Hybrid Technique for Effort Estimation of Software’s

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Abstract: The efforts are to be estimated before beginning with the development of software. This technique is known as effort estimation. Various models are proposed to measure the efforts accurately. The proposed work includes estimating the efforts of software using hybrid technique involved in previous models. COCOMO is constructive cost model and is considered as the most accurate model for effort estimation. Another method to measure the efforts is function point. It basically measures the size of the project that further helps to calculate efforts. In this work a hybrid formula used that depends upon the values of cost drivers. The efforts of each model are being calculated and their MMRE is calculated. The result shows that the hybrid model is derived by using TLBO algorithm provides more accurate results than the other estimation models.

Keywords: TLBO, Efforts, MMRE

I. INTRODUCTION

If there is no proper, reliable estimation provided in the software development, there will be no proper arrangement as well as control of the project. Even when all the important factors are considered, the software business is not useful in determining the project estimated. Small projects difficult to estimate and accuracy is not important. As the measure of project increases, required accuracy is not important. Nevertheless, as the span of project increments, required accuracy is important which is difficult to estimate. An estimate should have measure of granularity so it can be clarified. Since the effort put resources into a project is much more efficient among the most important and most analyzed factors [1]. So the prediction of this value while we start the software projects, it arranges the activities satisfactorily. Estimating the effort with a huge value of reliability is an issue which has not been unraveled yet. The first step towards achieving an effective estimate is to provide an exact estimation for the software size which is be proposed. Along with these formal descriptions of the needs for project estimation scope, the source of data might start. After receiving the size estimation of a product, it becomes very easy to estimate the effort of it. When the software development lifecycle of a project is defined only then the conversion from software size to total project effort estimation is possible [2]. Further the designing, develop and test of the software are defined for project development. In addition to coding of the software there is much more to the software development project. The smallest part of the effort is basically the coding part. The third important step in software development project is the determination of project schedule from the effort estimate. The number of people working on a project, the type of work they will do, the starting time and ending time of the project are the factors that are to be involved here. The data gathered from this step is to be laid on to the calendar schedule. The number of people that are to be involved in your project can be estimated using the historical data of the organization’s past project or industry data models. The total estimate of the project is also dependent in a way on the amount of cost an organization allocates to it [3]. In some of the fields the cost allocation is not done at all, and its adjustment is done by increasing the labor costs per hour. The overall costs for the software development is estimated by the software development project manage accordingly. His work is also to check that there are no additional costs to be later given by the organization. Constructive Cost model was developed by Barry W Boehm in 1981. It is an algorithmic cost model. Algorithmic cost model is developed taking into account relating the present project to previous projects. It depends on historical information. Halsted’s metrics is used for the purpose of estimating the program volume, complexity of the method as well as the effort of program. The program complexity is defined as the total number of operators and operands used in a program. Various operators and operands can be assigned to higher-level object oriented programming constructs [4]. These include Java methods, classes, as well as the packages. This metric is useful as well as constructive to identify the computationally intensive code which involves many complex formulas. The formulas are similar to the sources of imprecision or the errors. The derivations which do not have contention are not given by the Halsted’s equation which is a major drawback. The code length as well as the volume metrics is proposed by Halstead where the code length is utilized for providing source code program length. A single teacher or the interactions performed amongst the learners helps in improving the learners. This activity is done in basic TLBO algorithm [5]. When the tutorial hours are provided, the traditional teaching-learning environment is given which helps them in examining with relation to their classmates. This is also done through discussion made with the teacher. There is self-motivation also observed within the students which helps them learn without taking help from anyone. There is either 1 or 2 teaching factors in the basic TLBO algorithm. This results in
highlighting two important factors. Either the leaner learns all the things from the teacher, or it learns nothing at all. There are more efforts to be put in by the teacher in this kind of system. This helps in improving the performance of the teacher and slows the convergence rate of optimization [6]. There are various changes made in the TLBO algorithm for improving the exploration as well as exploitation limit. The basic TLBO algorithm is made to modify in recent times by the researchers. The same modifications are connected to the optimization of a two stage thermoelectric cooler and heat exchangers. There is a further enhancement and modification in the already improved algorithm which helps in improving the performance of the algorithm.

II. LITERATURE REVIEW

Peyman Khazaei, et.al (2016) proposed that in the day-ahead power systems scheduling, system operators formulated and solved the unit commitment (UC) problem to determine ON/OFF status and power dispatch of the producing units. In the paper, the teaching-learning-based optimization (TLBO) technique, which as an evolutionary algorithm, was employed to solve the unit commitment problem [7]. The proposed algorithm was compared with several existing methods. The numerical results showed the effectiveness of the proposed TLBO which was compared with several well known evolutionary algorithms, i.e., DP, PSO, and SLF A. The TLBO not just gave a solution bring down operating costs, additionally had a lower computation time. In addition, adequate spinning reserve was given to alleviate the effect of rapid load/generation changes because of unexpected disturbances.

Yu-Huei Cheng (2016) proposed that numerous single nucleotide polymorphisms (SNPs) for complex genetic diseases were genotyped by polymerase chain reaction restriction piece length polymorphism (PCR-RFLP) [8]. A feasible PCR-RFLP primer match was to be designed. Also there was a need to discover accessible restriction enzymes which could perceive the target SNP for PCR experimental purposes. In order to enhance the mining work, for restricted enzymes which are imposed on the new REBASE the SNP-RELPing method is utilized. For enhancing the TLBOMPD, the renewed PCR-RFLP which is extracted from numerous SNPs is utilized. The experimental results which were achieved were made to compare with the GAMPD results. This would be helpful for enhancing the reliability of this proposed technique.

