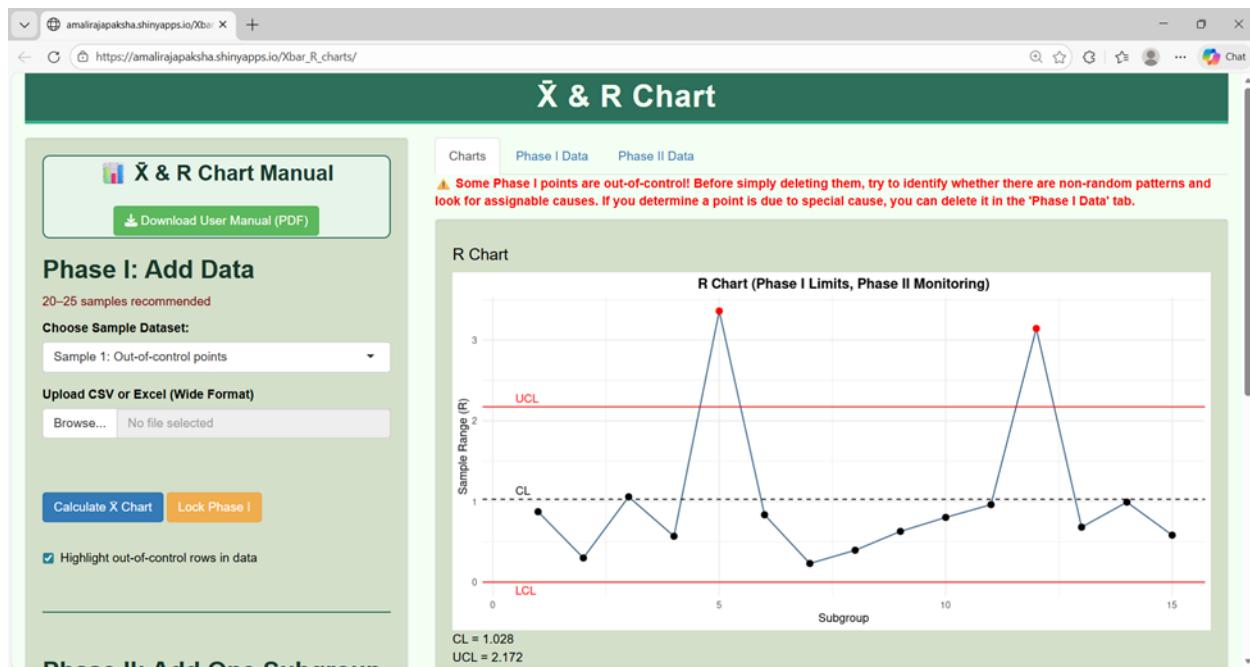


\bar{X} & R Chart Shiny App Manual

1. Launching the App

You can access the app directly through this link: [X & R Chart Shiny App.](https://amalirajapaksha.shinyapps.io/Xbar_R_charts/)



2. Overview of the App Interface

The app has two main sections:

- **Sidebar Panel:** For data input, calculations, and controls.
- **Main Panel:** Displays charts and data tables.

Tabs in Main Panel: 1. Charts – Visual representation of \bar{X} and R charts.

