer and Faieta to affect the quality of clustering with their model of cemetery formation. However, both the speed of ants and the number of ants in relation to the number of data items will impact the accuracy of an ant's memory. In other words, an ant's memory of dropped items becomes stale sooner when there are many ants moving many items as well as when there are fast ants present and likely to move items soon after those items have been dropped by other ants.

There are two variations of short-term memory that can be used. In both variations, ants track the locations of a limited number of items that they have previously dropped. In the first variation, a newly picked up item is compared directly with the individual items in the ant's memory. In the second variation, the newly picked up item is compared with items around the location of an item in memory.

3 Tasks

Investigate the effects of each variation of short-term memory in relation to:

- the ratio of ants to data items
- the speed of ants

For each case, test short-term memory buffer sizes of 0, 1, 10, and 100. Vary the effect being compared by three parameter values, each increasing by one order of magnitude. Determine the quality of the clustering after a chosen number of time steps. Measure the quality of clustering by the number of clusters, inter-cluster distances, and intra-cluster distances.

4 Submission Instructions

Produce a report in Portable Document Format (PDF) to describe your investigation and to present your findings. Refer to Assignment 1 for a brief guide on how to structure your report.

Refer to the instructions given in the study guide on the COS710 website for the submission procedure.