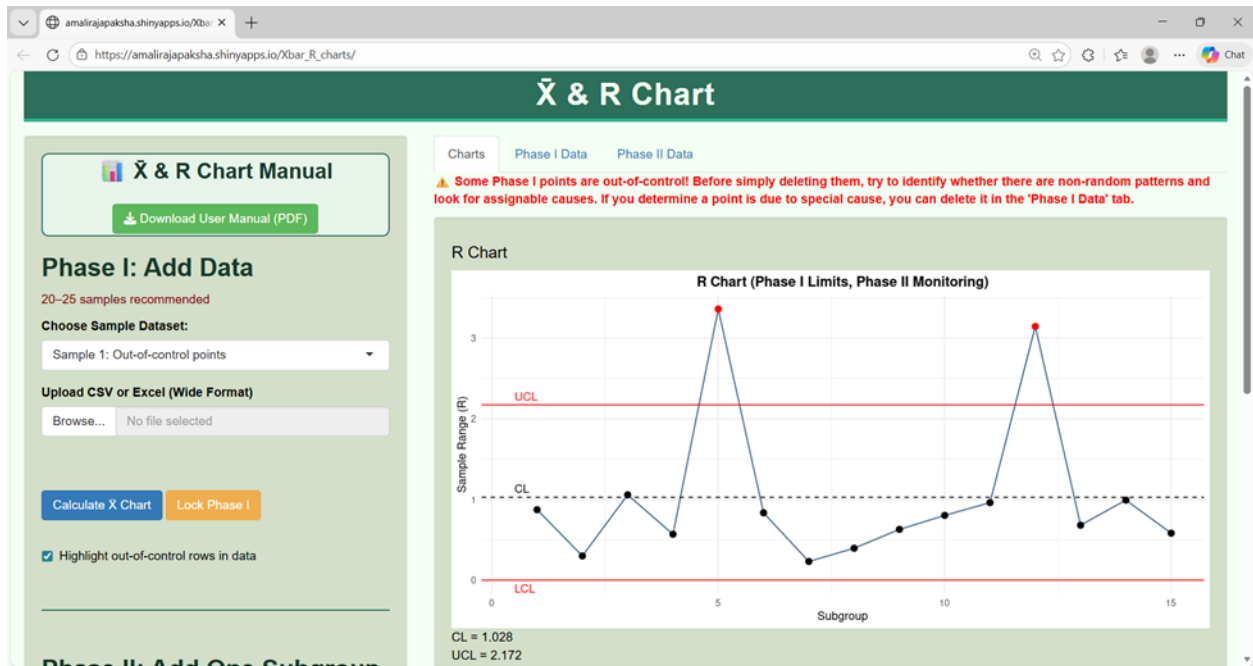


\bar{X} & R Chart Shiny App Manual

1. Launching the App

You can access the app directly through this link: [X̄ & R Chart Shiny App](https://amirajapaksha.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.

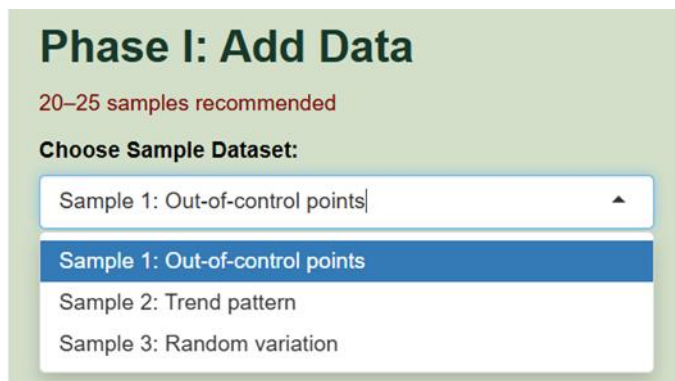
3. Phase I: Add Data

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.

