

**The Importance of Productivity Measurement in  
Use-Case-Points Effort Estimation.**

**By**

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**ABSTRACT**

The project productivity is an important factor for producing effort estimates from Use Case Points (UCP), especially when the historical dataset is absent. The first models of UCP effort estimation used a fixed and small number of productivity ratios for all projects. These approaches have not been examined over large number of projects. The recently available large software datasets allow us to do more research on the importance of productivity for effort estimation of software development. Hence, this thesis studies the relationship between project productivity and UCP environmental and technical factors, because they have a significant impact on the amount of productivity needed for a software project.

In this thesis, we propose a set of productivity prediction models using various classification and regression methods to examine the usefulness of productivity, and to investigate its impact on UCP effort estimation. The study also investigates how we can efficiently learn and predict project productivity from Technical Complexity Factor (TCF) and Environmental Complexity Factor (ECF), considering data locality. Data locality means predicting from most relevant data. Therefore, we classified projects in terms of their programming languages and sector types.

The results showed that using local data for predicting productivity is not as superior as using whole data. Also, we found that Regression Tree model was the most accurate model among other machine learning tools that we used in this study. Overall, we can conclude that using adjustment factors to predict productivity can work well, but might be using other factors can also enhance the prediction accuracy.