CSE 565 Assignment 2

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Design of Experiments (DOE)

DOE is a statistical method for planning, conducting, and analyzing experiments to evaluate how factors affect a desired outcome. It is a systematic approach that can help scientists and engineers make discoveries by studying the relationship between multiple input variables and output variables.

Software Specification

The given specification is for a basic e-commerce website, and the factors represent different features of the website.

1. AuthenticationMethod: Password, Biometric, OTP (One-Time-Password)
2. PaymentMethod: CreditCard, DebitCard, PayPal, UPI (Unified Payments Interface)
3. ShippingOption: Standard, Expedited, SameDay, Premium
4. DeviceType: Desktop, Mobile, Tablet
5. UserAccountType: Guest, Registered, Prime, Admin

Tool Introduction

The tool I am using is PICT (Pairwise Independent Combinatorial Testing Tool) by Microsoft. It's an easy-to-use command-line tool that can generate test cases based on pairwise combinations of your factors.

PICT generates test cases and test configurations. With PICT, you can generate tests that are more effective than manually generated tests and in a fraction of the time required by hands-on test case design.

PICT runs as a command line tool. Prepare a model file detailing the parameters of the interface (or a set of configurations, or data) you want to test and PICT generates a compact set of parameter value choices that represent the test cases you should use to get comprehensive combinatorial coverage of your parameters.

Installation

The tool can be installed from the GitHub Link at https://github.com/microsoft/pict
The latest version of the pict.exe file is found at https://github.com/microsoft/pict/releases/

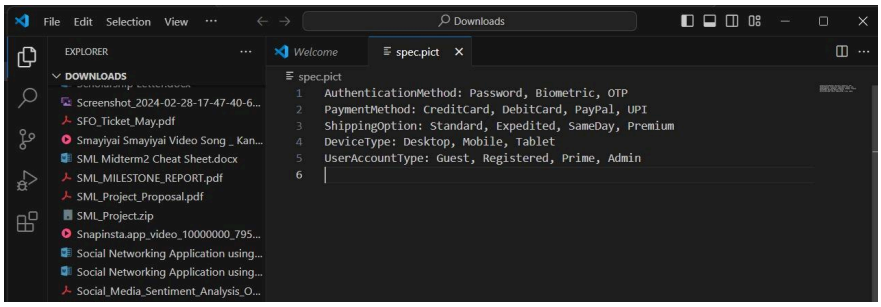
This tool is compatible only with Windows. If it needs to be run on Mac, then you need to install a framework **mono** in order to run .NET applications on mac.

So Mac users need to first install using this command: **brew install mono**
And then download the latest version of the exe file.

Developing Test Cases

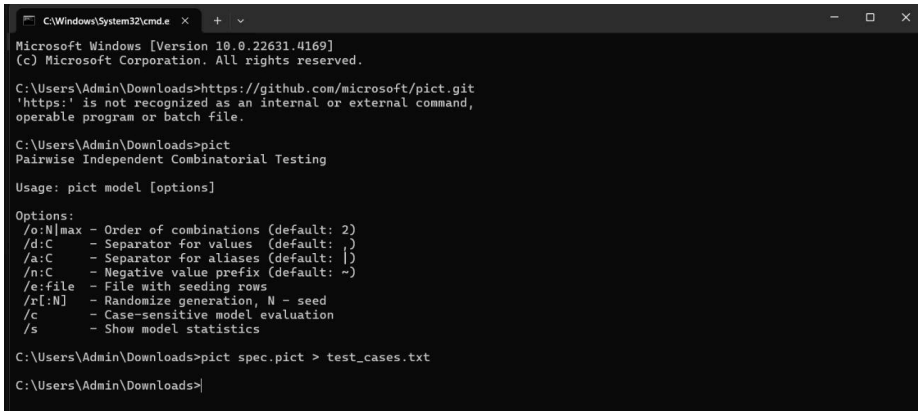
In order to develop the test cases, the following steps are required:

1. We need to create a **spec.pict** with the specification of factors and levels

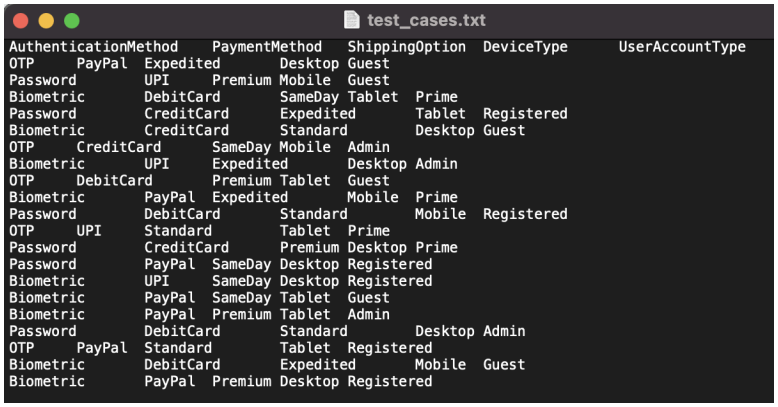


2. Then we should the run the PICT tool using the following commands:

   Windows: **pict spec.pict > test_cases.txt**
   Mac: **mono pict spec.pict > test_cases.txt**



3. The output file **test_cases.txt** from PICT will contain all the pairwise combinations that you can use as your test cases.



Test Cases Generated

The tool generated 20 different test cases which are as follows:

Authentication	Payment	Shipping	Device	User Account
OTP	Paypal	Expedited	Desktop	Guest
Password	UPI	Premium	Mobile	Guest
Biometric	Debit Card	Same Day	Tablet	Prime
Password	Credit Card	Expedited	Tablet	Registered
Biometric	Credit Card	Standard	Desktop	Guest
OTP	Credit Card	Same Day	Mobile	Admin
Biometric	UPI	Expedited	Desktop	Admin
OTP	Debit Card	Premium	Tablet	Guest
Biometric	Paypal	Expedited	Mobile	Prime
Password	Debit Card	Standard	Mobile	Registered
OTP	UPI	Standard	Tablet	Prime
Password	Credit Card	Premium	Desktop	Prime
Password	Paypal	Same Day	Desktop	Registered
Biometric	UPI	Same Day	Desktop	Registered
Biometric	Paypal	Same Day	Tablet	Guest
Biometric	Paypal	Premium	Tablet	Admin
Password	Debit Card	Standard	Desktop	Admin
OTP	Paypal	Standard	Tablet	Registered
Biometric	Debit Card	Expedited	Mobile	Guest
Biometric	Paypal	Premium	Desktop	Registered

Instead of testing every possible combination (which would be too many), pairwise testing ensures that every pair of feature levels is tested at least once. This method significantly reduces the number of test cases while still providing a broad coverage of feature interactions.

References

ChatGPT Prompt: https://chatgpt.com/share/66ee14c5-9e2c-8013-b23d-bee513a2d447
PICT Tool Github Repository: https://github.com/microsoft/pict
PICT Documentation: PICT Data Source - Windows drivers | Microsoft Learn
Design of Experiments (DOE) Glossary: What Is Design of Experiments (DOE)? | ASQ.