2. Phase I Data – Raw and calculated Phase I data.

3. Phase II Data – New subgroups added for Phase II monitoring.

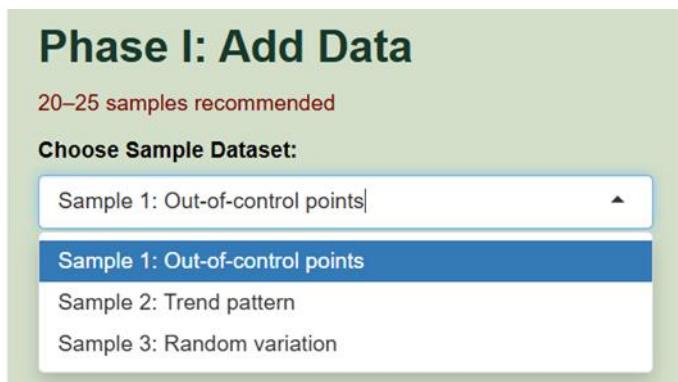
3. Phase I: Add Data

3.1 Uploading Phase I Data

3.1.1 Selecting a Sample Dataset

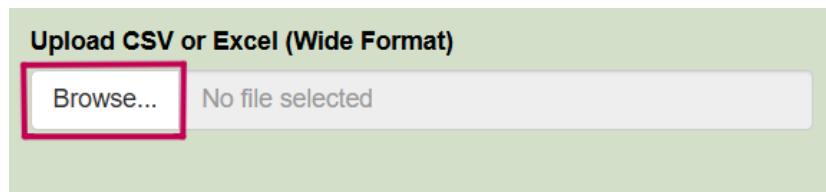
Note: The sample datasets provided are for illustrative and learning purposes only. They are not based on real data and are intended to demonstrate various scenarios in Phase I control chart analysis.

1. Use the “Choose Sample Dataset” dropdown.
2. Options:
 - Sample 1: Out-of-control points
 - Sample 2: Trend pattern
 - Sample 3: Random variation
3. Selecting a sample loads the data.



3.1.2 Uploading Your Own Data

1. Click “Upload CSV or Excel (Wide Format)”.



2. Choose a CSV or Excel file. Requirements:
 - First column: Subgroup numbers
 - Remaining columns: Numeric values.

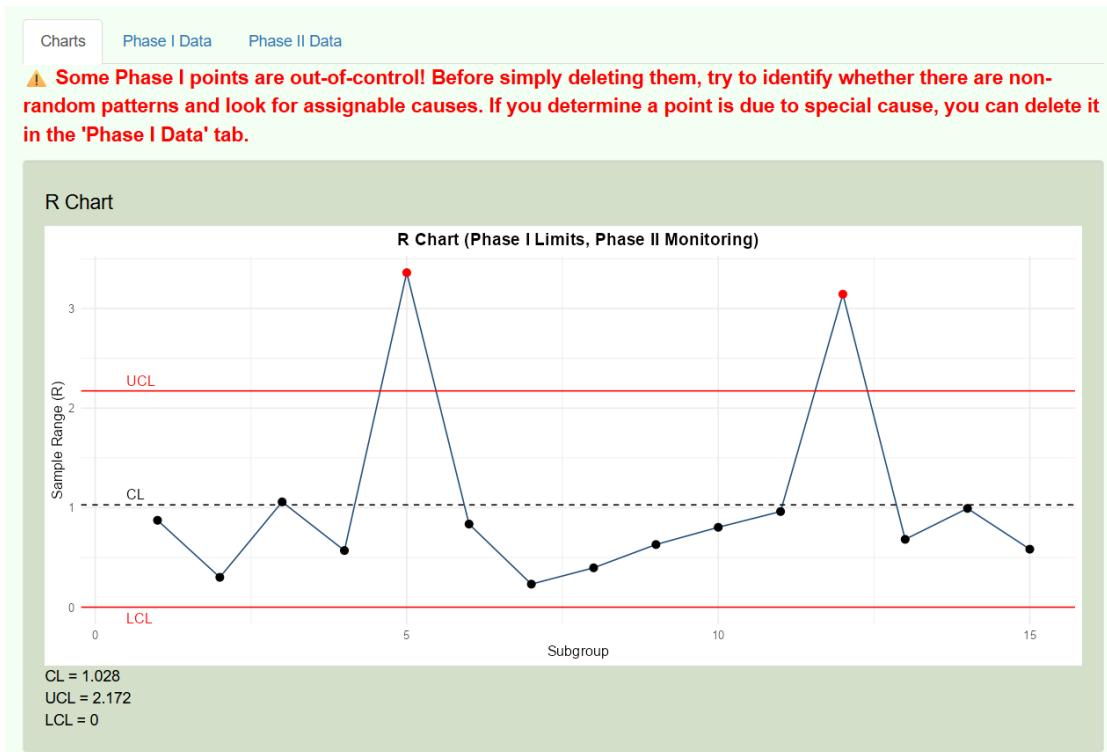
The data file should follow the format shown below.

