Tutorial on Rainfall Dispersion Diagram

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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 July on the basis of given data of two stations and interpret the result

Rainfall in cm		
Year	**Haldia**	**Ludhiana**
1980	28.6	8.4
1981	21.4	12.3
1982	31.1	7.4
1983	29.4	21.3
1984	26.3	11.2
1985	22.4	3.4
1986	25.3	8.9
1987	24.0	10.2
1988	30.1	12.3
1989	28.3	8.6
1990	27.5	6.3

Thus, rainfall data for two stations- Haldia and Ludhiana has been given for the month of July

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 Haldia and Ludhiana.

Solution:

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

• Arranging the rainfall data in ascending order for **Station Haldia**

Observation	**Rainfall in cm**
1	21.4
2	22.4
3	24
4	25.3
5	26.3
6	27.5
7	28.3
8	28.6
9	29.4
10	30.1
11	31.1

• Arranging the rainfall data in ascending order for **Station Ludhiana**

Observation	Rainfall in cm
1	3.4
2	6.3
3	7.4
4	8.4
5	8.6
6	8.9
7	10.2
8	11.2
9	12.3
10	12.3
11	21.3

• 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 stations**

• Calculation of Quartile values for **Station Haldia**

Observation	Rainfall in cm
1	21.4
2	22.4
3	24
4	25.3
5	26.3
6	27.5
7	28.3
8	28.6
9	29.4
10	30.1
11	31.1

Rank of Q1= (n+1)/4th observation

= (11+1)/4th observation

= 12/4th observation= 3rd observation

Value of Q1= 24 cms

Rank of Q2= (n+1)/2th observation

= (11+1)/2th observation

= 12/2th observation= 6th observation

Value of Q2= 27.5 cms

Rank of Q3= 3(n+1)/4th observation

=3(11+1)/4th observation

=3*12/4th observation

=9th observation

Value of Q3=29.4 cms

• Calculation of Quartile values for **Station Ludhiana**

Observation	Rainfall in cm
1	3.4
2	6.3
3	7.4
4	8.4
5	8.6
6	8.9
7	10.2
8	11.2
9	12.3
10	12.3
11	21.3

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

Q1= 7.4 cms

Q2= 8.9 cms

Q3= 12.3 cms

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

• Calculation of Coefficient of Quartile Deviation for **Station Haldia**

C.Q.D.=(Q3-Q1)/(Q3+Q1)

= (29.4-24)/(29.4+24)

=5.4/53.4=0.10

• Calculation of Coefficient of Quartile Deviation for **Station Ludhiana**

C.Q.D.=(Q3-Q1)/(Q3+Q1)

= (12.3-7.4)/(12.3+7.4)

= 4.9/19.7= 0.25

Interpretation

Thus, dispersion is greater for Station Ludhiana with greater value of C.Q.D. than Station Haldia with lesser value of C.Q.D. Rainfall is more variable in Ludhiana compared to Haldia.

• **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**

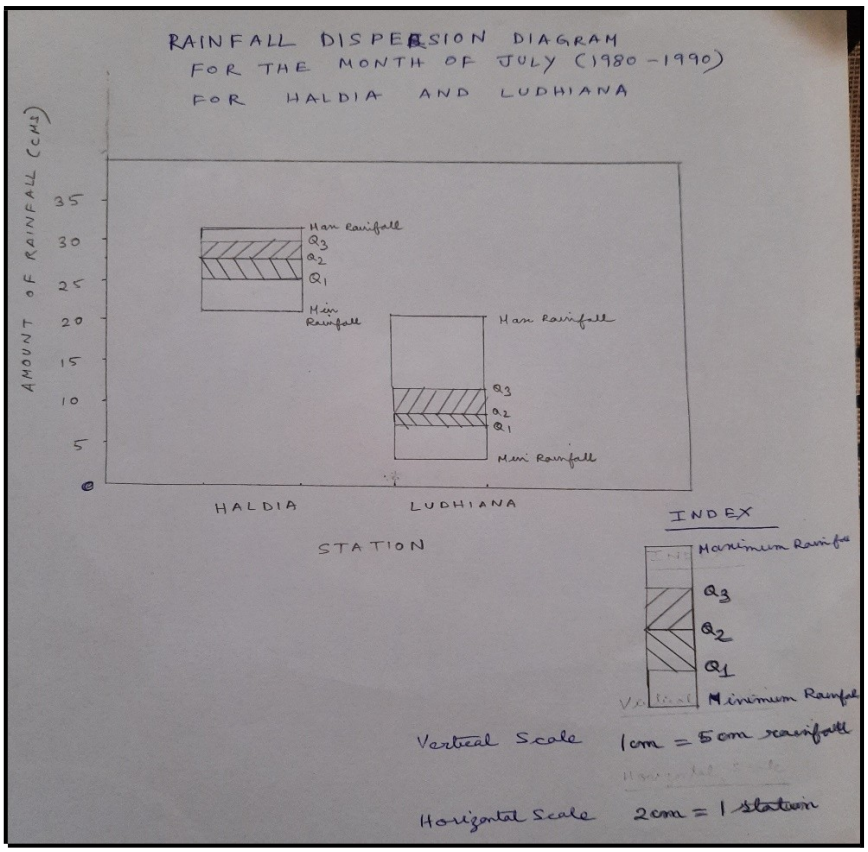
➟ **Before drawing keep in mind the following values for selecting the scale for Y-axis**

Station	Haldia	Ludhiana
min rainfall	21.4	3.4
Q1	24	7.4
Q2	27.5	8.9
Q3	29.4	12.3
max rainfall	31.1	21.3

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 THE MONTH OF JULY (1980 - 1990)
FOR HALDIA AND LUDHIANA
AMOUNT OF RAINFALL (CMS)
35
30
25
20
15
10
5
0
Max Rainfall
Q3
Q2
Q1
Min Rainfall
Max Rainfall
Q3
Q2
Q1
Min Rainfall
HALDIA
LUDHIANA
STATION
INDEX
Maximum Rainfall
Q3
Q2
Q1
Minimum Rainfall
Vertical Scale 1cm = 5cm rainfall
Horizontal Scale 2cm = 1 station