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Disassembly Technique for Software by Teaching and Learning Algorithm

Nitesh Hatwar and Sonali Nimbhorkar

***Abstract*— TLBO algorithm was proposed in this paper which was developed by R. V. Rao sir in 2011 for optimization problem. This algorithm work on two stages i.e. teaching and learning. The algorithm uses bunch of learner that assume as population and iteration size, so TLBO requires only specific parameter less algorithm. It is easy to implement. In this work we will demonstrate the performance of TLBO algorithm for Solving DSP Problem to minimize total completing time of disassembly and LSD algorithm for disassembly purpose.**

***Index Terms*— Disassembly Sequence Planning (DSP), Teaching Learning Based optimization (TLBO), Linear Sweep Disassembling (LSD)**

I. INTRODUCTION

Today's world ware each and every person using a software system in its own computer system the world is going to emerge into the technology which is widely used. The system and its components are together because of more than one software to build big software here by designing the new software system ware each component want to collaborate each other and the build new software. Each software to gate its own assembly a component with its respect to each software. By contribution of new software there is using of its own parameter, method and so on, so that by merging all the parameter to combine that all and the process the new software for using purpose. Creation new software there is need of practical assertion and modularity for the software [8-10].

In present world each can need to know what exactly in particular file or software. How it is built from many components. The crucial way to find a component in particular software that we want to disassemble particular file with less amount of time that we have to optimize. In the field of computer and its regarding technology the technique which where use for disassembling and optimizing the time of disassembly is one of the task. Disassembling technology is use to modify or re-engineering the process knowing the field in it.

In the country many of the software developer they are working on to develop an efficient software or user friendly GUI for customers. If the customer want know the thing whichever, used in building the software for this they get disassemble that software and complete that thing. The teaching and learning algorithm i.e. TLBO is used for optimization purpose only while software use to disassemble particular file with respect to time. The study of disassembling and optimization technique is mainly useful for time and todays person that don't have time in each of the field. Optimization is research topic in broad area and we will demonstrate in our computing field [9-10]. The optimization problem are many more in our computing field like scheduling, to find an optimal routing, etc. that are how to do fast likewise many of the algorithm that are used to optimize the thing[5]. The process of disassembling is basically used in manufacturing industries to disassemble a product and vice versa. Here, we use this technology for software purpose to disassemble ale or software to which we can see what exactly in that software as well as the method is use to develop a definite software. In day to day life one can know the software part to which they can use to maintain its sustainability to it.

The main aim of an optimization to disassemble a software with respect to time of disassembly. Here we have use the optimization technique i.e. TLBO algorithm because it require less parameter [1-3].The algorithm is develop by mechanical engineer researcher i.e. R. V. RAO [1]. The disassembly process is done by LSD Algorithm and optimization part is done by TLBO Algorithm. The survey many more optimization algorithm available like ABC, PSO, GA, HS, SFL [1-6], etc. however, ABC require optimum controlling parameter of number of bees limit. TLBO which work on only two parameter i.e. population size and number of generation, so it is parameter free algorithm [8].

II. WORK OF STUDY

The study regarding with disassembly is done by totally new concept for software or file and optimization as well. Here we have disassemble a file by LSDA while optimization part is done by TLBO and the main aim is totally about TLBO algorithm.

The process of disassembly and optimization is done by two algorithm.

A. LSD Algorithm
B. TLBO Algorithm

A. LSD

LSD algorithm is mainly use for disassembly process which can open the file or software. i.e .dll file in step by step mode. Currently the work we are using linearly and it will also work on recursively as well. So we have use it as LSDA only for process of disassembly. In these algorithm, we

started at the beginning of the section and keep track of the length of each instruction we disassemble. Naturally the next instruction address can be computed as follows:
Next instruction address = current instruction address + current instruction size
As the name implies this algorithm scan the executable linearly (it does not refer to the asymptotic computation of this algorithm) when call or jmp instruction are encountered, they are decoded as regular instruction, and gives no special consideration. Think of this algorithm instruction by instruction decoding [11].