Subgroup	X1	X2	X3	X4	X5
1	1.3235	1.4128	1.6744	1.4573	1.6914
2	1.4314	1.3592	1.6075	1.4666	1.6109
3	1.4284	1.4871	1.4932	1.4324	1.5674
4	1.5028	1.6352	1.3841	1.2831	1.5507
5	1.5604	1.2735	1.5265	1.4363	1.6441
6	1.5955	1.5451	1.3574	1.3281	1.4198
7	1.6274	1.5064	1.8366	1.4177	1.5144
8	1.419	1.4303	1.6637	1.6067	1.5519
9	1.3884	1.7277	1.5355	1.5176	1.3688

Note: The size of the subgroup can be any value. The app will automatically detect the actual sample size. However, the recommended sample size is 3-6

3.2 R Chart (Automatic Calculation)

1. After selecting or uploading Phase I data, the **R Chart is calculated automatically**.
2. No additional button is required for the R Chart calculation.



3.3 Deleting Out-of-Control Points

- Out-of-control points appear in red in Phase I data table.
- Warning messages appear for out-of-control points.
- Go to Phase I Data tab, select rows to delete.

Phase I Data

✓ Out-of-control points are highlighted in the tables below. To remove them, select the corresponding rows and click 'Delete Selected Rows' at the bottom of this page.

Original Data	Show: 25 entries	Search:				
Subgroup	X1	X2	X3	X4	X5	OutOfControl
1	9.831857300634337	10.5360739410492	10.12793526944304	9.65360742503898	10.11389184427956	
2	9.930946753155016	10.14935514346877	9.911478555102319	9.879134549410278	9.84303296406721	
3	10.467611249424474	9.41001485301111	10.26853769831351	9.860003393913034	9.900037784899174	
4	10.02115251742737	10.210406377046911	10.26344040625991	10.23398535350089	9.69442738507874	
5	15.03877833054828	9.8591625778192	10.24847432449125	9.974889280598452	9.879462632057327	
6	10.51451949060698	9.679652888203947	10.2066902762300	10.0799505419843	10.09105859242128	
7	10.13827486179678	9.93460752560251	10.16617529606128	9.9914397339588	10.13446293358683	
8	9.62048162651804	9.692198665507828	9.981426466826983	9.987138862812605	10.01590126801915	
9	9.79394414431942	9.781332631212658	9.908211200878025	10.41058606520434	10.27668024036392	
10	9.86630140870013	9.812488219645223	9.885586599699262	9.93268704522219	10.61502540568814	
11	10.36722453923184	8.493992008777276	9.791587906323846	10.45494118132886	9.852690650183039	
12	10.10794414811721	10.26133611334696	9.93762461659412	9.535374158730933	7.107249337807755	

- Click “Delete Selected Rows” at the bottom of this tab

R Data

Show: 10 entries

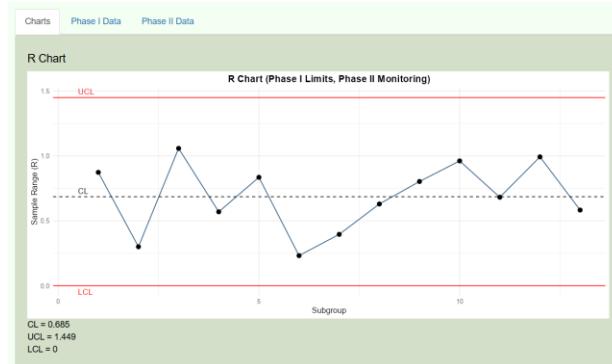
Subgroup	R	OutOfCon
1	0.8730065160019276	false
2	0.3000521794015611	false
3	1.057597641233627	false
4	0.5690126611920387	false
5	3.360323688490956	true
6	0.8348666078610378	false
7	0.2315677704587653	false
8	0.3954196384011119	false
9	0.6292480539916792	false
10	0.8025371860429207	false

Showing 1 to 10 of 15 entries

̄X Data

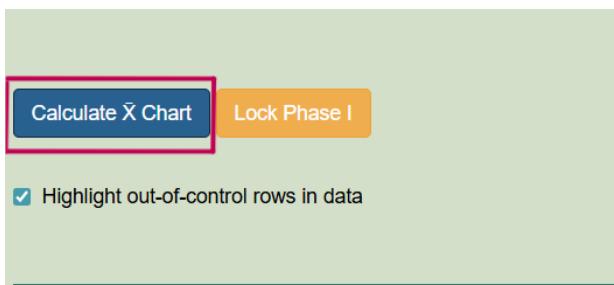
Delete Selected Rows

- Again, go to the Charts tab. R Chart automatically update.