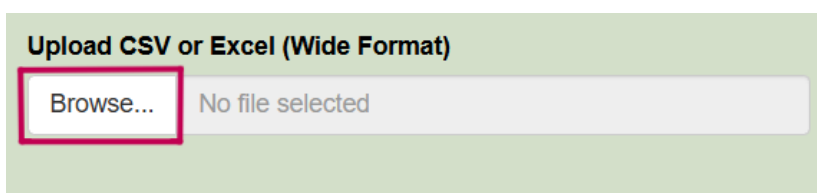
1. Use the “Choose Sample Dataset” dropdown.
2. Options:
 - Sample 1: Out-of-control points
 - Sample 2: Trend pattern
 - Sample 3: Random variation
3. Selecting a sample loads the data.



The screenshot shows a green header bar with the title "Phase I: Add Data" and a sub-header "20–25 samples recommended". Below this is a label "Choose Sample Dataset:" followed by a dropdown menu. The dropdown is open, showing three options: "Sample 1: Out-of-control points" (highlighted in blue), "Sample 2: Trend pattern", and "Sample 3: Random variation".

3.1.2 Uploading Your Own Data

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



The screenshot shows a green header bar with the title "Upload CSV or Excel (Wide Format)". Below this is a file selection interface with a button labeled "Browse..." (highlighted with a red box) and a text area that says "No file selected".

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

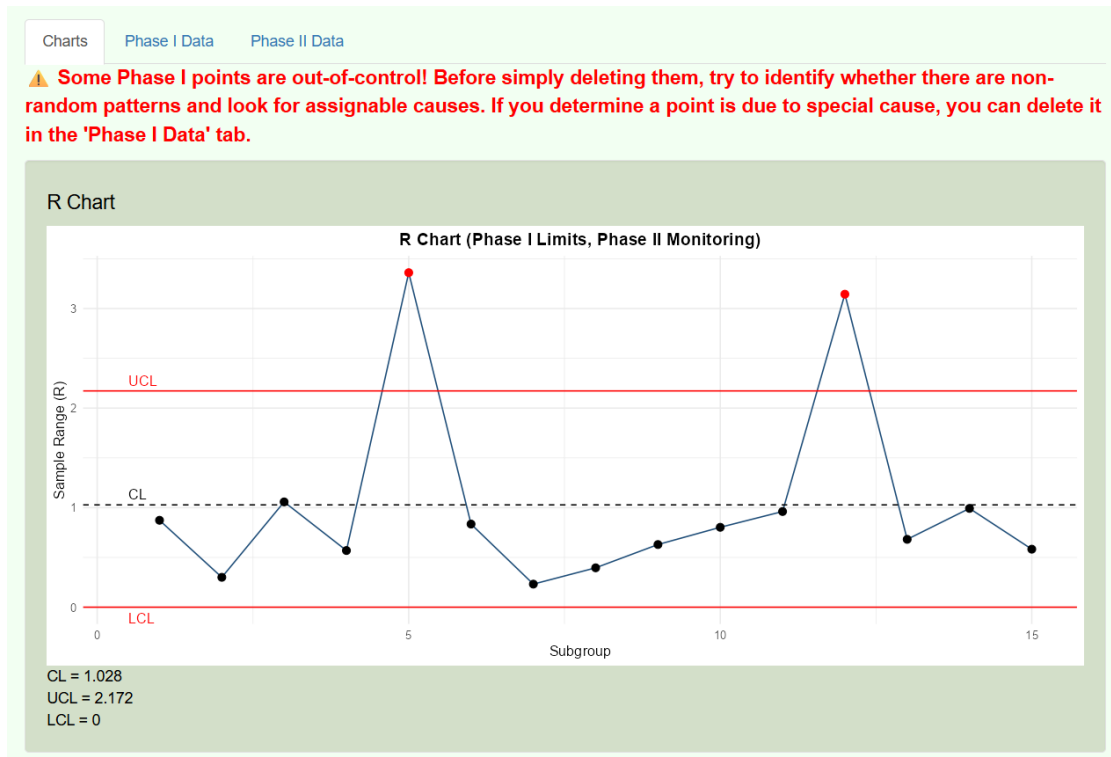
The data file should follow the format shown below.

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.