Ömer Faruk SARAÇ, Nevcihan DURU (2013) described that Software effort estimation was a challenging task in software project management. Software effort estimation is being analyzed for a very long time and various methods have been already proposed to do so. For achieving better accuracy of software cost estimation also, many of the methods were put forth which were present in combinations. COCOMO was one of them. It was a highly recommended model for software effort estimation [9]. This set was formed from the ANN output generated and within this set upper and lower boundaries were evaluated for effort estimation. When the results were compared with the other methods, this paper concluded that the proposed model gave better accuracy than COCOMO and ANN alone.

Taher Niknam, et.al (2012) proposed that this paper exhibited a 0-multi-objective-teaching-learning-based optimization algorithm. This algorithm was used to solve dynamic economic dispatch problem. This paper proposed a new methodology. Here, the phase angles were kept as a base for the optimization process instead of the design variables themselves. The nonlinear characteristics of the problem identified are then viewed in a very proficient manner now [10]. A min-max approach was developed for involving the decision creator’s favor. This was done through decision creator’s favor. This helped in choosing the best candidate solutions for the people that were to come. The applicability of the method was validated on three test systems, including 5-unit, 10-unit, and 120-unit test systems.

Iman Attarzadeh, et.al (2012) describes, in software development, the project manager has to face the problems regarding cost, time and staff estimation. This is one of the critical tasks in software development process. This paper provides better view of hybrid model ANN-COCOMO i.e. COCOMO model using artificial neural network for effective effort estimation [11]. Software estimation is classified as algorithmic and non algorithmic technique. COCOMO is considered as the best model that follows algorithmic techniques such a regression technique that is based on historical data. ANN is basically a mathematical technique to calculate the working of human brain. ANN basically fine using historical data. Because of changes in the business environment, the relationship among attributes became vague. To overcome this problem, this paper proposed the ANN-COCOMO model.

Chetan Nagar et.al (2012) combines the Use Case point and COCOMO. The Use Cases were used to predict the Line of Code. Use Case used in the method must be more specific not more generalized and so the Use cases have gained much more popularity. Researchers from academia as well as industry showed interest in the Use case based approaches. This was due to the reason that the results obtained were much more efficient along with their applicability [12]. To estimate the KLOC the project was divided into module. Further a module was divided into sub modules until the researcher could estimate the value of KLOC. The functional requirement of the system was shown the Use Case points. Thus this method proved to be much better than the other already existing ones. The paper also mentioned the way to combine the Use case and KLOC methods.

Lalit Kumar (2013), has presented algorithm for NP hard problems which is based on artificial bee colony (ABC) [13]. It is one of the newest nature-inspired swarm-based optimization algorithms and that has a good performance. NP hard problems are classified as Genetic algorithms, Majority Merge algorithm and Ant Colony algorithm. In the field of string the Shortest Common Super sequence is a classical problem. This novel technique obtains the better results than previous algorithm.

Lalit Kumar (2013) has presented, human communication and reasoning processes that are Fuzzy rule based systems
which provides a framework for representing & processing information [14]. Knowledge Driven Models and Data Driven Models these are two approaches that are used for rule based systems. These models generate the data by domain expert, knowledge engineers and numerical data. It’s a difficult task to find and extraction of information in these models. In Neural networks, genetic algorithm & particle swarm optimization are some of the approaches which has the advantages of strong robustness, fast convergence and high flexibility, fewer setting parameters, that is Basic Artificial Bee Colony algorithm.

III. RESEARCH METHODOLOGY
The TLBO algorithm is the algorithm which is used for the optimization. In this research TLBO algorithm is applied to reduce MRE value of the COCOMO Model by estimating predicted efforts more accurately. The TLBO algorithm comprises of methods which help each individual to take in something different and to enhance himself. The base of this algorithm has be derived from a normal teacher-earner methodology of a classroom. The TLBO algorithm holds the basics of traditional learning methods that are seen in a teacher and a learner. There are two essential methods of learning involved in it. The first is to learn through the teacher. It is also known as a teacher phase. The second is the learning that is done through interaction with different learners. This is known as the learner phase. TLBO is a population based algorithm. The population comprises of the gatherings of students (learners). The diverse subjects offered to the learners are analogous with the distinctive design variables of the optimization issue. The results of the learner that are obtained are analogous to the fitness value of the optimization issue. The teacher is held to be the best arrangement in the whole population.

IV. PROPOSED ALGORITHM
Step 1: Input the value of MRE of each project which is calculated using COCOMO model
Step 2: Calculate the learning value of each project
- For i=1 to number of projects
- For j=1 to MRE of each project
- Calculate the best value of MRE for each project for the learner phase
- Calculate the best teacher phase value of each project (i)
Step 3: Select the best MRE value of each phase by comparing it with the last phase
Steps 4; The step 2 and 3 is repeated until MRE value of each project is calculated.

V. EXPERIMENTAL RESULTS
The proposed work has been implemented in MATLAB and the results are evaluated as shown below.
As shown in figure 3, the various effort estimation models and optimization models are compared and it is analyzed that TLBO Model performs well in terms of MMRE Value.

VI. CONCLUSION

The effort estimation is the technique which will estimate the efforts for the software development. In the recent times various algorithms has been proposed which analyze the efforts for development. These models are COCOMO, COCOMO-II, Bailey, Dotty etc. In this work, we are working on COCOMO model which is based on KLOC values. It means that KLOC value is directly proportional to efforts means if the KLOC is analyzed accurately efforts are also analyzed in the efficient manner. In this work, we are using IVR dataset in which 47 projects are considered and KLOC of each project is given in the dataset. To reduce MRE value TLBO algorithm is applied which is based on learner and teaching phase. The proposed and existing algorithms are implemented in MATLAB and it is been analyzed that MRE value is reduced with the use of TLBO algorithm.

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