

CENG 491 Computer Engineering Design  
Weekly Report  
Reporting Period: 24/10/2008 - 30/10/2008

YAKUT

Sefa Kılıç  
Işıl Doğa Yakut  
Yunus Başağalar  
Yiğit Çağrı Akkaya

### Work Completed

1. The entire project team worked together on parallelization techniques, such as partitioning, divide and conquer, pipelining. The advantages and disadvantages of these parallelization techniques were analyzed according to data structures which is used in the problem [1].

Different types of parallel genetic algorithms were studied[2]:

- Global single-population master-slave
- Single population fine-grained
- Multiple population coarse-grained
- Hierarchical

Also analysis on performances of previous implementations using these algorithms were studied.

2. A part of GALib content was studied to gain an overview of its implementation and programming techniques. First, class diagram of base classes of the library was drawn in order to visualize the class hierarchy. Base classes of the library are as follows:

- GAPopulation
- GAGenome
- GAGeneticAlgorithm
- GAScalingScheme
- GASelectionScheme

Each of these classes have several derived classes. In order to fully understand the innerworking of library, we started with assigning a sub-class of GAGeneticAlgorithm base class to each member of the project team. Below, are the assigned libraries and their brief explanations.

- **Yiğit Çağrı Akkaya** studied GASimpleGA class which works on non-overlapping populations.
- **Sefa Kılıç** studied GASStateGA class which works on overlapping populations. This type of genetic algorithm does not change the size of population and exchanges constant number of individuals.

- **Işıl Doğa Yakut** studied GAIncGA class which works on overlapping populations. Newly created genomes are added to population.
- **Yunus Başağalar** studied GADemeGA class which has multiple populations. On each population steady-state algorithm is applied by default. In addition to other types of algorithms, migration occurs at each generation between populations.

## Work Planned

Now that we have a general information on the implementation of GALib and some techniques of parallelizing genetic algorithms, we plan to study message passing techniques in parallel with our studies on GALib. Specifically;

- Yiğit Çağrı Akkaya will study MPI (Message Passing Interface).
- Yunus Başağalar and Sefa Kılıç will study OpenMP.
- Işıl Doğa Yakut will continue to study implementation of GALib.

Although specific topics are assigned, all of the team members will have a general idea on each of the topics. Since we plan to meet for each topic and the responsible member will explain main points of his/her topic.

## Comments

Although we planned to decide on parallelization technique of the genetic algorithm library, we could not make it ready due to homework load of this week on other courses.

## References

- [1] Parallel Programming, Techniques and Applications Using Networked Workstations and Parallel Computers, B.WILKINSON and M.ALLEN [1999] by Prentice-Hall
- [2] A Survey of Parallel Genetic Algorithms , Erick Cantu-Paz [1998] , Paris