Charts **Phase I Data** Phase II 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

Subgroup	X1	X2	X3	X4	X5	OutOfControl
1	9.831857306034337	10.53607394104092	10.12793926644304	9.663067425038996	10.11389184482796	
2	9.930946753155016	10.14935514346877	9.911478555102319	9.879134549410278	9.84930296406721	
3	10.46761249424474	9.41091485301111	10.26853769831351	9.86003383913034	9.900337794899174	
4	10.02115251742737	10.21040677048911	10.26344004625991	10.23398953550089	9.694427385067874	
5	13.03879632054628	9.80616257768162	10.24647432449125	9.97488628059452	9.678462632057327	
6	10.51451949605498	9.67965298203947	10.20659207623003	10.0759955413943	10.09106859242128	
7	10.13827486179676	9.93460752560251	10.10617529605128	9.991435973395388	10.13446293358883	
8	9.62048162961804	9.692198665507828	9.981426486826983	9.987138862912605	10.01590126801915	
9	9.793944144431942	9.781332631212658	9.908211200878025	10.41058069520434	10.27668024036392	
10	9.896301408970013	9.812486219645223	9.88585869696296	9.932289704302219	10.81502540568814	
11	10.36722453923184	9.49396200677276	9.791587906323846	10.45494118132886	9.852690650183039	
12	10.10794414811721	10.25139611334636	9.93762481699412	9.535374198730983	7.107248033707795	

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

R Data

Show 10 entries

Search

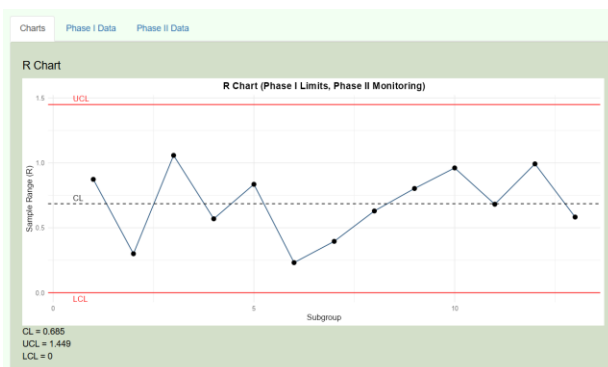
Subgroup	R	OutOfControl
1	0.8730065160019276	false
2	0.3000521794015611	false
3	1.057597641233627	false
4	0.5690126611920387	false
5	3.360323688490956	true
6	0.8348666078610378	false
7	0.2315677704587653	false
8	0.3954196384011119	false
9	0.6292480539916782	false
10	0.8025371860429207	false

