Improved Software Cost Estimation Model Using Cost Driver Reduction Based on Water Cycle Algorithm

Zahid Hussain Wani¹, Kaiser Javeed Giri^{2,*}, Rumaan Bashir³

^{1,2,3}Department of Computer Sciences, Islamic University of Science & Technology, J&K, India

*Corresponding Author: kaiserjaveed@gmail.com, Tel.: +91-9419167696

DOI: https://doi.org/10.26438/ijcse/v7i2.6472 | Available online at: www.ijcseonline.org

Accepted: 22/Feb/2019, Published: 28/Feb/2019

Abstract — Software cost estimation considered to be the critical, is equally vital tasks in software project management. In a highly challenging environment, software project managers are always in a need of robust estimation models inorder to predict the cost of upcoming software development projects accurately. Software cost estimation is the prediction of development effort and calendar time required to develop a software project. It is considered to be the key task as accurate estimation of any software not only accurately estimates development effort, cost, time and growth of a software development project but also yields delivery exactness and correctness vis a viz return an organization in a better schedule of its futuristic software projects. In this paper, software cost estimation is done by proposing a cost driver selection model which is based on an optimization technique called as water cycle algorithm. The proposed cost driver selection model selects only relevant set of cost drivers as an input to estimation process and ignores the very irrelevant cost drivers. In step second, these relevant set of cost drivers originating from step first are assigned to an Artificial Neural Network as its input for the purpose of getting the accurate estimation of software development project cost that needs to be developed. For evaluation purposes, Magnitude of Relative Error, Mean of Magnitude of Relative Error and Median of Magnitude of Relative Error are used as three performance measures to simply weigh the obtained quality of estimation as accuracy. The obtained results were compared with the results of a benchmark study of COCOMO model and another artificial neural network based model. From the comparative result, it becomes evident that the proposed model outperforms the rest of the two existing models.

Keywords- Artificial Neural Network, Cost Driver Reduction, Software Cost Estimation, Water Cycle Algorithm

I. INTRODUCTION

Software cost estimation is defined as the estimation of findings of cost and time for any software project. It is never an exact science and the reason being involvement of large number of cost drivers based on which the estimation is done. Furthermore, any process that involves a significant involvement of human factor can never be exact because humans are far too complex to be entirely expected. Software cost estimation is one of the most vital aspects of software development process. An inappropriate estimation of software development costs of any software product always make the project manager incapable of analyzing time and effort required for the project, thus leading to its over budgeting and time deadline extensions. Thus, software cost estimation is very significant tool as it affects both planning and budgeting of a project and equally challenging. From earlier discussion, it becomes evident that the success of every software development project is predominantly based on the accuracy of its cost estimation. An effective accuracy in estimation of software cost causes project managers to keep track of every activity of ongoing project and at the

same time let the organization to gain an insight of successful inception of futuristic projects by making efficient utilization of all of its resources including human resources like analyzers, designers, programmers & other alike work forces and some other Non-human resources. Thus accurate software cost estimation besides serving in successful completion of the currently running software development projects, also results in the overall development of the software development organization. Thus, predictions for new projects should be as close to the actual cost as possible inorder to avoid sufferings in terms of resources and standing against the deadline timings.

The rest of the paper is organized as follows: In Section II, a detailed description of various existing techniques in the field of software cost estimation is given, followed by a brief discussion about water cycle model that is used in attribute reduction as an optimization algorithm is presented in section III. Proposed model of cost drivers reduction and artificial neural network will be presented in section IV. Section V presents the details of datasets and the evaluation criteria used in the study. Section VI reports to the experimentation