Web Effort Estimation: Function Point Analysis vs. COSMIC

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Abstract

Context: software development effort estimation is a crucial management task that critically depends on the adopted size measure. Several Functional Size Measurement (FSM) methods have been proposed. COSMIC is considered a 2nd generation FSM method, to differentiate it from Function Point Analysis (FPA) and its variants, considered as 1st generation ones. In the context of Web applications, few investigations have been performed to compare the effectiveness of the two generations. Software companies could benefit from this analysis to evaluate if it is worth to migrate from a 1st generation method to a 2nd one.

Objective: the main goal of the paper is to empirically investigate if COSMIC is more effective than FPA for Web effort estimation. Since software companies using FPA cannot build an estimation model based on COSMIC as long as they do not have enough COSMIC data, the second goal of the paper is to investigate if conversion equations can be exploited to support the migration from FPA to COSMIC.

Method: two empirical studies have been carried out by employing an industrial data set. The first one compared the effort prediction accuracy obtained with Function Points (FPs) and COSMIC, using two estimation techniques (Simple Linear Regression and Case-Based Reasoning). The second study assessed the effectiveness of a two-step strategy that first exploits a conversion equation to transform historical FPs data into COSMIC, and then builds a new prediction model based on those estimated COSMIC sizes.

Results: the first study revealed that, on our data set, COSMIC was significantly more accurate than FPs in estimating the development effort. The second study revealed that the effectiveness of the analyzed two-step process critically depends on the employed conversion equation.

Conclusion: for Web effort estimation COSMIC can be significantly more effective than FPA. Nevertheless, additional research must be conducted to identify suitable conversion equations so that the two-step strategy can be effectively employed for a smooth migration from FPA to COSMIC.