BABCOCK UNIVERSITY
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COLLEGE OF POSTGRADUATE STUDIES
2022/2023 PhD Thesis Abstract

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RT: **Bi-Modal Classification Model for Non-functional Requirements Elicitation in Software Development**

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AB: Bi-modal Non-functional Requirements Classification play a major role in software developments as many systems developed were either not used or underused. Ill-elicitation of non-functional requirements has been a major challenge of automated system. Software developers turn out chunks of software every year but majority of these systems do not produce the required return on investment, and exposed to startup failures and lack adequate classification. These have caused setbacks to software industries because these systems do not meet Non-functional Requirements (NFRs) which are key indicators of the overall success of a software. Early detection and analysis of non-functional requirements is important in order to enable good architectural decision and proper implementation of software. Previous studies have shown that privacy, usability, reliability, and availability are the major elicitation techniques during the NFRs elicitation process while classification of non-functional requirements based on the type of system being developed are being neglected. Hence, this research developed a Bi-Modal Classification Model for Non-functional Requirements Elicitation (BCMNFRE) for software development.

The bi-modal was developed using conversational Natural Language Processing using chatbot "google dialog flow" for the elicitation of non-functional requirements. Classification of non-functional requirements was carried out using Long Short-Term Memory and fuzzy k-Nearest Neighbour classifier. The model was trained and tested with 1,452 and 170 requirements pre-test data respectively. This data was retrieved from the Tera-PROMISE repository. The BCMNFRE was then evaluated using accuracy, recall, precision, and the F1 measures as standard metrics. This was further validated by Cohen's Kappa reliability software.

Results from the BCMNFRE showed that both textual and voice requirements from stakeholders after analysis produced an optimized and prioritized non-functional requirement document. Evaluation results of the BCMNFRE produced an accuracy of 0.91, recall of 0.89, precision of 0.86 and F1 of 0.55 respectively. When compared with human experts (Software Requirement Engineers) the developed model produced a Cohen's Kappa reliability of 78%. The developed BCMNFRE was integrated into different platforms such as Facebook Messenger, Twillo, Web Demo, DialogFlow Messenger, and Telegram thereby making it available to a wider range of stakeholders irrespective of the geographical locations.
The BCMNFRE reliably identifies and improved the elicitation of non-functional requirements. It was recommended that this bi-modal non-functional requirement model be integrated into software development to avoid failure in software projects, especially in developing countries.

Keywords: Bi-Modal, Classification Model, Elicitation, Non-Functional Requirements, Requirement, Requirement Analysis, Software Development,

Word Count: 378

Abbreviations: RFN: Researcher's Full Name, RD: Researcher's Department, RS: Researcher's School, RE: Researcher's Email, RAE: Researcher's Alternate Email, RP: Researcher's Phone Contact, RT: Registered Title, MS: Main Supervisor, ME: Main Supervisor's E-mail Address, SP: Main Supervisor's Phone Contact, CS: Co-Supervisor, CE: Co-Supervisor's E-mail Address, CP: Co-Supervisor's Phone Contact, AB: Abstract

Suggested Citation: Otuneme, N.C., Eze, M.O. and Koyoro, S. 2023. Bi-Modal Classification Model for Non-functional Requirements Elicitation in Software Development. PhD Thesis Abstract, College of Postgraduate Studies, Babcock University. **https://doi.org/10.61867/pcub.1(5).113**