B. TLBO

TLBO is basically formulated on the basis of population size and number of generation. This algorithm is based on teaching and learning process only. This algorithmic process is very simple for optimization rather than other nature inspired algorithm. Both supervise and un-supervise learning is present.
This algorithm is consist of two phase. i.e. Teaching and Learning

a. Teacher phase

When there is teacher is present for the learning process then the supervise learning. The teacher convey the knowledge in between student or learner and calculate the mean grade of the total class on the basis of teacher and student and taken out best student from the class or group of learner. Then select the best teacher to learn the student because to improve the knowledge of student.
Let, Mi be the mean and Ti be the teacher at any iteration i. Ti will try to move mean Mi towards its own level, so now the new mean will be Ti designated as M_{new}. The solution is updated according to the difference between the existing and the new mean given by

$$Difference\_Mean_i = r_i\ (M_{New} - T_F M_i)$$

Where T_F is a teaching factor that decides the value of the mean to be changed, and ri is a random number in the range [0, 1]. The value of T_F can be either 1 or 2 which is again a heuristic step and decided randomly with equal probability as $T_F = round\ [1 + rand\ (0, 1)\ \{2 - 1\}]$.
This difference modifies the existing solution according to the following expression

$$X_{new,i} = X_{old,i} + Difference\_Mean_i,$$

b. Learner phase

When learner get the knowledge by discussing with friend or colleague or the absence of learner called un-supervise learning and the learner can increase their knowledge by disseminating with his colleague and find the best result among the class [1-5].
Learner modification is expressed as,
For i=1: Pn Randomly select another learner Xj, such that i ≠ j
If f(Xi) < f(Xj)
$X_{new,i} = X_{old,i} + ri(Xi - Xj)$
Else
$X_{new,i} = X_{old,i} + ri(Xj - Xi)$
End If
End For
Accept Xnew if it gives a better function value [2].

The flow chart of TLBO algorithm as shown below:

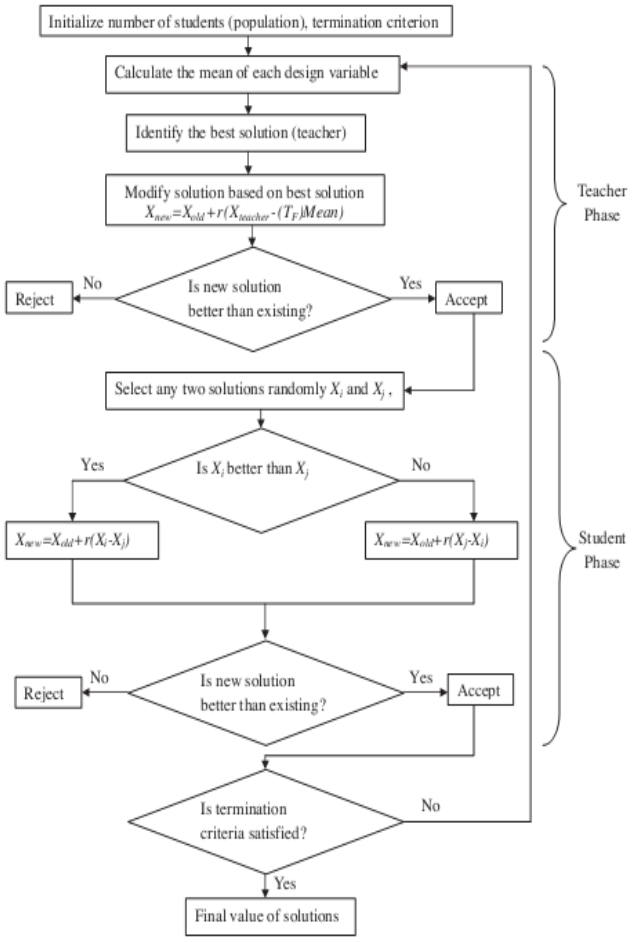

Figure 1. Flow Chart of TLBO Algorithm

III. PROPOSED METHODOLOGY

LSDA is used for disassembly purpose. In today's software programs are built by collection of many software component, so we cannot identify the instruction inside any software without knowing what data is and vice versa. A fundamental requirement of any software system that aims to reverse engineering an executable program statically is perfect disassembly of its machine code instruction. A basic algorithm taking all the section marked as code and disassembling it's by reading the instruction one after each other [9]. The method is proposed TLBO algorithm for optimization purpose only for getting an optimal or efficient solution with less time. The flow of proposed plane is given below:

