# Software Effort Estimation Techniques

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*Abstract-* One of the major concern of every software organization is software effort estimation. As size and complexity of software increases, it becomes very difficult to estimate the cost of efforts needed to built the software. This has attracted many researchers. Software estimation techniques applied by some of them gave good results and some did the opposite but none of the techniques has given accurate results in every situation. This paper focuses on literature review on research studies done in this field in the past few years. Comparative analysis of those techniques is also done.

*Keywords*: Delphi, COCOMO, Neural network, k-nearest tree, Regression tree.

## I. INTRODUCTION

It is a technique which is used to calculate the time required to complete a task. It is used in managing the process of software development lifecycle and supports planning of software projects. It is divided into two categories i.e..algorithm and non-algorithm method. Over estimation leads to wastage of organization resources The main aim of this estimation is budgeting, Project planning and control, trade off etc. It is active research area. It is desirable not only for scheduling of resources but also for better estimation and planning. Software estimation output is the base for the plan. Accuracy is one of the main factor in estimation. Without unbaising information balanced view on estimation performance it is difficult to obtain. There are many types of software estimation techniques like work breakdown structure, Delphi technique, testing point analysis,3-pointetc. Basic steps for software estimation technique 1.Estimate the size of development product, Estimates the effort, Estimate the schedule, Estimate the project cost.

Section II of this paper presents the study and review of available research. Comparison and findings of available literature in tabular form is presented in section III. Finally the conclusion of findings is presented in section IV.

## II. RELATED WORK

Jack E. Matson, Bruce E. Barrett, Joseph M. Mellichampin [1] in 1994, The author proposed an assessment of different types of regression models that has relation with development of software for measurement of size in function points. It also focus on current method for the measurement of function point and give the suggestion for modification in approach so that accuracy is increased. Statistical procedure is described based on function point data. It also provide a cost estimation model. The main factor which affects the cost estimation is size of product.

KjetilMoløkken and MagneJørgensen [2] in 2003 Author provides This paper summarizes estimation, most of projects (60-80%) encounter and/or schedule overruns, in this seems be lower then the overruns reported by consultancy companies estimation methods must expert judgment-based. In this lack o surveys including extensive analyses

Tim Menzies, Zhihaochen, Jsirushihn, karenlum [3] in 2006, The author proposed a model specification and calibration which gives the sub-optimal model. It has various requirement like exploration of number of models, irrelevant variables, using the rejection rules select some of the model. But there is a problem we cannot distinguish between the rival modelling. It identifies many causes which affect the performance of model like superfluous attribute, modeling assumptions.

Mehwish Nasir [4] 2006, The author propose depth review estimation techniques author tell about strengths and weakness, popularity and applicability. In improved estimation accuracy about knowledge essential, there techniques makes estimation process smother and easier and used artificial intelligence.

MagneJorensen MartinShepperd [5] in 2007, The author reviewed on many research paper and help in the improvement of estimation research with the help of library of estimation paper which is classified according to topic, usage of data sets, research approach etc. It supports the future estimation research which increases the awareness of data sets. It manually search related paper, increase the number of search.

Ali Nassif, luizFemandoCapretz, Danny [6] in 2010, In this techniques author say software estimation is imperative in software engineering. Many projects fail due to inaccurate length or effort estimation. In managedcompetently and facilitates manager's estimate the effort, schedule and cost of the project. In manages to bid efficaciously software projects. In this demonstrates function points model and presents a many techniques used to degree the size of software in the early tiers. Some techniques based on Artificial Intelligence are presented to illustrate how the accuracy of estimation can be improved.

Vu Nguyen [7] in 2010, The author proposed the improvement in the COCOMO models which approximate the size and effort. It helps in increasing the accuracy of software projects. Bayesian analysis and regression technique is used for levelling the model.

P.kSuri and PallaviRajan [8] in 2012 In this paper the author described the different types of estimation model along with their aspects. Different models are analogy, SLIM,COCOMO . It avoids budget and help in error decreasing. It also told about the future prediction that weights are applied for calculation of software module.

Bilson Rosa, Ray Madachy, Borry Boehm and Brad Clark [9] in 2014, In Author Provides about software estimation model thatthis paper introduces a straightforward methodology for foreseeing programming advancement exertion. The relapse demonstrates utilizes item size and application types to anticipate exertion. Item estimate is estimated regarding the identical source lines of code. The examination depends on observational information gathered from 317 exceptionally late ventures actualized inside. Impact of item measure on programming exertion will be deciphered alongside application space.

