

**A PYTHON PACKAGE FOR SOLVING NONLINEAR
ADDITIVELY SEPARABLE NONCONVEX
OPTIMIZATION PROBLEMS**

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Degree of Master of Science

Department of Computer Science and Engineering

University of Moratuwa

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Dissertation submitted in partial fulfillment of the requirements for the degree Master
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Candidate's Declaration

I hereby declare that this report was carried out by me under the supervision of Dr. Charith Chitraranjan, in the Department of Computer Science and Engineering, University of Moratuwa as a partial fulfillment of the requirements of the of the M.Sc. degree in Computer Science at the University of Moratuwa. It has not been submitted to any other institution or study program by me for any other purpose.

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I/We certify that the above declaration made by the candidate is true & this report is forwarded for the purpose of evaluation.

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ABSTRACT

Nonlinear optimization problems are difficult to solve in many practical situations, and only a few approaches are developed in recent history. The main problem in the nonlinear optimization problem is it needs some convexity approximation to obtain global optima. Otherwise, it ends up with the local optima. Separable programming is a common method to solve nonlinear optimization problems. Most of the nonlinear programming techniques, including the separable programming end up with the local optima when the problem is nonconvex. To overcome this problem several types of research have been conducted in recent history.

Computational implementations are an essential component in nonlinear programming as they are hard to solve with traditional methods. Also, very limited computational implementations have been developed in this area. However, in general, such implementations cannot promise that the results they generate are globally optimal. Therefore “**laptimize**” python package was developed to solve nonlinear separable nonconvex optimization problems using a branch and bound method. This algorithm was proposed by James E. Falk of The George Washington University. It has been verified that it can produce a global solution in a finite number of steps for a large class of nonlinear programming problems in the separable class. The correctness, stability, and convergence of the algorithm are evaluated with nonlinear programming examples.

Table of Contents

CHAPTER 01	1
INTRODUCTION	1
1.1 Overview.....	1
1.2 Background of the study	1
1.3 Objectives	2
1.4. Optimization	2
1.5 Significance of the Study.....	5
CHAPTER 02	7
REVIEW OF LITERATURE	7
CHAPTER 03	11
THEORETICAL BACKGROUND OF THE STUDY	11
3.1 Overview.....	11
3.2 Introduction to the Algorithm.....	11
3.3. The Approximating Problem	12
3.4. The Branch and Bound Approach	14
CHAPTER 04	16
MATERIALS AND METHODOLOGY	16
4.1 Overview.....	16
4.2 Introduction.....	16
4.3 laptimize –Linear Approximated Programming for Optimization.	20
CHAPTER 05	27
RESULTS AND DUSCUSSION	27
5.1 Overview.....	27
5.2 Results	28
5.3 Summary.....	41
5.4 Implementation Comparison	48
5.3 Discussion	49
CHAPTER 06	50
CONCLUTIONS AND POSSIBLE FUTURE WORKS	50
6.1 Conclusions	50
6.2 Future Works	50
References	51

Table of Figures

Figure 4.1: Initial <i>Fix</i> representation.....	17
Figure 4.2: The Approximating Function <i>Fij(yi)</i> representation.....	18
Figure 4.3: laptimize package page in PyPi.....	20
Figure 4.4: laptimize installation via pip	21
Figure 4.6: laptimize project structure	22
Figure 4.7: laptimize setup.py file	23
Figure 4.8: laptimize algorithm flow chart	26
Figure 5.1: Graphical representation of objective function	28
Figure 5.1: Graphical representation of nonlinear constraint function	28
Figure 5.3: Branch and Bound tree for Example 01	31

Table of Tables

Table 5.1 Approximated function values for grid points	29
Table 5.2.1: Initial solution for Example 01	30
Table 5.1.2: Initial solution for Example 01	30
Table 5.3: Results Comparison for Example 01	31
Table 5.4: Results Comparison for Example 02	32
Table 5.5: Results Comparison for Example 03	33
Table 5.6: Results Comparison for Example 04	34
Table 5.7: Results Comparison for Example 05	35
Table 5.8: Results Comparison for Example 06	36
Table 5.9: Results Comparison for Example 07	37
Table 5.10: Results Comparison for Example 08	38
Table 5.11: Results Comparison for Example 09	39
Table 5.12: Results Comparison for Example 10	40
Table 5.13: Results Comparison for Example 11	41
Table 5.14: Results Comparison for Example 12	42
Table 5.15: Results Comparison for Example 13	43
Table 5.16: Results Comparison for Example 14	44
Table 5.13 Package evaluation summary results	46