Statistical formulas

Formulas

Statistics	Excel function	Sample	Freq. table	Interpretation
Mean $ar{x}$	AVERAGE(sample)	$\frac{\sum x_i}{n}$	$\sum x_i f_i$	The value that best represent the values of the sample (except when there are outliers).
Median Me	MEDIAN(sample)			The value in the middle of the ordered sample. 50% of values of the sample are above and 50% below it.
Mode Mo	MODE(sample)			The most common value in the sample.
Minimum Min	MIN(sample)	$\min\{x_i\}$		The minimum value of the sample.
Maximum Max	MAX(sample)	$\max\{x_i\}$		The maximum value of the sample.
First quartile Q_1	QUARTILE(sample,1)			25% of the values of the sample are lower or equal to it.
Second quartile Q_2	QUARTILE(sample,2)			50% of the values of the sample are lower or equal to it.
Third quartile Q_3	QUARTILE(sample,3)			75% of the values of the sample are lower or equal to it.
Decile $i \ D_i$	PERCENTILE(sample, i/10)			i*10% of the values of the sample are lower or equal to it.
Percentile i P_i	PERCENTILE(sample, i/100)			<i>i</i> % of the values of the sample are lower or equal to it.
Range	MAX(sample)-MIN(sample)	Max-Min	Max - Min	Measures the overall spread of the sample.
Interquartile Range IQR	QUARTILE(sample,3)-QUARTILE(sample,1)	$Q_3 - Q_1$	$Q_3 - Q_1$	Measures the spread of the 50% central values of the sample.
Variance s^2	VAR.P(sample)	$\frac{\sum (x_i - \bar{x})^2}{n}$	$\sum (x_i - \bar{x})^2 f_i$	Measures the average spread with respect to the mean in square units.
Standard deviation s	STDEV.P(sample)	$\sqrt{s^2}$	$\sqrt{s^2}$	Measures the average spread with respect to the mean in the units of the variable.
Coef. variation ${\it cv}$	STDEV.P(sample)/ABS(AVERAGE(SAMPLE))	$\frac{s}{ \bar{x} }$	$\frac{s}{ \bar{x} }$	Measures the relative spread with respect to the mean. It has no units. The lower the dispersion, the more representative is the mean.
Coef. skewness g_1	SKEW(sample)	$\sum \left(\frac{x_i - \bar{x}}{s}\right)^3$	$\sum \left(\frac{x_i - \bar{x}}{s}\right)^3 f_i$	Measures the asymmetry of the sample distribution ($g_1=0$ symmetry, $g_1>0$ right-skewed, $g_1<0$ left-skewed).
Coef. kurtosis g_2	KURT(sample)	$\sum \left(\frac{x_i - \bar{x}}{s}\right)^4 - 3$	$\sum \left(\frac{x_i - \bar{x}}{s}\right)^4 f_i - 3$	Measures the peakness or flatness of the sample distribution compared to a normal distribution $(g_2=0 \text{ normal kurtosis}, g_1>0 \text{ leptokurtic or peaked distribution}, g_1<0 \text{ platykurtic or flat distribution}.$