Analysis of Estimation Techniques in Software Metrics and Project Management

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Abstract: *Software development processes are split into a number of separate activities. Cost estimation of software development project focuses on how associating estimates of effort and time with the project activities.*

Keywords: Cost estimation, COCOMO, Software metrics, Project Management

1. Introduction

Project cost estimation and project scheduling are usually carried out together. The costs of development are primarily the costs of the effort involved, so the effort computation is used in both the cost and the schedule estimate. The initial cost estimates may be used to establish a budget for the project and to set a price for the software for a customer. The total cost of a software development project is the sum of following costs:

1) Hardware and software costs including maintenance.
2) Travel and training costs.
3) Effort costs of paying software developers.

One of the most valuable asset in any software industry is the accurate estimation of effort (manpower) and cost. Because of the highly dynamic nature of software development, it becomes more and more difficult to get accurate cost and effort estimation which is the most important factor which makes software more essential for controlling estimation cost. Cost estimation is one of the most major and challenging activity to manage the softwaredevelopment Cost, because values of many of the variables are not known and not easy to predict at an early stage of Software Development. An ideal Software Cost Estimation Model should provide ample confidence, precision and accuracy from its predictions. In this paper, we have performed an analysis of most of the algorithmic techniques which has been developed till now for Software Cost Estimation.

Cost estimation is an important tool that can affect the planning and budgeting of a project. Because there are a finite number of resources for a project, all of the features of a requirements document can often not all be included in the final product. A cost estimate done at the beginning of a project will help determine which features can be included within the resource constraints of the project (e.g., time). Requirements can be prioritized to ensure that the most important features are included in the product. The risk of a project is reduced when the most important features are included at the beginning because the complexity of a project increases with its size, which means there is more opportunity for mistakes as development progresses. Thus, cost estimation can have a big impact on the life cycle and schedule for a project.

2. Algorithm

Step – 1: START → Application's start up interface
Step – 2: Enter password & login to the application
Step – 3: Select the estimation model i.e. *Basic or Intermediate*
Step – 4: Select implementation complexity
Step – 5: Calculate the implementation's size through function points
5.1: Specify functional characteristics
5.2: Specify more functional & operational constraints
5.3: Specify development technology
Step–6: Calculate function-point value
Step–7: Specify various implementation attributes or cost drivers involving other different functional & operational characteristics in order to calculate the Effort Adjustment Factor.
7.1: Specify Product Attributes
7.2: Specify Hardware Attributes
7.3: Specify Personnel Attributes
7.4: Specify Project Attributes
Step – 8: Calculate estimated Effort, Time & People required in the implementation of bug/enhancement
Step – 9: Calculate phase-wise distribution of estimated total effort
Step – 10: Calculate phase-wise distribution of estimated total schedule
Step–11: Schedule the complete project or the solution-implementation of the bug/enhancement as per the distributed schedule
**Step–12:** Plan the number of people or personnel who would be involved under different phases of the development life cycle of the project
Step–13: Fetch the detailed report containing the analysis statistics of the performed estimation according to selected model i.e. *Basic or Intermediate*.

3. Performance Analysis

The Hybrid model will work more effectively as compared to other cost estimation models. This analysis is compared with certain parameters such as Phase wise Effort distribution, Phase wise time distribution, Man Power estimation, cost estimation, Project Scheduling and Personnel Planning. The Hybrid model is best suitable for all the parameters.

Parameters/ Model	Phase-wise Effort Dist-ribution	Phase-wise Time Dist-ribution	Man-Power Estimation	Cost Estimation	Project Scheduling	Personnel Planning
Hybrid Model	✓	✓	✓	✓	✓	✓
Cocomo Model	X	X	X	✓	X	X
Function - Point Analysis Technique	X	X	X	X	✓	✓
Parametric Software Techniques	X	X	X	X	✓	✓
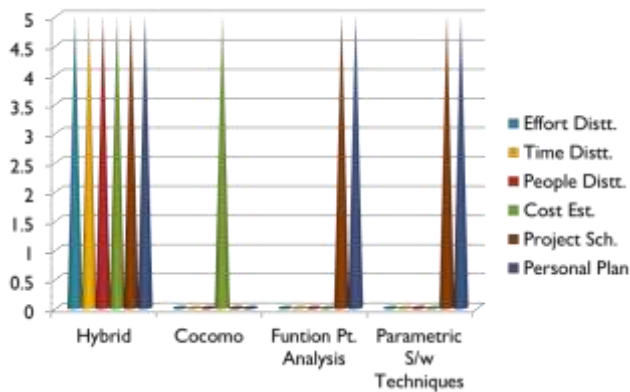
4. Conclusion

It Enables the Project Manager(s) to calculate the size of the application in terms of lines of code.

Strengthens the organizations through estimating software metrics like Effort, Time & People, helps the organizations to confidently extend fair commitments to their clients.

Helps the companies to the total duration amongst SDLC phases which results in a timely tracking of the overall progress of the project

All in all, this tool helps any commercial software organization to quantitatively estimate, analyse & utilize the fundamental software metrics that are a key to the success of any software project.

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