TeamPlus: A Data-Driven Tool Utilizing a Genetic Algorithm for Optimal Software Team Formation [Supplementary Material]

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1. Threats to Validity

Following the classification schema by Wohlin *et al.* [1], we address the threats to the validity of this study as outlined below.

Construct Validity concerns whether our measures accurately reflect the theoretical constructs they are intended to represent. In this study, we ensured construct validity through meticulous parameter selection for the GA, including crossover and mutation rates. These parameters were carefully chosen based on extensive experimentation to accurately represent the dynamics of software team formation. However, there remains a potential threat from the subjective nature of certain parameter choices. To mitigate this, we employed cross-validation and consulted with industry experts to validate our parameter settings.

Internal validity relates to the control of extraneous variables and the causal relationships established within the study. In this context, consistency and robustness checks through cross-validation and sensitivity testing support internal validity. These methods also ensure that the different implementations and settings of the GA consistently produce reliable results. These methods help control potential implementation biases and construct operationalization, ensuring the findings' internal consistency.

External validity is ensured by including multiple projects within a single organization, covering a broad range of team formation scenarios. This diversity mitigates the threat of limited generalization and allows us to discuss potential algorithm adaptations for different project types and organizational contexts. Our plan to collaborate with other organizations further enhances the study's generalizability.

Conclusion validity focuses on the reliability of the relationship between the treatment and the outcome. In our study, the adequacy of metrics, developed through consultations with industry experts and validated by literature reviews, supports the conclusion's validity. These metrics assess technical skills and collaboration dynamics, capturing the nuances necessary for effective team formation. To ensure the reliability of the findings, we employed advanced statistical techniques such as [specific techniques], including significance tests and power analysis. Furthermore, continuous feedback from project managers and team members refined these metrics, enhancing the conclusions' accuracy.

References

[1] C. Wohlin, P. Runeson, M. Höst, M. C. Ohlsson, B. Regnell, Experimentation in Software Engineering, Springer, Heidelberg, 2012. doi:10.1007/978-3-642-29044-2.