UNIVERSITY OF SCIENCE

FACULTY OF INFORMATION TECHNOLOGY

COMMENTS FROM THESIS'S ADVISOR

(Research)

Thesis's title: GENERATING MANUAL TEST CASES FROM USE CASES USING LARGE LANGUAGE MODELS

Students: **Nguyễn Trịnh Như Ý** (20127100) – **Phạm Ngọc Anh Thư** (20127343)

Advisor: Associate Professor Nguyen Van Vu, Ph.D.

1. Research Topic and Idea

In this thesis project, the team investigated an approach for generating test cases for manual testing (in natural language) from use-case specifications using large language models (LLMs). This topic is significant for several reasons. First, a considerable amount of software testing today is still performed manually. Second, testers typically create test cases based on requirements before executing them on the application under test, and this test-case design process can be both time-consuming and prone to errors. Automating this process can enhance software quality and reduce the time spent on testing activities. Moreover, many software projects document requirements using use-case specifications. Finally, recent advancements in LLMs provide opportunities to automate the generation of technical documents for software development, including test cases from use-case specifications.

2. Research Methodology

The proposed method for generating test cases consists of two phases, test design and test case generation. The test design phase focuses on generating sets of test scenarios to best reflect conditions and situations covered in use cases. The second phase focuses on producing detailed test steps for each test scenario. Test scenarios and test steps are written in natural language so that testers can read and follow them. The team applied GPT-4's prompting techniques to produce test cases.

To evaluate the proposed method, the team applied it to a dataset of four real-world applications, consisting of 44 use cases. The outputs were assessed using metrics such as correctness, duplication, incorrectness, and coverage.

Overall, the research method was carried out well.

3. Contributions

The study offers several contributions. One is a new method for generating test cases for manual testing from use-case specifications. The generated use cases are reasonably accurate and readable by testers. Another contribution is an experiment to provide evidence that it is feasible to use LLMs for automated generation of test cases for manual testing.

4. Management and Progress Reporting

The students have been highly proactive throughout the project. They actively listened to feedback and conducted thorough investigations based on the guidance provided. As diligent individuals, they did not hesitate to undertake the tasks I recommended. I am exceedingly pleased with their performance.

5. Thesis Writing

The thesis is well-organized and clearly written. It provides sufficient detail on the proposed method and the experimental design used to evaluate it. The results are thoroughly analyzed, interpreted, and discussed.

6. Oral Presentation

The students delivered an excellent presentation in front of the committee, demonstrating both confidence and a clear understanding of their accomplishments throughout the thesis. They responded to the committee's questions comprehensively.

7. Publication and/or Real-world Application

A paper was prepared and submitted to the Pacific Rim International Conference on Artificial Intelligence (PRICAI 2024). However, by the time the students presented their thesis, the result of the submission had not yet been announced

Rank: *Outstanding*   *Ho Chi Minh city*, August 16th, 2024
                                                          Advisor

                                                          Nguyen Van Vu