MEASURES OF ABSOLUTE VARIABILITY *R Programming*	10 of June 2013

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Measures of absolute variability deals with the dispersion of the data points. This include the following:

- Range - `range`;

- Interquartile Range - `IQR`;

- Quartile Deviation;

- Average Deviation; and,

- Standard Deviation - `sd`.

These measures of variability are restricted to uniform units of measurement when comparing two distributions.

Example 1. The heights (in centimetres) of the 17 BS Stat students in section A23 of Statistical Inference under Dr. Supe were recorded. The data are the following: 151, 160, 162, 155, 154, 154, 153, 168, 169, 153, 158, 166, 152, 157, 150, 169, and 167. Compute the range, interquartile range, quartile deviation, average deviation, and standard deviation.

The range is computed using the function `range`, while the interquartile range is obtained by `IQR`. Thus,

```
> heights <- c(151, 160, 162, 155, 154, 154, 153, 168, 169,
+              153, 158, 166, 152, 157, 150, 169, 167)
> range(heights)
[1] 150 169
>
> IQR(heights)
[1] 13
```

The range returned the minimum and maximum values of the data which are 150 and 169, respectively. And for the interquartile range, the output returned is the difference between the third and first quartiles. For quartile deviation, the formula is given by

$$QD = \frac{Q_3 - Q_1}{2}$$

where:

- Q_D - quartile deviation;

- Q_3 - third quartile; and,

- Q_1 - first quartile.

This equation is just the interquartile range over 2. And thus, the function would be

```
> QD <- function(data){
+   IQR(data)/2
+ }
```

Implies,

```
> QD(heights)
[1] 6.5
```

Lastly, the mean deviation

$$AD = \frac{\sum_{i=1}^{n} |X_i - \bar{X}|}{n - 1}$$

where:

- AD - average deviation;

- X_i - ith individual observations;

- $\bar{X}$ - sample mean; and,

- n - total number of observations.

Is coded as,

```
> AD <- function(data){
+   sum(abs(data-mean(data)))/(length(data)-1)
+ }
```

And therefore, the average deviation of the heights is,

```
> AD(heights)
[1] 6.257353
```

References

Asaad, Abubakar S. (2011). *Simplified Biostatistics*. Manila: Rex Book Store, Inc..

Labels

Descriptive Statistics, R, Tutorial