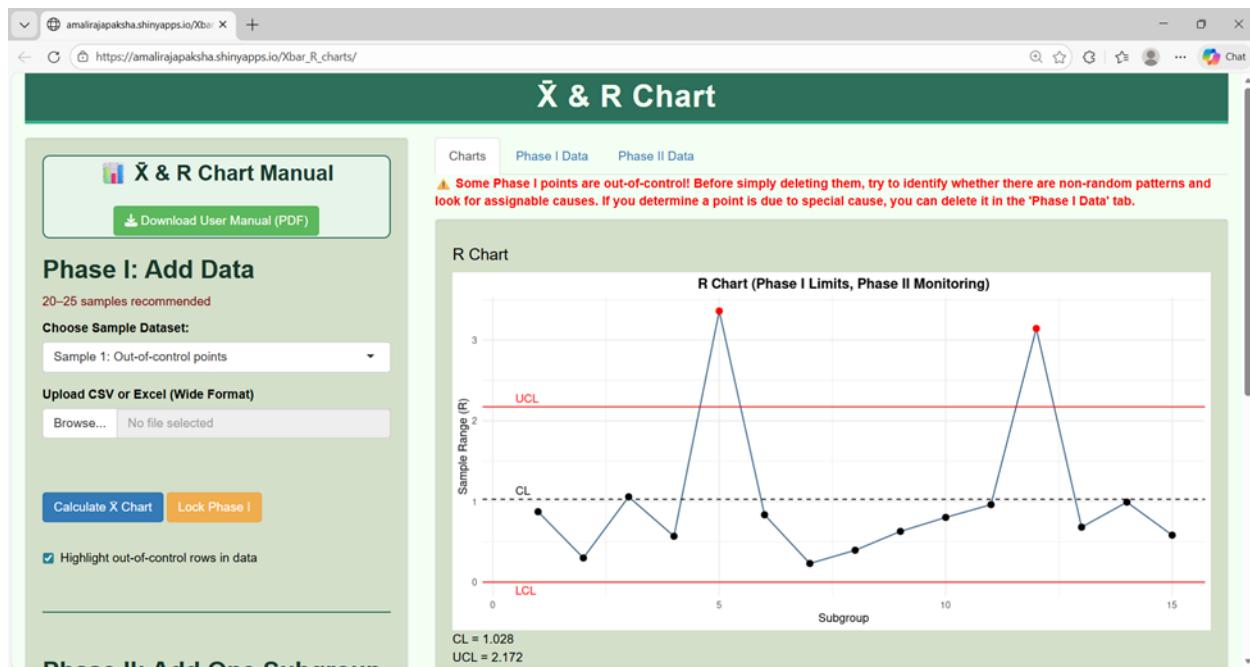


\bar{X} & R Chart Shiny App Manual

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.

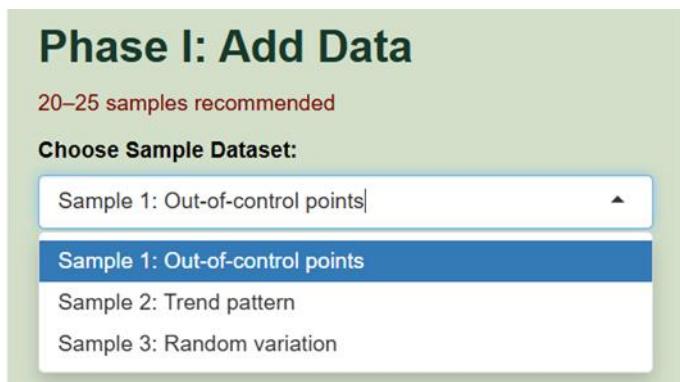
3. Phase I: Add Data

3.1 Uploading Phase I Data

3.1.1 Selecting a Sample Dataset

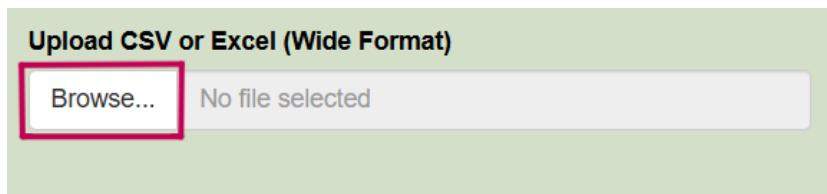
Note: The sample datasets provided are for illustrative and learning purposes only. They are not based on real data and are intended to demonstrate various scenarios in Phase I control chart analysis.

