

Tutorial on Rainfall Dispersion Diagram- Part 2

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This tutorial is based on solution of question appearing in the university exam. This will help the students to solve the questions on this topic appearing in their exams.

Problem: Prepare a rainfall dispersion diagram for the month of January and August on the basis of given data of two stations and interpret the result

Rainfall in cm		
Days	January	August
1 st	0.00	2.40
2 nd	0.00	2.80
3 rd	1.20	1.40
4 th	2.30	1.30
5 th	1.60	1.70
6 th	0.00	2.10
7 th	0.00	2.10
8 th	1.00	2.00
9 th	2.10	2.10
10 th	1.40	3.10
11 th	1.60	3.00

Thus, rainfall data for two months- January and August has been given for 11 days

This type of question requires finding out quartile values and calculation of coefficient of quartile deviation for two different series. For example, quartile values are required to be calculated individually for January and August.

Solution:

Step 1: Arrange the rainfall data in ascending order for two months

- Arranging the rainfall data in ascending order for Month January

Observation	Rainfall in cm
1	0.00
2	0.00
3	0.00
4	0.00
5	1.00
6	1.20
7	1.40
8	1.60
9	1.60
10	2.10
11	2.30

- Arranging the rainfall data in ascending order for **Month August**

Observation	Rainfall in cm
1	1.30
2	1.40
3	1.70
4	2.00
5	2.10
6	2.10
7	2.10
8	2.40
9	2.80
10	3.00
11	3.10

- Total number of observations(**n**) for both the stations is 11 i.e. the series is ODD

- Step 2: **Calculation of Quartile values for both the months**

- Calculation of Quartile values for **Month January**

Observation	Rainfall in cm
1	0.00
2	0.00
3	0.00
4	0.00
5	1.00
6	1.20
7	1.40
8	1.60
9	1.60
10	2.10
11	2.30

Rank of Q1= $(n+1)/4^{\text{th}}$ observation

= $(11+1)/4^{\text{th}}$ observation

= $12/4^{\text{th}}$ observation= 3rd observation

Value of Q1= 0.00 cms

Rank of Q2= $(n+1)/2^{\text{th}}$ observation

= $(11+1)/2^{\text{th}}$ observation

= $12/2^{\text{th}}$ observation= 6th observation

Value of Q2= 1.20 cms

Rank of Q3= $3(n+1)/4^{\text{th}}$ observation

$$=3(11+1)/4\text{th observation}$$

$$=3*12/4\text{th observation}$$

$$=9\text{th observation}$$

Value of Q3=1.60 cms

- Calculation of Quartile values for Month August

Observation	Rainfall in cm
1	1.30
2	1.40
3	1.70
4	2.00
5	2.10
6	2.10
7	2.10
8	2.40
9	2.80
10	3.00
11	3.10

Following the same process, the Quartile values for August will be calculated. Detailed calculation needs to be shown.

$$Q1= 1.70 \text{ cms}$$

$$Q2= 2.10 \text{ cms}$$

$$Q3= 2.80 \text{ cms}$$

- Step 3: Calculation of Coefficient of Quartile Deviation to determine the dispersion

- Calculation of Coefficient of Quartile Deviation for Month January

$$\text{C.Q.D.}=(Q3-Q1)/(Q3+Q1)$$

$$= (1.60-0.00)/(1.60+0.00)$$

$$=1.60/1.60=1$$

- Calculation of Coefficient of Quartile Deviation for Month August

$$\text{C.Q.D.}=(Q3-Q1)/(Q3+Q1)$$

$$= (2.80-1.70)/(2.80+1.70)$$

$$= 1.10/4.50= 0.24$$

Interpretation

Thus, dispersion is greater for Month of January with greater value of C.Q.D. than Month of August with lesser value of C.Q.D. Rainfall is more variable in the Month of January compared to Month of August.

• Step 4: **Drawing the rainfall dispersion diagram**

→ Plot both the stations in a single graph. There will be a single diagram

→ Plot the stations on the X Axis selecting any suitable scale. There should be a gap between the two bars

→ Plot the Amount of rainfall on the Y Axis selecting any suitable scale fitting the rainfall values of both the stations

→ Before drawing keep in mind the following values for selecting the scale for Y-axis

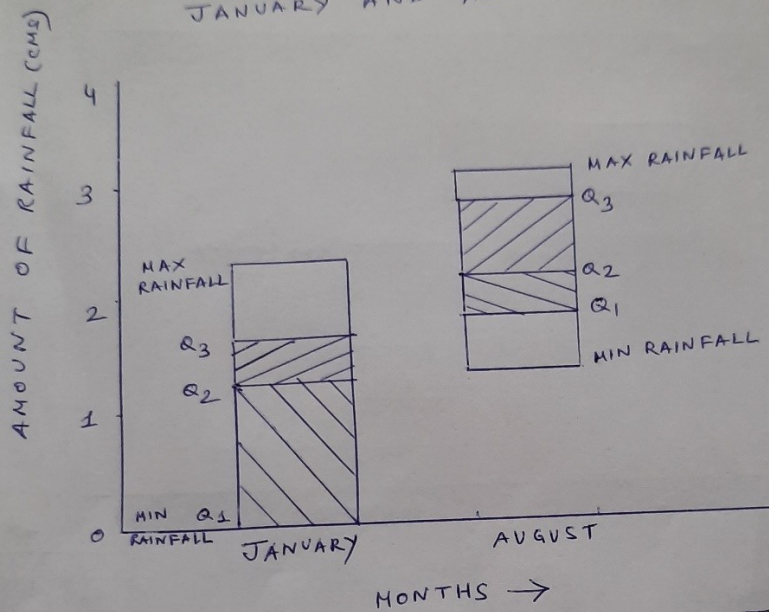
Station	January	August
min rainfall	0.00	1.30
Q1	0.00	1.70
Q2	1.20	2.10
Q3	1.60	2.80
max rainfall	2.30	3.10

After plotting, shade the inter-quartile band for both the stations. Carefully follow the diagram shown below

Diagram

Diagram is in the next page

RAINFALL DISPERSION DIAGRAM FOR 11 DAYS OF THE MONTHS - JANUARY AND AUGUST



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Vertical Scale - 2cm = 1cm rainfall
Horizontal Scale - 2cm = 1 month

