Computing Percentiles

Data Science and A.I. Lecture Series

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Example Data

To calculate the quartile deviation using the formula, let's proceed step-by-step with the dataset:
2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Computing Q_1

Computing Q_3

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For a dataset with n values, quartiles can be found by identifying the data points that correspond to specific percentiles.

Computing Q_3

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For a dataset with n values, quartiles can be found by identifying the data points that correspond to specific percentiles.
First quartile Q_1 is the value at the 25th percentile.

Computing Q_3

Example Data

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2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Computing Q_1

For a dataset with n values, quartiles can be found by identifying the data points that correspond to specific percentiles.
First quartile Q_1 is the value at the 25th percentile.
Position of $Q1$: $\frac{n+1}{4}$

Computing Q_3

Example Data

To calculate the quartile deviation using the formula, let's proceed step-by-step with the dataset:
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For a dataset with n values, quartiles can be found by identifying the data points that correspond to specific percentiles.
First quartile Q_1 is the value at the 25th percentile.
Position of $Q1$: $\frac{n+1}{4}$
With n = 10:

Computing Q_3

Example Data

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For a dataset with n values, quartiles can be found by identifying the data points that correspond to specific percentiles.
First quartile Q_1 is the value at the 25th percentile.
Position of $Q1$: $\frac{n+1}{4}$
With n = 10:
Q_1 **position** $= \frac{10+1}{4} = 2.75$

Computing Q_3

Example Data

To calculate the quartile deviation using the formula, let's proceed step-by-step with the dataset:
2, 4, 6, 8, 10, 12, 14, 16, 18, 20

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With n = 10:
Q_1 position $= \frac{10+1}{4} = 2.75$
The 2.75th position is between the 2nd and 3rd values, so we interpolate:

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Q_1 **position** $= \frac{10+1}{4} = 2.75$
The 2.75th position is between the 2nd and 3rd values, so we interpolate:
$Q_1 = 4 + 0.75 \times (6 - 4) = 4 + 0.75 \times 2 = 4 + 1.5 = 5.50$

Computing Q_3

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Computing Q_3

Third quartile Q_3 is the value at the 75th percentile.

Example Data

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For a dataset with n values, quartiles can be found by identifying the data points that correspond to specific percentiles.

First quartile Q_1 is the value at the 25th percentile.

Position of $Q1$: $\frac{n+1}{4}$

With n = 10:

Q_1 **position** $= \frac{10+1}{4} = 2.75$

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Computing Q_3

Third quartile Q_3 is the value at the 75th percentile.

Position of Q_3 **:** $\frac{3(n+1)}{4}$

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Computing Q_3

Third quartile Q_3 is the value at the 75th percentile.
Position of Q_3 : $\frac{3(n+1)}{4}$
With n = 10:
Q_3 **position** $= \frac{3(10+1)}{4} = \mathbf{8.25}$

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Position of Q_3 : $\frac{3(n+1)}{4}$
With n = 10:
Q_3 **position** $= \frac{3(10+1)}{4} =$ **8.25**
The 8.25^{th} position is between the 8th and 9th values, so we interpolate:

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With n = 10:
Q_3 **position** $= \frac{3(10+1)}{4} =$ **8.25**
The 8.25^{th} **position is between the 8th and 9th values, so we interpolate:**
$Q3 = 16 + 0.25 \times (18 - 16) = 16 + 0.25 \times 2 = 16 + 0.5 = 16.50$

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The 8.25^{th} **position is between the 8th and 9th values, so we interpolate:**
$Q3 = 16 + 0.25 \times (18 - 16) = 16 + 0.25 \times 2 = 16 + 0.5 = 16.50$
The interquartile range (IQR) is the range between Q_3 and $Q1$:

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The interquartile range (IQR) is the range between Q_3 and $Q1$:
IQR = Q3 - Q1 = 16.5 - 5.5 = 11

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IQR = Q3 - Q1 = 16.5 - 5.5 = 11
The quartile deviation (semi-interquartile range) is half of the IQR:

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The quartile deviation (semi-interquartile range) is half of the IQR:
Q.D. = $\frac{Q3-Q1}{2} = \frac{11}{2}$ **= 5.5**

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Position of Q_3 : $\frac{3(n+1)}{4}$
With n = 10:
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The 8.25^{th} **position is between the 8th and 9th values, so we interpolate:**
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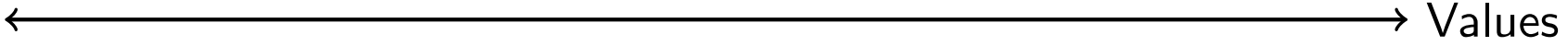
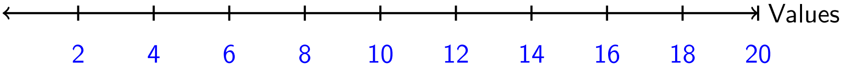
The interquartile range (IQR) is the range between Q_3 and $Q1$:
IQR = Q3 - Q1 = 16.5 - 5.5 = 11
The quartile deviation (semi-interquartile range) is half of the IQR:
Q.D. = $\frac{Q3 - Q1}{2} = \frac{11}{2}$ **= 5.5**
Q1 = 5.5, Q3 = 16.5,Interquartile Range (IQR) = 11, Quartile Deviation (Q.D.) = 5.5