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.

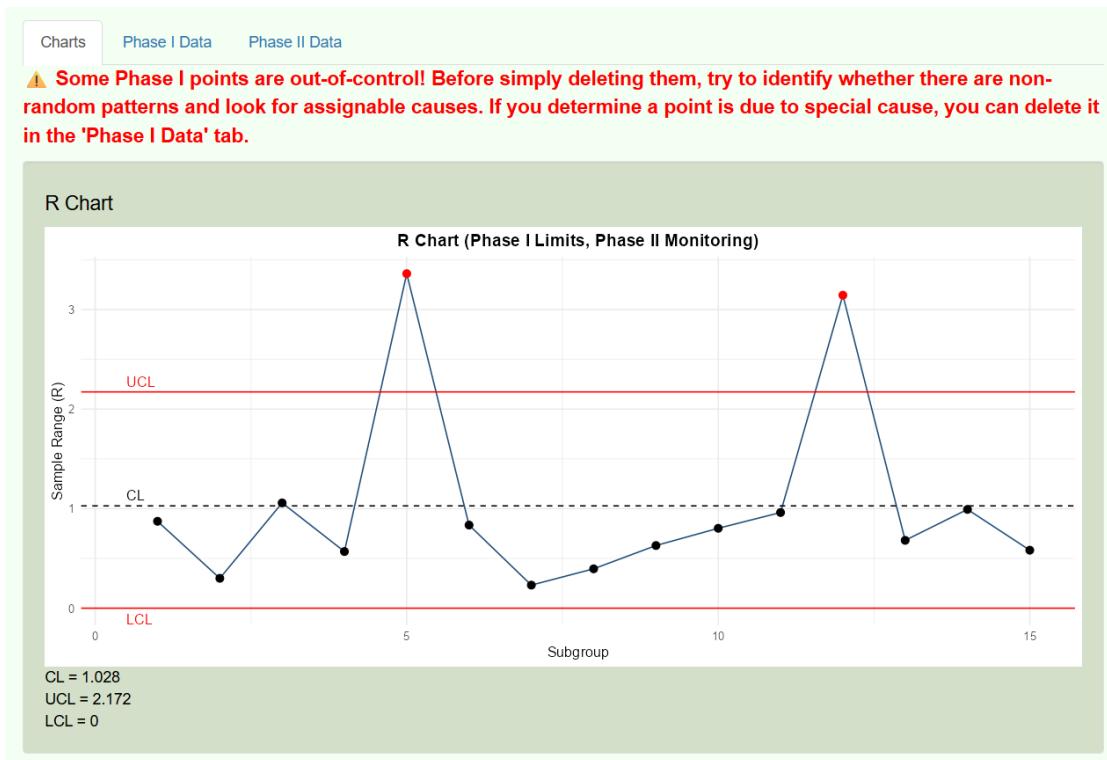
The data file should follow the format shown below.

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

1. Out-of-control points appear in red in Phase I data table.
2. Warning messages appear for out-of-control points.
3. 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	1	9.831857300634337	10.5360739410492	10.12793526944304	9.65360742503898	10.11389184427956	
2	2	9.930946753155016	10.14935514346877	9.911478555102319	9.879134549410278	9.84303296406721	
3	3	10.467611249424474	9.41001485301111	10.26853769831351	9.860003393913034	9.900037784899174	
4	4	10.02115251742737	10.210406377046911	10.26344040625991	10.23398535350089	9.69442738507874	
5	5	15.03877832054828	9.8591625778192	15.24847432449125	9.974889280598452	9.878462632057327	
6	6	10.51451949006498	9.6796527588203947	10.2066902762300	10.0799505419843	10.09105859242128	
7	7	10.13827486179678	9.93460752560251	10.16617529606128	9.9914397339588	10.13446293358683	
8	8	9.62048162651804	9.692198665507828	9.981426466826983	9.987138862812605	10.01590126801915	
9	9	9.79394414431942	9.781332831212658	9.908211200878025	10.41058606520434	10.27668024036392	
10	10	9.86630140870013	9.812488219645223	9.885586599699622	9.93268704522219	10.61502540568814	
11	11	10.36722453923184	8.493992008777276	9.7915879086323846	10.45494118132886	9.852690650183039	
12	12	10.10794414811721	10.26133611334696	9.93762461659412	9.535374158730933	7.107249337807755	