Showing 1 to 10 of 15 entries

\bar{X} Data

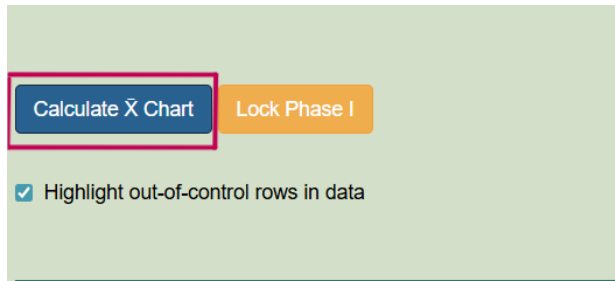
Delete Selected Rows

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

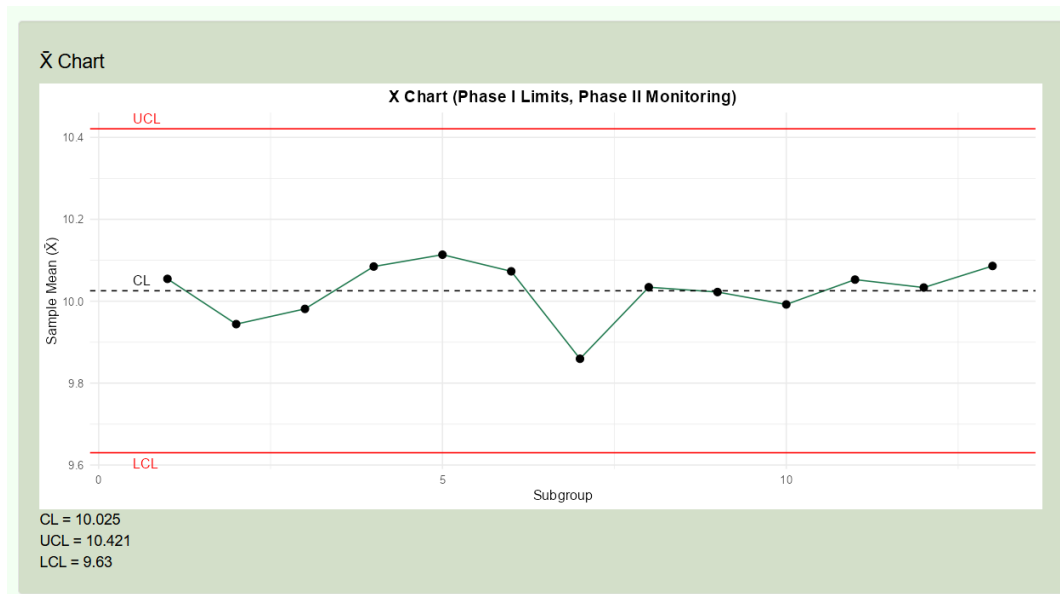


3.4 \bar{X} Chart

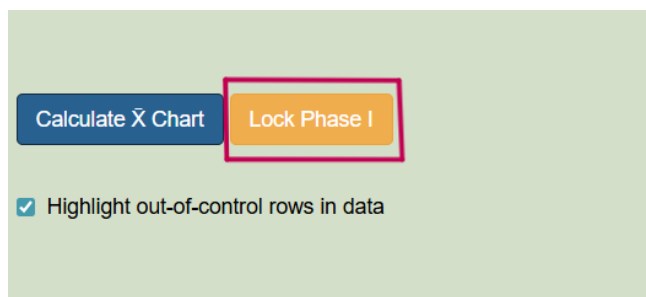
1. After deleting out-of-control points, if the R chart is in control, construct the \bar{X} Chart.
2. Click “Calculate \bar{X} Chart” in the sidebar.



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



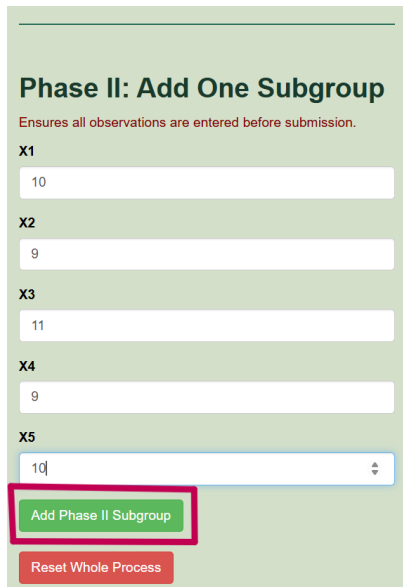
4. After finalising the control limits, lock Phase I.