Values


Values
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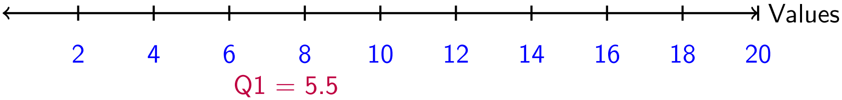
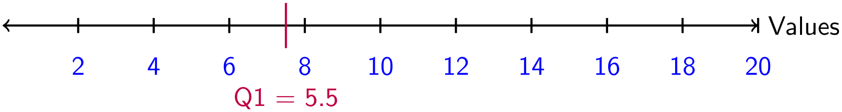
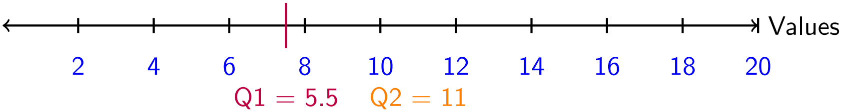
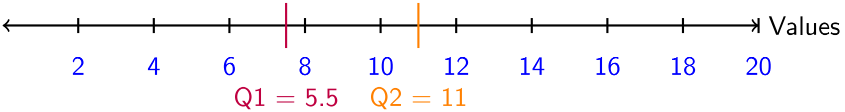
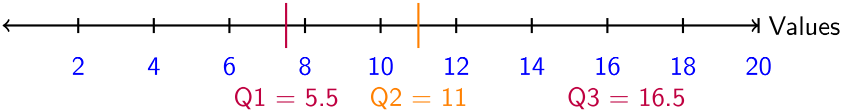
4
6
8
10
12
14
16
18
20

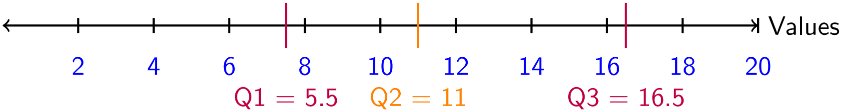

Values
2
4
6
8
10
12
14
16
18
20
Q1 = 5.5

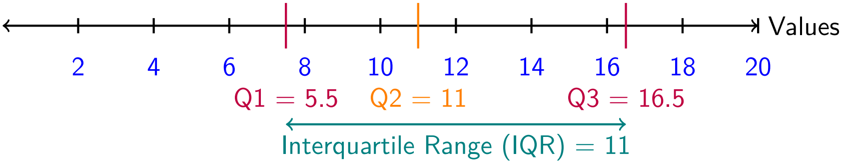

Values
2
4
6
8
10
12
14
16
18
20
Q1 = 5.5

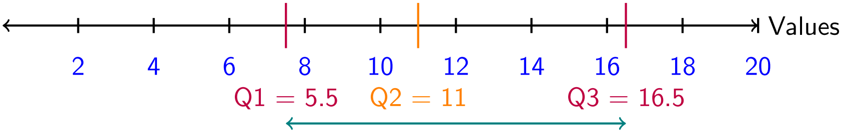

Values
2
4
6
8
10
12
14
16
18
20
Q1 = 5.5
Q2 = 11


Values
2
4
6
8
10
12
14
16
18
20
Q1 = 5.5
Q2 = 11


Values
2
4
6
8
10
12
14
16
18
20
Q1 = 5.5
Q2 = 11
Q3 = 16.5

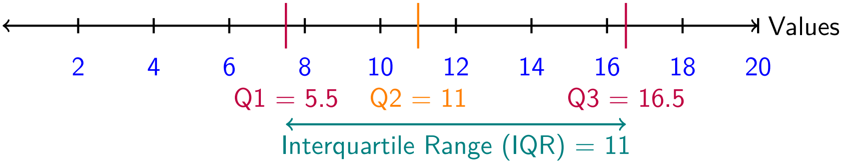

Values
2
4
6
8
10
12
14
16
18
20
Q1 = 5.5
Q2 = 11
Q3 = 16.5


Values
2
4
6
8
10
12
14
16
18
20
Q1 = 5.5
Q2 = 11
Q3 = 16.5
Interquartile Range (IQR) = 11



Interquartile Range (IQR) $= 11$

Quartile Deviation (Q.D.) $= \frac{Q3 - Q1}{2} = 5.5$



Quartile Deviation (Q.D.) $= \frac{Q3 - Q1}{2} = 5.5$

So, the quartile deviation of the dataset is 5.5,which reflects the average spread of the middle 50% of values around the median.