AN AUTOMATED SOFTWARE TEAM FORMATION BASED ON BELBIN TEAM ROLE USING FUZZY TECHNIQUE

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Abstrak

Dalam kejuruteraan perisian (SE), pasukan memainkan peranan yang penting dalam menentukan kejayaan projek. Untuk memastikan hasil yang optimum projek pasukan bekerja pada, ia adalah penting untuk memastikan bahawa pasukan itu terdiri daripada ahli-ahli dengan ciri-ciri betul. Dalam satu pasukan memberikan peranan yang betul kepada setiap ahli pasukan untuk memastikan bahawa individu yang paling sesuai dipilih untuk tugas-tugas tertentu dan usaha mereka menyumbang maksimum kepada prestasi pasukan secara keseluruhan. Salah satu peranan pasukan lazim adalah Belbin peranan pasukan. Belbin dibangunkan teori ini untuk pembentukan pasukan yang berjaya. Teori ini tertumpu kepada peranan pasukan dan bagaimana mereka harus dipadankan untuk mengelakkan konflik dan membina pasukan bunyi yang diurus secara optimum. Oleh itu, matlamat utama kajian ini adalah untuk membangunkan satu pasukan perisian kaedah pembentukan automatik berdasarkan Belbin pasukan Peranan dengan menggunakan teknik kabur. Teknik kabur dipilih kerana ia membolehkan menganalisis data tidak tepat dan mengelaskan kriteria yang dipilih. Dalam kajian ini, dua peranan dalam peranan Belbin pasukan, yang Pembentuk (Sh) dan Plant (Pl) dipilih untuk memberikan peranan tertentu dalam pasukan perisian - ketua pasukan dan programmer, masing-masing. Peranan ini dipilih kerana gabungan peranan ini dapat menentukan ahli-ahli pasukan yang berkesan dalam pasukan SE. Pembentukan pasukan perisian automatik yang dicadangkan ketika itu dinilai dengan menggunakan kajian pakar. Para peserta terdiri daripada 12 pemaju perisian daripada Asiacell Syarikat Telekomunikasi di Kurdistan Rantau Kerajaan Iraq (KRG). Keputusan menunjukkan bahawa kaedah ini berguna untuk digunakan bagi membentuk pasukan SE dalam suasana industri. Pembentukan pasukan yang dicadangkan automatik perisian boleh menjadi alat yang berguna untuk pengurus apabila memberikan ahli pasukan baru untuk projek perisian. Selain itu, dengan menggunakan kaedah yang dicadangkan, ia boleh membantu pembuat keputusan khusus pengurus untuk membentuk pasukan yang berkesan dan sama rata. Pasukan yang berkesan dan sama boleh mempunyai peluang yang sama untuk mengalami kerja-kerja pasukan yang baik dan dengan itu, untuk menjadi pasukan yang berjaya.

Kata kunci: Pembentukan pasukan, Belbin peranan pasukan, Teknik kabur, Pembentukan pasukan Automasi, Kejuruteraan perisian.

Abstract

In software engineering (SE), team plays an important role in determining the project success. To ensure the optimal outcome of the project the team is working on, it is essential to ensure that the team comprises of the members with right characteristics. In a team assigning the right role to each team member in order to make certain that the most appropriate individuals are chosen for specific tasks and their efforts contribute maximum to the overall team performance. One of the prevalent team roles is Belbin team role. Belbin developed this theory for formation a successful team. This theory is centered on the team roles and how they should be matched in order to avoid conflicts and build sound teams that are optimally managed. Therefore, the main aim of this study is to develop an automated software team formation method based on Belbin Team Role by using a Fuzzy technique. Fuzzy technique was chosen because it allows analyzing of imprecise data and classifying selected criteria. In this study, two roles in Belbin Team role, which are Shaper (Sh) and Plant (Pl) were chosen to assign the specific role in software team – team leader and programmer, respectively. These roles were chosen because the combination of these roles is able to determine effective team members in SE team. The proposed automated software team formation was then evaluated using an expert review. The participants consist of 12 software developers from Asiacell Telecommunication Company in Kurdistan Region Government of Iraq (KRG). The results demonstrate that the method is useful to be used for forming SE team in industrial setting. The proposed automated software team formation can serve as a useful tool for managers when assigning new team members to a software project. In addition, by using the proposed method, it can help decision makers specifically managers to form effective and equal teams. Effective and equal teams can have an equal chance to experience good team work and thus, to be a successful team.

Keywords: Team formation, Belbin team role, Fuzzy technique, Automated team formation, Software engineering.

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List of Abbreviations

SE	Software engineering
KRG	Kurdistan Region Government
ITRU	Industrial Training Research Unit
ME	Monitor Evaluator
CF	Completer-Finisher
CO	Coordinator
IMP	Implementer
PL	Plant
SH	Shaper
SP	Specialist
RI	Resource Investigator
TW	Team worker
MDT	Multi-Dimensional Trust
IS	Information System
BTRSPI	Belbin Team Role Self-Perception Inventory
FTSE-100	Financial Times Stock Exchange 100 Index
GBMs	Group Balance Metrics
MAUT	Multi-Attribute Utility Theory
AHP	Analytic Hierarchy Process
CBR	Case-Based Reasoning
DEA	Data Envelopment Analysis
SMART	Simple Multi-Attribute Rating Technique
GO	Goal Programming
SAW	Simple Additive Weighting
TOPSIS	Technique for Order Preferences by Similarity to Ideal Solutions
MCDM	Multi Criteria Decision Making
SPI	Self-Perception Inventory

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter introduces the background of study, followed by statement of the problem, research questions, and objectives of the research. The research scope, significance and contribution of the research are also presented.

1.2 Background of the Study

In software engineering (SE), team plays an important role in determining the project success (Ebert & Neve, 2001; Ralph & Kelly, 2014). To ensure the optimal outcome of the project the team is working on, it is essential to ensure that the team comprises of the members with right characteristics (Syed-Abdullah, Omar, & Idris, 2011). According to the prevalent definition, team is any group of small number of individuals with matching skills and other characteristics, all of whom are dedicated to a common resolution, performing objectives, as well as approach, for which the responsibilities they are jointly accountable (Gilley, Morris, Waite, Coates, & Veliquette, 2010). When the team members are able to cooperate, the entire unit can accomplish greater heights of thought as well as preserve information better and longer than individuals that work quietly and lonely.

Gibson (2009) also noted that the importance of a team lies in the ability of participation in group endeavors to improve leadership skills and boost the morale of the team members. This also facilitates efficiency in the processes and procedures, thus enhancing

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