

Project 1, Part 2: Specification-Based Testing – Design of Experiments

1. Explanation of the test cases created by the tool.

Answer: 1

The tool generated fractional factorial design test cases which is much lower than full factorial design $5 * 5 * 4 * 4 * 2 = 800$. The below screen shot shows 25 test cases covering all possible combination of,

- Type of phone with battery level, connectivity, memory and parallel task running.
- Battery level with connectivity, memory, parallel task running.
- Connectivity with memory & parallel task running.
- Memory with parallel task running.

Types of Phone	Battery Level	Connectivity	Memory	Parallel Task Running
iPhone X	6 - 79%	3G	2Gb	Yes
Iphone 8	< 20%	Edge	2Gb	No
Samsung S9	20 - 39%	4G	1GB	No
Huawei Mate	6 - 79%	3G	6GB	No
Google Pixel	40 - 59%	3G	4GB	No
Samsung S9	80 - 100%	3G	2Gb	Yes
Iphone 8	20 - 39%	3G	6GB	Yes
Samsung S9	6 - 79%	Edge	4GB	No
Huawei Mate	40 - 59%	4G	2Gb	Yes
Google Pixel	< 20%	3G	1GB	Yes
iPhone X	40 - 59%	Edge	1GB	Yes
Iphone 8	80 - 100%	4G	4GB	Yes
Samsung S9	40 - 59%	Wireless	6GB	Yes
Huawei Mate	< 20%	Wireless	4GB	Yes
Google Pixel	6 - 79%	4G	1GB	Yes
iPhone X	< 20%	4G	6GB	No
Iphone 8	40 - 59%	3G	1GB	No
Samsung S9	< 20%	3G	1GB	Yes
iPhone X	80 - 100%	Wireless	1GB	No
Google Pixel	20 - 39%	Wireless	2Gb	No
iPhone X	20 - 39%	3G	4GB	Yes
Iphone 8	6 - 79%	Wireless	1GB	Yes
Huawei Mate	20 - 39%	Edge	1GB	Yes
Huawei Mate	80 - 100%	3G	1GB	No
Google Pixel	80 - 100%	Edge	6GB	Yes

2. Screenshot of the report showing the test cases generated by the tool.

Answer: 2






Factors

Add Factor ▼

Remove

Add N Factors

1

Name	Role	Changes	Values					Units
 Types of Phone	Categorical	Easy	iPhone X	Iphone 8	Samsung	Huawei N	Google P	
 Battery	Categorical	Easy	< 20%	20 - 39%	40 - 59%	6 - 79%	80 - 100%	
 Connectivity	Categorical	Easy	Wireless	3G	4G	Edge		
 Memory	Categorical	Easy	1GB	2Gb	4GB	6GB		
 Parallel Tasks Running	Categorical	Easy	Yes		No			

Custom Design						
Design	Custom Design					
Criterion	D Optimal					
Model						
Evaluate Design						
DOE Dialog						
Columns (5/0)						
Types of Phone *						
Battery *						
Connectivity *						
Memory *						
Parallel Tasks Running *						
Rows						
All rows	25					
Selected	0					
Excluded	0					
Hidden	0					
Labeled	0					

Types of Phone	Battery	Connectivity	Memory	Parallel Tasks Running
1 iPhone X	6 - 79%	3G	2Gb	Yes
2 Iphone 8	< 20%	Edge	2Gb	No
3 Samsung S9	20 - 39%	4G	1GB	No
4 Huawei Mate	6 - 79%	3G	6GB	No
5 Google Pixel	40 - 59%	3G	4GB	No
6 Samsung S9	80 - 100%	3G	2Gb	Yes
7 Iphone 8	20 - 39%	3G	6GB	Yes
8 Samsung S9	6 - 79%	Edge	4GB	No
9 Huawei Mate	40 - 59%	4G	2Gb	Yes
10 Google Pixel	< 20%	3G	1GB	Yes
11 iPhone X	40 - 59%	Edge	1GB	Yes
12 Iphone 8	80 - 100%	4G	4GB	Yes
13 Samsung S9	40 - 59%	Wireless	6GB	Yes
14 Huawei Mate	< 20%	Wireless	4GB	Yes
15 Google Pixel	6 - 79%	4G	1GB	Yes
16 iPhone X	< 20%	4G	6GB	No
17 Iphone 8	40 - 59%	3G	1GB	No
18 Samsung S9	< 20%	3G	1GB	Yes
19 iPhone X	80 - 100%	Wireless	1GB	No
20 Google Pixel	20 - 39%	Wireless	2Gb	No
21 iPhone X	20 - 39%	3G	4GB	Yes
22 Iphone 8	6 - 79%	Wireless	1GB	Yes
23 Huawei Mate	20 - 39%	Edge	1GB	Yes
24 Huawei Mate	80 - 100%	3G	1GB	No
25 Google Pixel	80 - 100%	Edge	6GB	Yes

3. An assessment of the test cases.

Ans: 3

The screen shot below shows some of the test cases generated by the tool which covers a wide range of scenarios and meets the DOE objective of minimize test run and effective results. It can be concluded the tool was able to draw test cases based on DOE technique efficiently.

Types of Phone	Battery Level	Connectivity	Memory	Parallel Task Running
iPhone X	6 - 79%	3G	2Gb	Yes
Iphone 8	< 20%	Edge	2Gb	No
Samsung S9	20 - 39%	4G	1GB	No
Huawei Mate	6 - 79%	3G	6GB	No
Google Pixel	40 - 59%	3G	4GB	No

4. An assessment of the tool.

- Features and functionality
- Area of usage
- Ease of use
- Ease of setup and install

Answers: 4

There are number of tools that can be used to generate test cases using DOE but it is difficult to decide which one would be appropriate for the purpose of this assignment. Narrowing down my search I came across two widely used industry tools Modde Umetrics and JMP. Both are commercial product and offers a 30-day trial period. I decided to go with JMP, JMP is a comprehensive statistical software develop by SAS specifically for data analysis, visualization and predictive modeling.

- Features and Functionality, JMP offers many features from importing and cleaning data to performing Statistical analysis, Design of Experiment and Quality control. Some of the advance DOE features that I have explored are,
 - Custom Design
 - Augmented Design
 - Easy DOE
 - Classical – Full Factorial Design

Some of the other functionalities are,

- Definitive Screening
 - Design Diagnostics
 - Consumer Studies
 - Special Purposes
 - Sample size explorers
- Area of usage, JMP is used in different industries such as chemical, consumer products, pharmaceutical and semiconductor. JMP academic programs are used by professors and students of more than 1300 colleges and universities.
- Ease of use, JMP is a professional tool so requires some form of training and knowledge of statistics. However, the user-friendly GUI and guides can help beginners to understand and navigate the software.
- Ease of setup and Installation, JMP is easy to setup and install following the instructions. To download the trial version a subscriber form needs to be filled in as it is not an open-source software but no credit card detail is required.