Story Point Estimation with Explainable AI

D M S S Dassanayake
(Reg. No.: MS23465190)

A THESIS
SUBMITTED TO
SRI LANKA INSTITUTE OF INFORMATION TECHNOLOGY
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF SCIENCE IN INFORMATION TECHNOLOGY SPECIALIZED IN
ENTERPRISE APPLICATION DEVELOPMENT

SEPTEMBER 2025

I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science

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MSc Supervisor: Dr Mahima Weerasinghe

Approved for MSc. Research Project:

____

MSc in IT Program Coordinator, SLIIT

Approved for MSc:

____

Head of Graduate Studies, FoC, SLIIT

DECLARATION

This is to certify that the work is entirely my own and not that of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Sri Lanka Institute of Information Technology or to any other institution for assessment for any other purpose.

Sign: Shehan.

D M Shehan Sandeepa Dassanayake

Date: 2025/11/03

ABSTRACT

Estimating Story points with Explainable AI

Dasswaththe Mudiyanselage Shehan Sandeepa Dassanayake

MSc. In Information Technology Specialized in Enterprise Application Development

Supervisor: Dr. Mahima Weerasinghe

September 2025

Accurate story point estimation remains as a challenge in Agile software development because story point estimation depends on human intuition, experience, and subjectivity. Traditional story point estimation methods like planning poker and expert judgment most of the time lead to inconsistencies and biases, and it could impact resource allocation of the project and predictability of the project. This study addresses those limitations by seamless integration of transformer based natural language processing (NLP) models (BERT variants) and Explainable AI techniques (XAI) to interpret the estimation of story points.

Four transformer-based models, BERT-base-uncased, DistilBERT, RoBERTa-base, and DistilRoBERTa-base were trained using TAWOS dataset with baseline and customized preprocessing pipelines. Advanced preprocessing techniques such as adaptive Fibonacci mapping, semantic T5 based data augmentation, and context injection, improved the model accuracy. The model trained with DistilBERT achieved the highest performance with 0.520 with 10 early stopping patience and 0.507 accuracy with early stopping patience 4 and the lowest mean absolute error 0.72 (MAE = 0.72).

To improve the transparency and interpretability of trained models, XAI methods like SHAP and LIME explanations were applied. A survey with 8 agile practitioners showed strong alignment between XAI explanations and human explanations, with SHAP explanation achieving 72% and LIME explanation achieving 65% overlapping with agile practitioners identified keywords.

The findings show that transformer models with XAI achieved accuracy comparable to human estimations (80% agreement) with interpretable predictions. This study contributes to a transparent, and data-driven framework for agile story point estimation, connecting the gap between human expertise and Artificial intelligence decisions.

ACKNOWLEDGEMENT

This research would not have been possible to complete without the help I received from so many parties and people. First, I need to thank to the Sri Lanka Institute of Information Technology for giving myself to the chance to work on this research project and for helping me to build up both my research and academic skills.

And, I also am truly thankful to my supervisor, Dr. Mahima Weerasinghe. His support, guidance, and honest feedback in the last year really helped me to enhance my work and stay on the right track to complete the research project.

I am also thankful to my colleagues at SLIIT, who always shared useful advice and support to complete the research project on time. Their input and advice helped me to improve my thought process.

Finally, I owe the biggest thanks to my dearest wife and family. They were always behind me, motivating me, supporting me when I felt tired and always encouraging me to keep moving forward and keep on track. Their continuous support is the reason this research journey is possible.

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