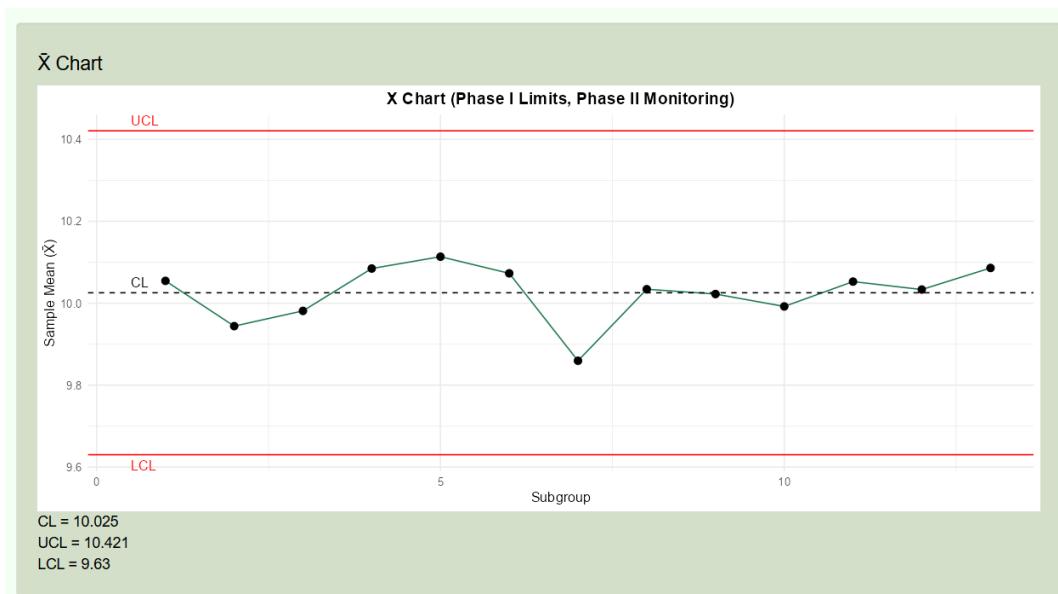


3.4 \bar{X} Chart

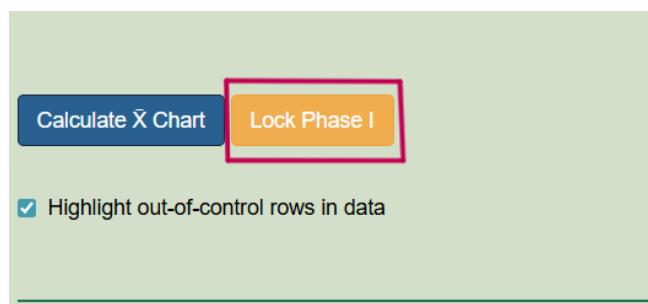
1. After deleting out-of-control points, if the R chart is in control, construct the \bar{X} Chart.
2. Click “Calculate \bar{X} Chart” in the sidebar.



3. Then, the \bar{X} Chart will appear in the Charts tab below the R chart.



4. After finalising the control limits, lock Phase I.



4. Phase II: Add New Subgroup

Note: Phase II data cannot be entered until the \bar{X} chart has been constructed.

1. Scroll to “Phase II: Add One Subgroup”.
2. Enter numeric values for the new subgroup.

Phase II: Add One Subgroup

Ensures all observations are entered before submission.