HimaniRastogi, Swati dhankhar, MishaKakkar [10] in 2014, The author proposed the comparative analysis of different type of estimation technique with its merits and demerits. No single technique can overcome all the shortcomings so hybridisation is necessary to produce realistic estimates. ANN-COCOMO II-PSO gives better result when they are used isolated.

Rshmachawla, Deepak Ahlawat, Mukesh kumar [11] in 2014, The author reviewed on many cost estimation model. Accuracy is major challenge and author predict that soft computing based technique has better approximation than other model. To remove uncertainty and imprecision MFs can be developed.

Amid KhatibiBardsiri, Kerman,Seyyed Mohsen Hashemi [12] in 2014, Imprecision is the major reason for project failure. The author proposed the discovery of model which are present in the beginning of estimation area. It includes

many accessible and parametric model or non-parametric method. Software estimation and algorithmic techniques are introduced.

Mohammed Aljohani and RizwanQureshi [13] in 2017, In this author said that Software development life cycles require lot of sports and capabilities to avoid risks and the great software estimation approach is meant to be employed. Therefore, in this research, a comparative take a look at turned into carried out, that do not forget the accuracy, utilization, and suitability of current strategies. Technique are used COCOMO. SLIM single and multiple respectivelyWithin the techniques consisting of budgeting and selection-making approaches he conclusion for this reason is a conditional affirmation that artificial intelligence fashions are able to supplying adequate estimation fashions. Their overall performance is to a massive diploma depending on the informationon which they may be educated, and the quantity to which appropriate project records is to be had will determine the quantity to which ok effort estimation fashions can be evolved.

Youngheekim, Keumsuk lee [14] in 2017, The author proposed the comparison of accuracy of techniques for software development effort estimating. Regression analysis and machine learning methods are used for comparison. MMRE, MdMRE, Pred(10) methods are used. Accuracy is measured with the help of variable which are selected from other model. Neural network has best estimation ability.

### III. COMPARATIVE ANALYSIS OF LITERATURE REVIEW

| Sr. No | Year | Method | Strength | weaknesses |
|---|---|---|---|---|
| 1 | 1994 | Function point, regression analysis | Focused on a problem current method measuring | Limitation of models |
| 2 | 2003 | Survey estimation | Judgment based | Analyzing problem affected selective memory |
| 3 | 2006 | Rival modeling method, MRAPPER COSEEK MO | Effort models learned form a very small number | Performance Can be so large |
| 4 | 2006 | Analog method & Top | Estimation technique methodolo | Improve estimation accuracy |

| | | | | |
|---|---|---|---|---|
| | | down, buthem up method | gy | |
| 5 | 2007 | Systematic estimation evaluation method | Future software cost research increase awareness properties data set | Problem in effort estimation domain |
| 6 | 2010 | Size estimation techniques | Artificial installation illustrate improved | Estimation software life cycle solved |
| 7 | 2010 | Conte's Criteria Welocox on singed rank test | Relation between cline and business enterprise | No single technique best situation |
| 8 | 2010 | COCOMO | Improving COCOMO model | Addressing COCOMO models |
| 9 | 2012 | Cost estimation COCOMO, Delphi | Parametric models high accuracy | Difficult accurately |
| 10 | 2014 | Boehm's, COCOMO Computing based technique | The accurate cast and effort development | Problem in effort estimation domain |
| 11 | 2014 | Hybridization method | Most accurate result as measure selection | Intricate problem |
| 12 | 2014 | Parametric and non-parametric method | Project management wild considered weakest link | Discovered ideal |
| 13 | 2014 | Delphi, COCOMO Machine learning accuracy | Large project used SPM | Project language not good |
| 14 | 2017 | COCOMO, COCOMO-2 SLIM | Decision making processes | Rick management, rick estimation |
| 15 | 2017 | Neural network k-nearst tree Regression tree | Accuracies MMRE MdMRE | Neural network Difficult work |

## IV. CONCLUSION

On account of the scientific categorization, spent significant time in different imitation highlights and evaluated various "software building"related efforts in interdisciplinary and front-line sciences, this paper aims to analyze various researches that are concisely good but not so well. Some of the techniques are beneficial due to their accuracy but these techniques are highly budgeted, so we have to put some corrective measures in these techniques to lower its overall cost. So in the future, new technique will found which are not over budgeted and they gives us a good result .Hence this paper direct our efforts and resources to find the relevant techniques which are lower in installation cost as well as in maintenance cost and yield far more efficient results.

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