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

R Data

Show: 10 entries

Search:

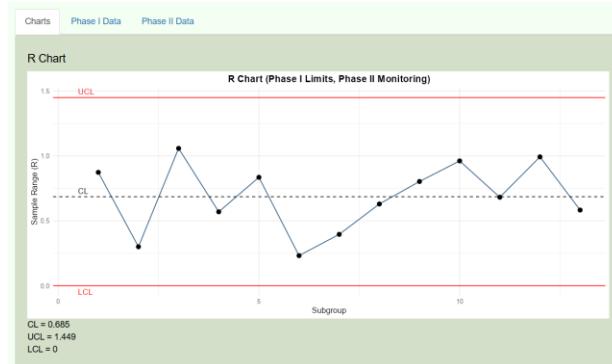
	Subgroup	R	OutOfCon
1	1	0.8730065160019276	false
2	2	0.3000521794015611	false
3	3	1.057597641233627	false
4	4	0.5690126611920387	false
5	5	3.360323688490956	true
6	6	0.8348666078610378	false
7	7	0.2315677704587653	false
8	8	0.3954196384011119	false
9	9	0.6292480539916792	false
10	10	0.8025371860429207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

Showing 1 to 10 of 15 entries

̄X Data

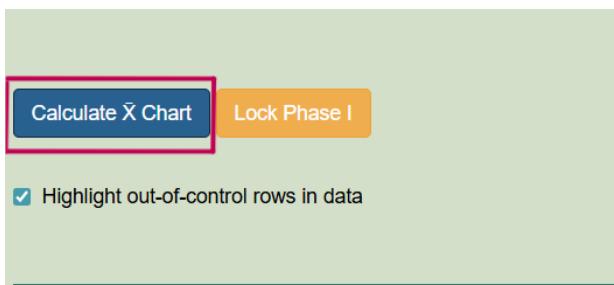
Delete Selected Rows