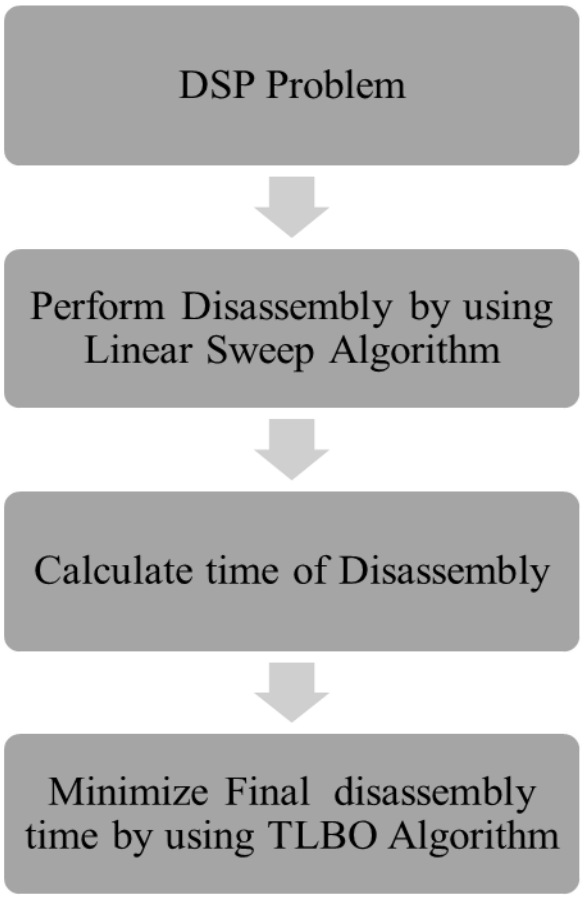

Figure 2. Flow of Proposed Plan

IV. THE PROCESS OF DISASSEMBLING AND AN OPTIMIZATION

Step-1: Take DSP problem i. e. .dll file
Step-2: Now apply disassembling algorithm i.e. LSDA
Step-3: Calculate disassembling time with system in mili-second.

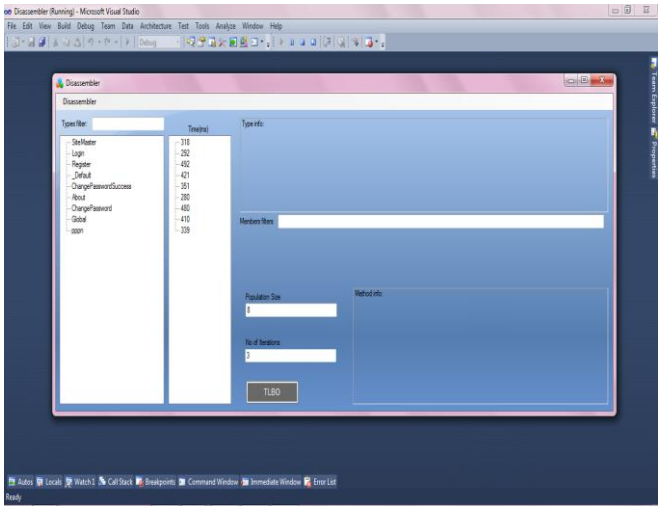

Figure 3. Shows Disassembling Process

Step-4 After calculating the time of disassembling then apply TLBO algorithm on the basis of number of population and number of iteration.

Table 1. Comparison of Time

Disassembling time (ms) without TLBO	Disassembling time (ms) with TLBO
512	366.789
441	307.028
370	253.882
300	195.120
500	357.310
429	381.394
356	237.160
429	395.714

Step-5 found final optimal time with respect to previous time which shows above.

IV. PERFORMANCE OF BENCHMARK FUNCTIONS

The performance of the TLBO algorithm is checked by applying it on the standard Benchmark Functions for solving an optimization problem.