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

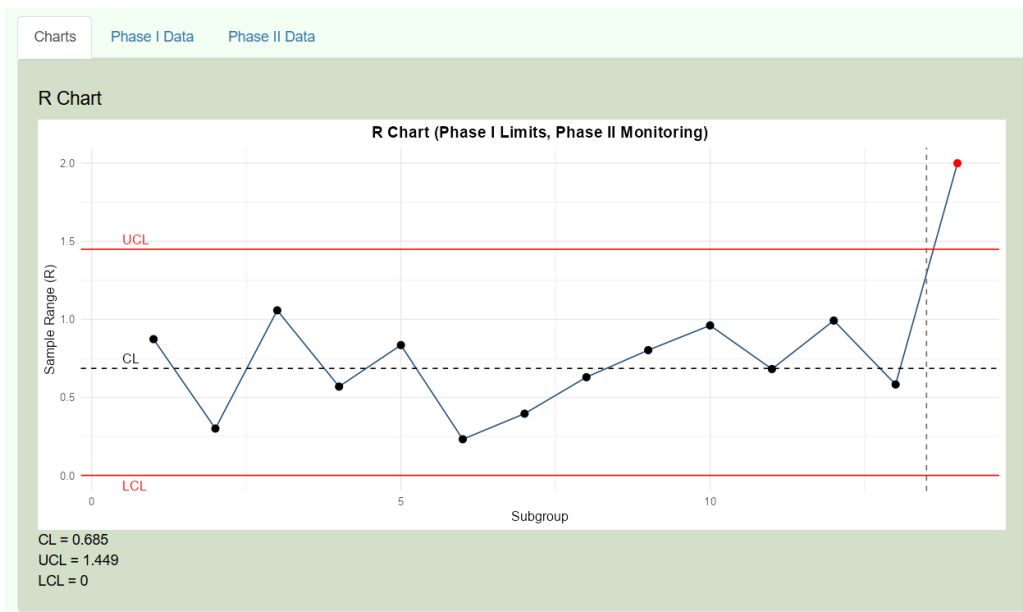
X4
9

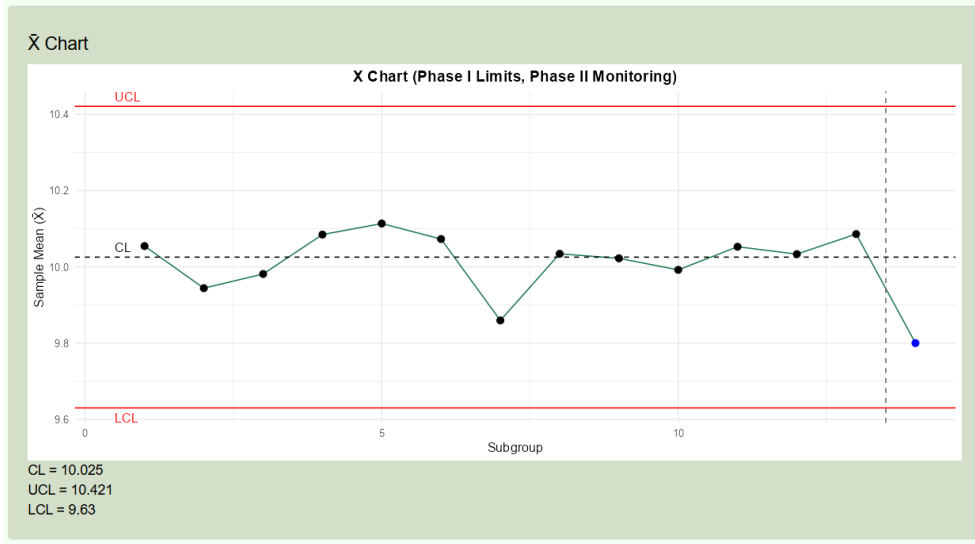
X5
10

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 entries Search:

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

Showing 1 to 3 of 3 entries Previous **1** 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” .

Charts Phase I Data Phase II Data

Phase II Subgroup Data

Show 10 entries

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

Showing 1 to 3 of 3 entries

Delete Selected Phase II Rows

Charts Phase I Data Phase II Data

Phase II Subgroup Data

Show 10 entries

Search

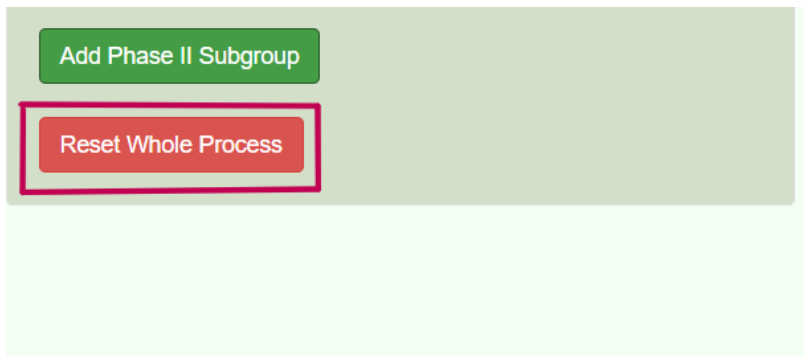
	Subgroup	X1	X2	X3
1	1	10	9	11
3	2	11	12	10

Showing 1 to 2 of 2 entries

Delete Selected Phase II Rows

6. Resetting the App

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



End of Manual

Reference

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