X1
10

X2
9

X3
11

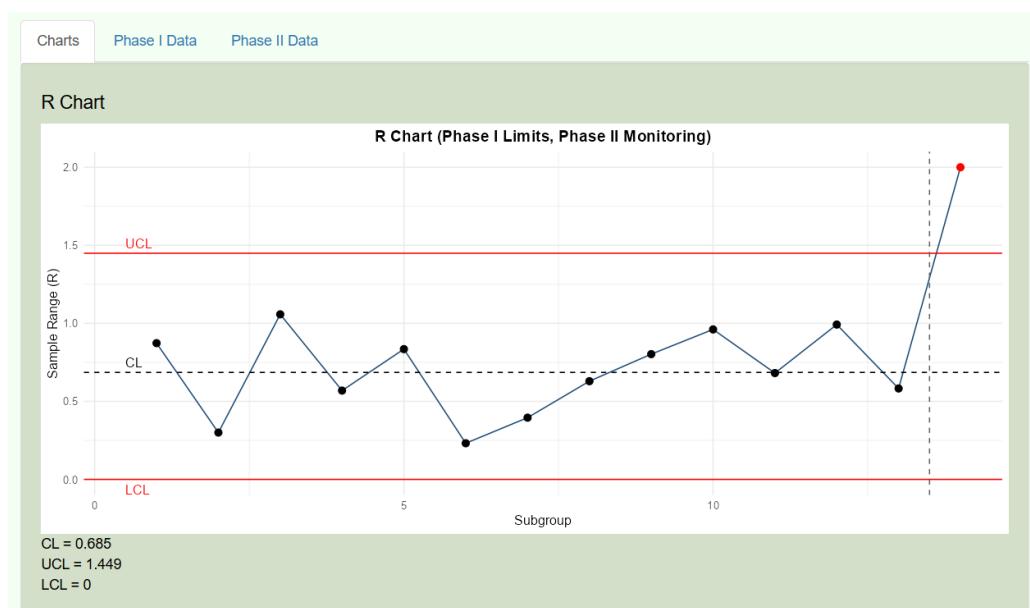
X4
9

X5
10

Add Phase II Subgroup

Reset Whole Process

3. Click “Add Phase II Subgroup”.
4. Charts update to include Phase II:
 - Phase I: **black points**
 - Phase II: **blue points**
 - Out-of-control: **red points**





5. “Phase II Data” Tab

- Initially empty. Once Phase II observations are entered, they will be stored in the Phase II Data tab.

Charts Phase I Data **Phase II Data**

Phase II Subgroup Data

Delete Selected Phase II Rows

Charts Phase I Data **Phase II Data**

Phase II Subgroup Data

Show 10 entries Search:

Subgroup	X1	X2	X3	X4	X5
1	1	10	9	11	10
2	2	12	7	10	9
3	3	11	12	10	8

Showing 1 to 3 of 3 entries Previous Next

Delete Selected Phase II Rows

2. If you need to remove a point (e.g., due to entry error), select the row(s) and click “Delete Selected Phase II Rows” .

Subgroup	X1	X2	X3
1	1	10	9
2	2	12	7
3	3	11	12

Showing 1 to 3 of 3 entries

Delete Selected Phase II Rows

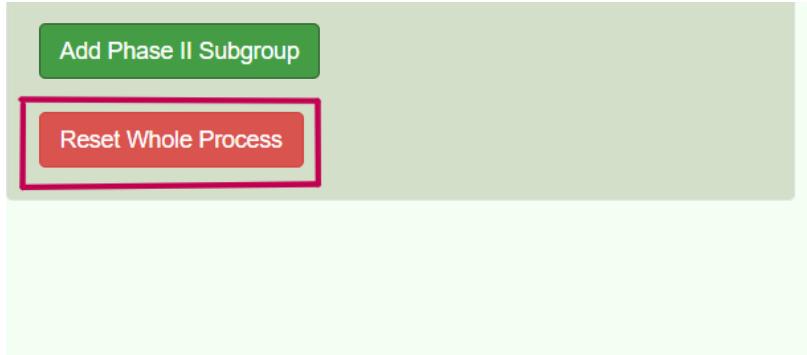
Subgroup	X1	X2	X3
1	1	10	9
3	2	11	12

Showing 1 to 2 of 2 entries

Delete Selected Phase II Rows

6. Resetting the App

- Click “Reset Whole Process”.
- Phase I and Phase II data are cleared.
- Ready for a new study.



End of Manual

Reference

Montgomery, D. C. (2013). *Introduction to statistical quality control* (6th ed.). John Wiley & Sons.