

Design of Experiments Assignment

Purpose

This assignment focuses on demonstrating your understanding of the Design of Experiments (DOE) methodology. You will learn to create effective pairwise combination test cases for a mobile application using traditional DOE tools and generative AI. The assignment also encourages critical analysis of these tools, evaluating their strengths and limitations in software testing.

Objectives

By completing this assignment, you will:

- Apply DOE principles to design test cases.
- Research and select an appropriate tool for DOE-based testing.
- Develop pairwise combination test cases using two approaches:
 1. A DOE-specific tool.
 2. A generative AI tool (e.g., ChatGPT).
- Compare the effectiveness of AI-powered tools with traditional DOE methods for software testing.

Project Overview

This project involves using the Design of Experiments methodology, a systematic and statistical approach, to generate pairwise test cases. The goal is to comprehensively analyze how multiple input factors interact and affect the system's behavior. The mobile application under test requires user input in five different categories, each with multiple options, as shown below:

Type of Phone	Authentication	Connectivity	Memory	Battery Level
iPhone 14	Fingerprint	Wireless	128 GB	< 20 %
iPhone 13	Face recognition	3G	256 GB	20 - 39%
Galaxy Z	Text Password	4G LTE	512 GB	40 - 59%
Huawei Mate		5G Edge	1 TB	60 - 79%
Google Pixel 7				80 - 100%

Instructions

Task 1: Develop Test Cases Using a DOE Tool

- Research and select an appropriate DOE tool for generating pairwise combination test cases.
- Use the chosen tool to design test cases based on the mobile application specifications.
- Document your process, including the tool selection criteria and the steps followed to create the test cases.

Task 2: Develop Test Cases Using a Generative AI Tool

- Select a generative AI tool (e.g., ChatGPT) to create test cases.
- Design pairwise combination test cases for the mobile application using prompts to guide the AI.
- Document the prompts used and the resulting test cases generated by the AI tool.

Task 3: Compare and Analyze Test Cases

- Compare the two sets of test cases created in Tasks 1 and 2.
- Analyze the scope, coverage, and efficiency of each method in validating the mobile application.
- Highlight the strengths and weaknesses of both the DOE tool and the generative AI approach.

Task 4: Evaluate the DOE Tool

Assess the effectiveness of the DOE tool in generating pairwise test cases by addressing the following aspects:

- **Features and Functionalities:** Discuss the tool's key features and capabilities.
- **Scope and Coverage:** Evaluate the breadth and depth of test cases generated by the tool.

- **Performance:** Analyze the tool's efficiency in creating test cases.
- **Ease of Use:** Describe how user-friendly the tool was during the process.

Task 5: Evaluate the Generative AI Tool

Assess the performance of the generative AI tool in generating pairwise test cases by addressing the following points:

- **Prompt Design:** Reflect on your experience in crafting prompts and processing the AI-generated results.
- **Significance in Software Testing:** Discuss the potential role and advantages of generative AI in software testing using DOE techniques.
- **Performance:** Evaluate how well the AI-generated test cases meet the requirements.