Table No. 2 Benchmark Functions

Function	Formulation
Rastrigin's Function	$f(x) = \sum_{i=1}^{n} [x^2 - 10\cos(2\pi x_i) + 10]$
Schwefel Function	$f(x) = -\sum_{i=1}^{n} (X_i \sin(\sqrt{\lvert X_i \rvert}))$
Sphere Function	$f(x) = \sum_{i=1}^{n} x_i^2$

Table No. 3 Range of Benchmark Functions

Name	Function Range	Multi-model	Sepa-rable	Regular
Rastrigin's Function	-5.12≤xi,≤5.12	Yes	Yes	Yes
Schwefel Function	-500≤xi,≤500	Yes	Yes	No
Sphere Function	-100≤xi,≤100	No	Yes	Yes

To identify the computational effort and consistency of the TLBO algorithm, three different benchmark functions considered they are tested in this experiment. The results obtained using the TLBO algorithm are compared with the basic TLBO algorithm, along with other well-known optimization algorithms. The details results of the benchmark functions are given in Table no. 3.

Table No. 4 Results obtained from Benchmark Functions

Objective Function	Population size	Iterations	$F(x)_{Min}$
Rastrigin's function	5	10	0.2651
	10	30	0.3853
	15	50	0.4829
	20	100	1.4732
	25	125	1.6349
Schwefel function	5	10	33.7849
	10	30	42.9136
	15	50	43.1088
	20	100	48.5653
	25	125	46.6068
Sphere function	5	10	8.3457e+03
	10	30	8.5886e+03
	15	50	9.0878e+03
	20	100	9.4208e+03
	25	125	9.4439e+03

V. CONCLUSION

The research work has been done on the basis of two algorithm i.e. LSDA and TLBO algorithm. The LSDA is for disassembling purpose. Most of the algorithm are available for optimization like, PSO, GA, ABC, ACO, etc. they works on their own parameters with two more parameters, but TLBO works on only two parameters. That's why we proposed TLBO algorithm, which is specific parameter-less algorithm and the TLBO algorithm which is checked on standard benchmark functions with low computational burden. All methods is used as engineering purpose only and aim is fulfilled in this work.

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REFERENCES

[1] R. Venkata Rao, V.D. Kalyankar and G. Waghmare, "Parameters optimization of selected casting processes using teaching–learning-based optimization algorithm," Applied Mathematical Modelling (Elsevier), 2014.

[2] R.V. Rao and G.G. Waghmare, "Multi-objective design optimization of a plate-fin heat sink using a teaching-learning-based optimization algorithm," Applied Mathematical Modelling (Elsevier), 2014

[3] Kai Xia, Liang Gao, Weidong Li and Kuo-Ming Chao, "Disassembly sequence planning using a Simplified Teaching–Learning-Based Optimization algorithm," Applied Mathematical Modelling (Elsevier), 2014

[4] R.V. Rao, V.J. Savsani and D.P. Vakharia "Teaching–Learning-Based Optimization: An optimization method for continuous non-linear large scale problems," Information Sciences (Elsevier) 183 (2012) 1–15.

[5] P. J. Pawar& R. VenkataRao, "Parameter optimization of machining processes using teaching–learning-based optimization algorithm," Springer,2013

[6] R. VenkataRao and VivekPatel,"A multi-objective improved teaching-learning based optimization algorithm for unconstrained and constrained optimization problems," International Journal of Industrial Engineering Computations 5 (2014).

[7] R. VenkataRao∗, Vivek Patel, "An improved teaching-learning-based optimization algorithm for solving unconstrained optimization problems," ScientiaIranica (2013).

[8] Suresh Chandra Satapathy, Anima Naik and K Parvathi, "A teaching learning based optimization based on orthogonal design for solving global optimization problems," (Springer), 2013

[9] Benjamin Schwarz, Saumya Debray and Gregory Andrews, "Disassembly of Executable Code Revisited," Working Conference on Reverse Engineering (WCREí02) (COMPUTER SOCIETY)1095-1350/02 $17.00 © 2002 IEEE

[10] Jianmin Jiang and Hongping Shu, "Assembly, Disassembly, Adaptation and Replacement of Software Components," International Conference on Computer Science and Software Engineering, 2008 IEEE DOI 10.1109/CSSE.2008.1051.

[11] "A1Logic%20Research%20%20Disassembly%20 Algorithms.htm"

Nitesh Hatwar, B. E. (CSE), M. Tech. (CSE.), Optimization, IEEE member.
Sonali Nimbhorkar M. Tech. and Prof. at G. H. Raisoni college of Engineering, Nagpur (MS), India.