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

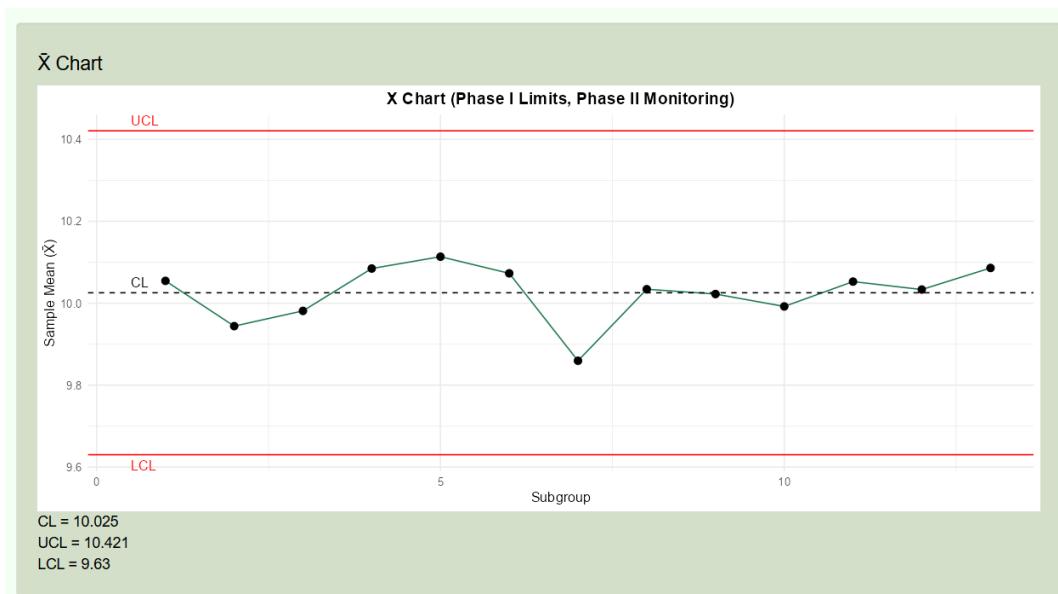


3.4 \bar{X} Chart

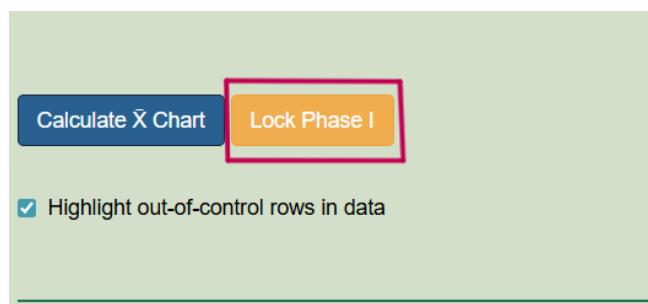
1. After deleting out-of-control points, if the R chart is in control, construct the \bar{X} Chart.
2. Click “Calculate \bar{X} Chart” in the sidebar.



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

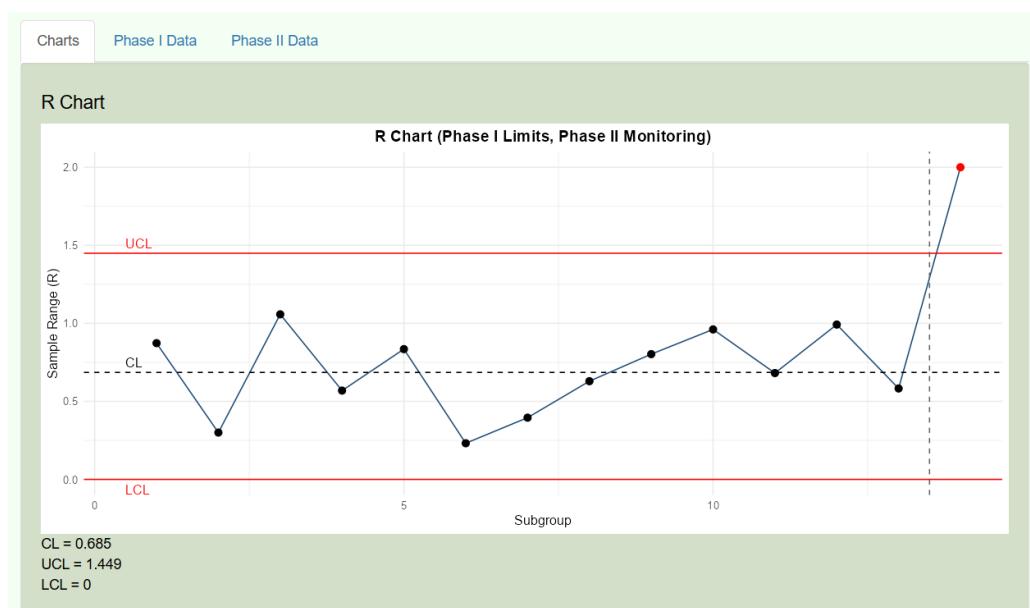
X4
9

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

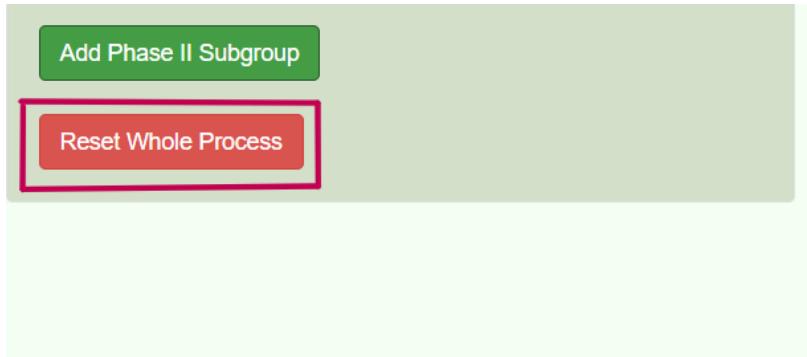
Subgroup	X1	X2	X3
1	1	10	9
3	2	11	12

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.