

A Method for Estimating the Effects of Functionality Risk

Ramandeep Kaur, Neha Malhotra

Abstract—In the field of Software Engineering software risk management is an important area. Due to the complex nature of software development industry there are many types of risks which can cause project failure. From such risks developing wrong software functions is one due to which many problems can arise. If effects of this risk are not estimated it would pose problems for the success of the project. By estimating the effects of developing wrong software functions developer will come to know which problem they have to face with the occurrence of this risk and considering these effects developer can take appropriate action to manage this risk. So, We are proposing a FCM based tool to estimate the effects of developing wrong software functions.

Index Terms— Risk Management, Fuzzy Cognitive map.

I. INTRODUCTION

Software engineering is the process of solving customer's problems by the systematic development and evolution of large, high quality software systems within cost, time and other constraints.[11] Project development in the field of software engineering is complex in nature, because of this there can be unexpected problems that results in project delay, exceeding budget and quality problems related to products. Neglecting those risks will results in a project failure or poor quality software that partially fulfills the user requirement and thus leads to the dissatisfaction of user. Although such problems or risks cannot be totally eliminated from software projects but can be managed. Risk management can help to deal with problems before they occur. Risk management is a way for managing risks and concerns with all activities that are performed to reduce uncertainty associated with certain tasks or event.

The top software risk item can be :-

- 1) Personal shortfall
- 2) Unrealistic schedules and budgets
- 3) Developing the wrong software functions
- 4) Developing the wrong user interface
- 5) Gold Plating
- 6) Continuing stream of requirement change
- 7) Shortfall in externally performed tasks
- 8) Shortfall in externally furnished components
- 9) Real time performance shortfall
- 10) Straining computer science capabilities [7]-[9]

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A. Risk of Developing Wrong Software Functions

Developing wrong software function is one of the risk of software risk items listed in [7] -[9]. The function of the software is to perform the work that the user needs from the software to do. Functionality risk can be defined as the risk that a completed system will not works according to users' needs. If the developer develops the wrong software function then various problems can arise due to this like incorrect operation of the software, unexpected result, dissatisfaction of user, product rejection, increase in maintenance for taking corrective actions, overhead of rework, adversely affecting developer reputation and many other problems can arise that can become a challenge for software project and can lead the project to the failure. To estimate the effects of developing wrong software functions we will use the approach of fuzzy cognitive map.

B. Fuzzy Cognitive Map

Fuzzy Cognitive Map (FCM) is a cognitive map in which relations between elements like events, concepts, project resources can be used to compute the "strength of impact" of these elements. FCM have been introduced by Kosko (1986) as signed directed graph for representing casual reasoning and computational inference processing, exploiting a symbolic representation for the description and modeling of complex system. Fuzzy cognitive map defines different aspects of the behavior of complex system in terms of concepts. The construction of a FCM requires the input of human experience and knowledge on the system under consideration. [6] The graphical representation of FCM consists nodes and directed edges. Nodes represent the concepts that are used to describe the behavior of the system, connected by signed and weighted edges that represents the casual relationship that exist between concepts i.e the influence of cause variable on effect variable.

II. RELATED WORK

This section discusses the use of Fuzzy cognitive map(FCM) approach in different scenarios.

Cristina Lopez *et.al* (2011), This paper describes that proper system maintenance is necessary for the successful performance of software, and Enterprise Resource Planning (ERP). However, there are many types of risks that can cause problems for ERP maintenance. For the prevention of these risks that negatively affects the system performance practitioners have to manage these properly. The research in this paper aims to provide support for practitioners work to manage ERP maintenance risks. For this, they constructed FCM for the identification of ERP maintenance risks and the existing connections or relations between them.



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They have built a tool based on FCM that helps ERP teams to simulate the impact of risks on ERP maintenance. [1]

Neha Malhotra *et.al* (2011) The systems and software development industry is characterized by a paradigm of project failure. There are various factors that can lead to project failure. Gold plating is one of them. Gold plating can cause various problems in the projects like increase in project complexity, use of more resources, and increase in budget and time of the project and many others. If effects of gold plating are not estimated it will lead to project failure. So, for estimating the effects of gold plating a tool based on fuzzy cognitive maps (FCM) has been designed. This tool can help developer to know the effects of doing gold plating on the project and considering the output of the tool the developer can make appropriate decisions regarding the project. [2]

Jose L. Salmeron *et.al* (2012), In this paper focus of the research is on assessing the joint impact of risks on ERP maintenance goals. For studying ERP maintenance risk, They have proposed innovative FCM tool. They have built dynamic simulation tool that allows ERP manager to foresee the impact of risks on maintenance goal. To do this they used augmented FCM approach . The result proves that risks strongly effect ERP maintenance goals. ERP user satisfaction specifically was the goal which was most strongly affected by the risks. [3]

Surbhi Anand *et.al* (2012) Software Engineering is a discipline to provide high quality software to the customers. But there are many factors that affect the quality of software. These factors can cause various problems in the projects. If effects of these risk factors are not estimated it will lead to the failure of the project. To avoid such situation from occurring it is important to estimate the possible effects of the risk factors on the software projects. So, in this research possible risk factors have been identified and their interdependencies with each other have been find out and a decision support system is proposed to analyze software risks. The results of the tool will help the software developers to take important future decisions. [4]

Gerogiannis, V.C. *et.al* (2012), In this paper the factors affecting customer satisfaction from Smartphone are investigated and identification is done how these factors relate to each other. The approach of FCM is applied to show the positive and negative casual relationship between the factors which influence the Smartphone user's overall satisfaction. To construct the FCM, customer satisfaction factors are identified from literature which are then used as survey items. By interviewing Smartphone marketing experts expert judgment is taken into account to reveal the casual relationship between satisfaction factors. FCM explore that user convenience is one of the most important satisfaction factor and that is influenced very positively by factors such as faster communication, independence of time and place and remote control of everyday thing. Complexity is revealed as the factor that negatively affects satisfaction of user. [5]

III. PROPOSED WORK

We are proposing a tool to estimate the effect of developing wrong software functions on project failure. The proposed tool will be based on fuzzy cognitive map. This tool will calculate the effects of input factors on output factors. Proposed work consists following steps:-

1) We have found number of factors which can arise if wrong software functions are developed by the developer.

- 2) After finding these factors, we will determine the interdependencies between these factors.
- 3) Then, We will estimate the effects of these factors on output factors like project failure, Technical difficulties and quality of the software.
- 4) In order to estimate the effects of these factors, we will consider five different effect levels i.e. "Very Low", "Low", "Medium", "High", and "Very High". We will take experts' views to know which factors have the which effect level on output factors through filling up survey form.
- 5) Finally after analyzing experts opinions we will select certain input factors to make the tool and with the help of this tool we will check the effects of selected input factors on output factors.

The proposed tool will be helpful for developers to estimate the effects of developing wrong software functions on the success of project. In this way this tool would be quite beneficial for providing awareness of consequences of this risk.

IV. CONCLUSION

By estimating the effects of developing wrong software function we can identify the problems that can arise with the occurrence of this risk and we will comes to know their impact on software project and with this developer can take appropriate actions to prevent or manage this risk. Doing this rate of success of software project will increase and chances of project failure can decrease. So, this paper proposes a tool which will help the developer to estimate the effects of developing wrong software functions on the project and will help the developer to make appropriate decisions regarding the project based on the output produced by the tool.

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