

**AN ANALYTICAL MODEL FOR TASK DURATION
PREDICTION FOR SOFTWARE DEVELOPMENT
PROJECTS**

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Sri Lanka

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Dissertation submitted in partial fulfilment of the requirements for the degree
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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Master's thesis under my supervision.

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ABSTRACT

Project risk assessment is a critical component of project management, playing a pivotal role in ensuring the success of software development projects. Effective project management practices are instrumental in achieving favourable project outcomes. Therefore, meticulous handling of project risks throughout the project lifecycle is imperative. In the context of software development projects, inaccurate estimation of project deadlines poses significant risks and challenges that can impede project success. Accurate estimation of task durations is essential for resource allocation, timely project delivery, and overall success. However, estimating task durations based on historical data from project management platforms presents challenges. Inaccurate estimations can lead to delays, resource misallocation, and inefficiencies. This research aims to address the challenge of task duration estimation in software development projects by developing a data-driven approach. Leveraging historical data from project management platforms and utilising machine learning (ML) techniques, the study seeks to determine task durations accurately. Statistical techniques, descriptive statistics, text analysis, and forecasting algorithms are used for data analysis. The research aims to enhance decision-making, optimise resource allocation, and improve project performance. The driving force behind this research is the need for accurate task duration estimates in dynamic software development projects. Project management platforms provide access to extensive historical data, enabling more accurate estimations. A qualitative research approach is employed, guided by literature findings and semi-structured interviews. Data is collected from publicly available datasets, focusing on the Jira public dataset. ML techniques are applied to develop predictive models for accurate task duration estimation. The outcomes provide insights and techniques for software project managers, enabling informed decisions, resource optimization, and improved performance. The research advances project management practices by offering solutions to the challenges of task duration estimation. Future research can explore additional variables, refine models, and validate findings in different project contexts for enhanced generalizability and applicability.

Keywords: project management, machine learning techniques, descriptive statistics, text analysis, forecasting algorithms

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LIST OF ABBREVIATIONS

ML	Machine Learning
AI	Artificial Intelligence
WBS	Work Breakdown Architecture
PMBOK	Project Management Body of Knowledge
PERT	Program Evaluation and Review Technique
CPM	Critical Path Method
EPCCM	Engineer Procure Construct Contract Management
FMEA	Failure Mode and Effects Analysis
CFS	Critical Success Factors
ANN	Artificial Neural Networks
COCOMO	Constructive Cost Model
CBU	Cubic Regression Model
MLR	Multiple Linear Regression
SVR	Support Vector Regression
GBR	Gradient Boosting Regression
MPNN	Multilayer Perceptron Neural Networks
BI	Business Intelligence
ETL	Extraction-Transform-Load
MSE	Mean Squared Error
RBF	Radial Basis Function