Normalized Sprint Estimation
An Agile Project Estimation Method

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ABSTRACT

Accurate estimation of software projects is quintessential for overall success of the project. Estimation of agile projects adopted in most of the modern software projects is challenging due to lack of historical data and due to dynamic characteristics of the agile projects. In this paper we introduce “Normalized Sprint Estimation” method which factors in dynamic characteristics of the agile projects such as non-functional requirements, sprint success factors and such. The author applied the normalized sprint estimation method to 14 sprints from three digital projects and the predicted estimation values had Pred (0.3), more than 80%. Though the normalized sprint estimation model is tested for digital projects, the same methodology can be applied for software projects from other domains as well.

KEYWORDS

Agile Estimation, Estimation, Software Engineering, Sprint Estimation

INTRODUCTION

Accurate estimation of software projects plays crucial role in the positive outcome of the project. The estimation further impacts staffing, costing, planning, resource planning, milestone planning and such activities. There are very well-established estimation methods for software projects for matured project execution methodologies such as waterfall model, Iterative model. However modern software projects predominantly use agile methodologies that have shorter sprints, continuous and iterative delivery.

Agile execution model aims to deliver the software in smaller increments leading to faster delivery cycles. Scrum, extreme programming (XP), feature driven development, DSDM (Dynamic System Development Method), adaptive software development are
the main methods that follow agile methodology. Four main manifestos of agile projects are “Individuals and interactions over processes and tools.”, “Working software over comprehensive documentation”, “Customer collaboration over contract negotiation” and “Responding to change over following a plan”. Due to the flexible and dynamic nature of attributes associated with agile characteristics, traditional estimation models cannot be used for agile estimation.

Story point estimation and use case point estimation are normally used for agile projects. Agile projects are more responsive to change and promote collaborative and iterative deliveries (Highsmith, 2001). “User story” is the primary unit of work for developers in agile project. Developers define tasks, timelines and dependencies for user stories and user stories are prioritized based on their business importance.

In this paper we discuss a novel estimation method, “Normalized sprint estimation” for agile projects that factors in the core agile characteristics during estimation.

**Paper Organization**

In the remaining portions of the introduction section we will look at state of the art methods and the challenges and gaps with state of the art agile effort estimation methods. We will discuss the complete details of the “Normalized sprint estimation” in the “Method” section. In “Results” section we will look at the MRE, MMRE and Pred (0.25), Pred (0.3) values for 14 sprints taken from three different digital project. Finally, we will discuss the results, threats to validity and future scope of improvements in “discussion” section.

**Literature Review and Related Work**

Jørgensen and Shepperd (2007) did the survey of over 300 cost estimation models and categorized the cost estimation models into categories such as expert judgement, regression based, function point, analogy based and theory based. The main challenges in estimation models that belong to these categories are methodology issues (issues related to estimation methods), political factors, user communication and management control (Lang et al., 2013). The main empirical estimation models are COCOMO 81, SEER-SEM, COCOMO II, SLIM, REVIC, COSTMODL and empirical estimation models can be categorized into various categories such as regression-based, COCOMO based, Analogy based, SLIM, expert judgement based, stepwise ANNOVA (Basha, 2010):

- **Empirical estimation models**: COCOMO (Boehm, 1981), Function Point/FP (Albrecht), COCOMO 2 (Boehm, 1995), SEER-SEM (Jenson 1984), SLIM (Putnam & Myers, 1992), PRICE-S (Frank Freiman), Estimac etc.;
- **Expertize based**: Delphi (Boehm, 1984), Rule-based/Rule of thumb, Use case point (Ochodek, Nawrocki, Kwarciaj), Work breakdown structure (Jørgensen, 2004), Planning poker, Story point estimation;
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