



A Survey on Comparison between Biogeography Based Optimization and Other Optimization Method

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Abstract: *Optimization strategies have gained wide importance in solving complex problem. Biogeography Based Optimization (BBO) is a population based evolutionary algorithm that is based on the mathematics of biogeography. Many optimization algorithm such as genetic algorithm, Ant colony optimization etc are used in various field such as image processing. BBO algorithm works on the basis of two concept-Migration and Mutation. In this paper, we survey comparison of BBO and other optimization.*

Keywords: *BBO, Migration, Mutation, DE, ACO, PSO.*

I. INTRODUCTION

A) *Biogeography Based Optimization*

Biogeography based optimization a type of evolutionary algorithm. As its name implies, BBO is based on mathematical study of biogeography. Biogeography is the study of the distribution study of animals and plants over time and space.

BBO is an evolutionary process that achieves information sharing by species migration. It is modeled after the emigration and immigration of species between habitats to achieve information sharing. BBO operates by migrating information between individuals, thus resulting in a modification of existing individual. Individual do not die at the end of generation. One characteristic of BBO is that the original population is not discarded after each generation. It is rather modified by migration.

BBO is a population based optimization algorithm it does not involve reproduction or the generation of "children". Mathematical equations that govern the distribution of organisms were first discovered and developed during 1960. Mathematical model of biogeography describe how species migrate from one island to another, how species arises, and how species become extinct. Biogeography basically on two criteria-HIS and LIS. Geographical area that are well suited and more compatible residence for biological species are said to have highly suitability index (HSI). Features that correlate with HIS include such factors as rainfall, diversity of vegetation, diversity of topographic features, land, area and temperature. The variables that are characterize habitability are called suitability index variables. Habitat with HSI tend to have large number of species, while those with low HSI have a small number of species. HSI are more static than LSI. LSI have a high species immigration rate because of their sparse population.

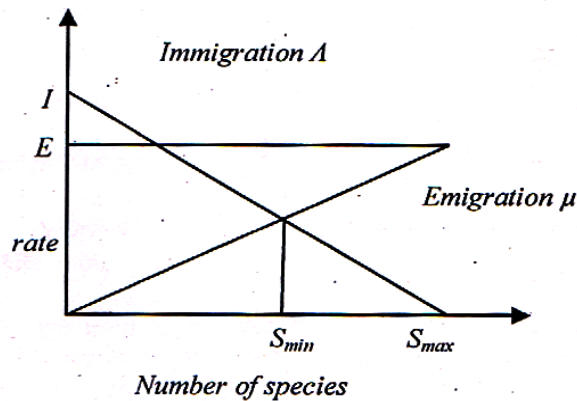
B) *BBO basically depends upon following theory:*

i) *Migration:* The BBO migration strategy in which we divide whether to migrate from one region to other or not. The migrate rate of each solution are used to probabilistically share features between solutions. BBO migration is used to change existing habitat. Migration in BBO is used to modify the island. The migration arises when LSI occurs. When species are less compatible with their habitat then they migrate.

ii) *Mutation:* The purpose of mutation is to increase the habitat among the population. In BBO, the mutation is used to increase the diversity of the population to get good solution.

Certain features of BBO:-

- BBO has a way of sharing information between solution.
- BBO solution survive forever.
- BBO does not require a priori knowledge of the number of partitions in the image.



II. COMPARISON BETWEEN BBO AND OTHER OPTIMIZATION METHOD

1. BBO is differ from Ant colony optimization because ACO generates a new set of solution with each iteration. But in BBO , Maintains its set of solutions from one iteration of the next, relying on migration to probabilistically adopt those solution.
2. BBO has the most in common with Particle Swarm Optimization and DE In those approaches, Solutions are maintain in one iteration to the next, But each solution is able to learn from its neighbours and adopt it self as the algorithm progress.
3. PSO represents each solution as a point in a space, and represents the change over time of each solution as a velocity vector. PSO do not change its solution directly.
4. DE changes its solution directly, but change in a particle DE solution are based on difference between other DE solutions. DE is not biological motivated.
5. GA and ES reproduce children by crossover, namely their solution disappear at the end of each generation, while BBO solution are not discarded after each generation, but are rather modified by migration.

III. CONCLUSION

BBO compare with other optimization in that BBO solution are changed directly via migration from other solution. In BBO solutions directly share their attribute with other solutions. But in other optimization do not happen like this, So BBO can better to detect abnormal growth of tissues as compare to other optimization method in MRI image segmentation. BBO is a population based optimization algorithm it does not involve reproduction or the generations.

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