

A
Dissertation
On
**Modified Biogeographical Based Optimization Algorithm
(MBBO) and Efficient Simulated Annealing to obtain
Optimal solution for Travelling Tournament
Problem(TTP)**

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CERTIFICATE

This is to certify that the dissertation titled “**Modified Biogeographical Based Optimization Algorithm (MBBO) and Efficient Simulated Annealing to obtain Optimal solution for Travelling Tournament Problem (TTP)**” is a bonafide record of work done at Delhi Technological University by Ashish Chopra, Roll No. 2K12/CSE/06 for partial fulfillment of the requirements for degree of Master of Technology in Computer Science & Engineering. This project was carried out under my supervision and has not been submitted elsewhere, either in part or full, for the award of any other degree or diploma to the best of our knowledge and belief.

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Abstract

This project aims to apply evolutionary extended species abundance models of biogeography on Travelling Tournament Problem. This implementation shows a heuristic approach of enhanced simulated annealing based on extended species abundance models of biogeography in order to obtain optimal solution and to solve the problem of local minima for Travelling Tournament Problem. We upgrade the migration step of BBO by using probabilistic measures and hybridize it with simulated annealing to solve the TTP. Our proposed hybrid approach converges to an optimal solution for TTP. There is negative impact of non deterministic problems on the TTP solution. We considered all these non-deterministic problems as noise. The physical significance of noise in our algorithm is any existing parameter which can affect the fitness of the habitat. We also calculate the overall cost of TTP for various extended species abundance models of BBO(Linear and Non linear models) to achieve desirable results. The Extended species abundance models consist concepts of Growth Rate and Decline Rate which are correlated to Immigration Rate and Emigration Rate. The extended version of BBO have six Models consists of linear and non linear models which have the parameter specification: growth rate (σ_k) as a function of species evolution rate and the species immigration rate λ and species decline rate as a function of species extinction rate and emigration rate (μ) for the determination of the total species count at a given time instant on a single habitat. We demonstrate the performance of each of the extended models of BBO for solving the Travelling tournament problem and found that the average convergence of each of the proposed extended species abundance models is faster leading to better optimization results previous approaches applied on TTP We compare the performance of our approach with other methodologies like ACO and PSO. TTP is NP-hard problem for which we need to produce an output which is an optimal schedule from the input which is distance matrix given to us. We apply enhanced simulated annealing to this schedule and try to obtain efficient schedule. We apply cost function to this obtained schedule and generate the minimal cost for our TTP problem and solve the issue of local minima which exists in some genetic algorithms ant colony optimization (ACO) and particle swarm optimization (PSO). We plot some graphs representing the convergence rates of the cost produced by different approaches for TTP.

Topic	Page Numbers
Chapter 1.Introduction.....	1
1.1 Motivation.....	1
1.2 Problem Statement.....	2
1.3 Scope of work.....	3
1.4 Organization of the Project.....	4
Chapter 2. Problem statement and Literature Survey.....	6
2.1 Description of problem statement.....	6
2.1.1 TTP Terminologies.....	6
2.1.2 TTP Constraints.....	7
2.2 Literature review.....	8
Chapter 3.State of the art Techniques for TTP.....	12
3.1 Conventional Metaheuristic.....	12
3.1.1 Tabu search.....	12
3.1.2 Combined Integer programming and constraint programming.....	13
3.1.3 Simulated annealing.....	14
3.1.4 Iterated local search.....	14
3.2 Nature inspired Algorithms.....	15
3.2.1 Genetic Algorithm.....	15
3.2.2 Particle Swarm Optimization.....	16
3.2.3 Ant Colony Optimization.....	17
Chapter 4. A hybrid heuristic for TTP	20
4.1 Principle Approach	20
4.2 Working Procedure of BBO	20
4.3 Operations of BBO.....	22
4.3.1 Migration	22
4.3.2 Mutation	23
4.4 Extended BBO	24
4.7.1 Linear models	25
4.7.2 Non linear models.....	25
4.5 Need of modification	26
4.6 Efficient Migration mechanism	27
4.7 Equations used	29
4.8 Enhanced Simulated Annealing	30
4.8.1 Obtaining Neighborhood.....	31
4.8.2 Simulated annealing Algorithm.....	35
4.8.3 Strategic oscillations	36
4.8.4 Reheats.....	37

4.8.5 Objective function.....	37
4.8.6 Cost function.....	38
4.8.7 Flow chart of ESA.....	39
Chapter 5.Detailed System Architecture.....	40
5.1 Block diagram of architecture.....	40
5.2 Fitness function used.....	42
5.3Proposed algorithm.....	43
Chapter 6. Computational Results.....	46
6.1 Parameter specifications.....	46
6.2 Matlab Simulation.....	46
6.3 Performance comparison with other Algorithms.....	49
Chapter 7. Conclusion and future scope.....	54
7.1 Conclusion.....	54
7.2 Future work.....	55
Chapter 8. Publication from Thesis.....	56
References.....	57
Appendix A.....	61
Appendix B.....	62

List of Tables

Table caption	Page number
Table 1.1: Single round robin schedule.....	7
Table 1.2: Double round robin schedule.....	8
Table 2: Initial schedule to the first move swap homes for ESA.....	31
Table 3: Output of applying swap homes on table 2.....	32
Table 4: Input to second move swap rounds of ESA.....	32
Table 5: Output of swap rounds move of ESA.....	32
Table 6: Input to third move swap teams of ESA	33
Table 7: Output to third move swap teams of ESA.....	33
Table 8: Input to fourth move partial swap rounds of ESA.....	34
Table 9: Output to fourth move partial swap rounds of ESA.....	34
Table 10: Input to fifth move partial swap teams of ESA.....	34
Table 11: Output to fifth move partial swap teams of ESA.....	35
Table 12: Implementation of Linear models for all instances.....	47
Table 13: Implementation of non linear models for all instances.....	48
Table 14: linear and non linear models complete result including bfs. bis, bfc and bic.....	49
Table 15: Distance matrix of NL6 instance.....	50
Table 16: Simulated annealing parameters for mTTP.....	51
Table 17: Distance matrix of 8 team instance of National League.....	51
Table 18: Distance matrix of 10 team instance of National League.....	52

List of Figures

Fig 1: BBO working principle.....	21
Fig 2: Migration mechanism.....	22
Fig 3: Probability Distribution function of fitness of habitat.....	26
Fig 4: The PDF of noise involved in the fitness.....	26
Fig 5: Flow chart illustrating working of ESA.....	39
Fig 6: Proposed architecture.....	41
Fig 7: Algorithm description.....	44
Fig 8: Migration procedure.....	45
Fig 9 Comparison of cost produced by linear model for Modified BBO and for Standard BBO.....	47
Fig 10: Comparison of cost produced by Non linear model For Modified BBO and for Standard BBO.....	48
Fig 11: Comparison Between the cost evaluated by ACO, PSO, Modified BBO for NL6.....	50
Fig 12 NL8 team minimum cost computed.....	52
Fig 13 NL10 minimum cost computed.....	53