Fundamentals of Statistics contains material of various lectures and courses of H. Lohninger on statistics, data analysis and chemometrics.....click here for more.

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z-Transform

Sometimes one has the problem to make two samples comparable, i.e. to compare measured values of a sample with respect to their (relative) position in the distribution. An often used aid is the **z-transform** which converts the values of a sample into z-scores:

$$z_i = \frac{x_i - \bar{x}}{s}$$

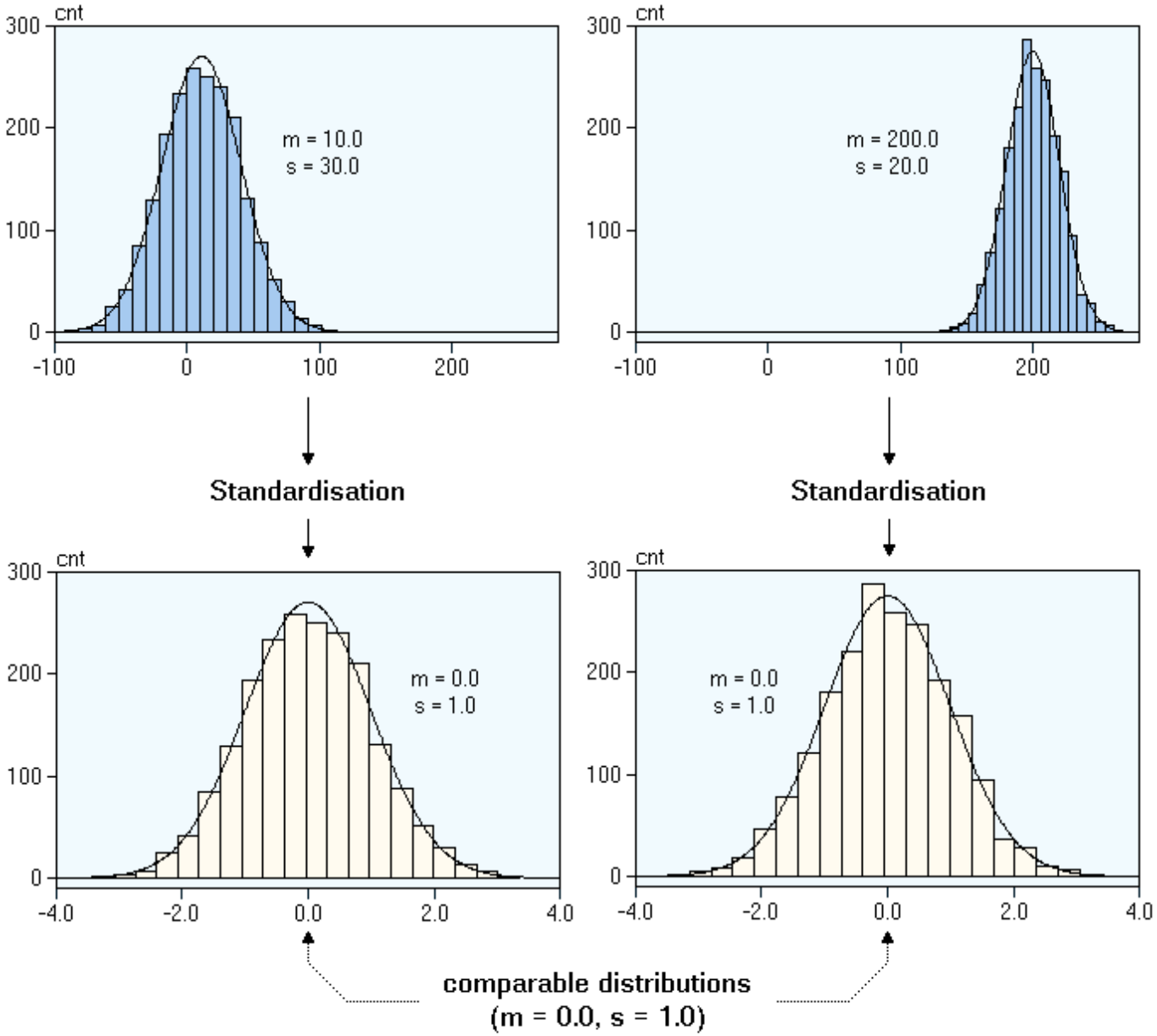
with

- z_i ... z-transformed sample observations
- x_i ... original values of the sample
- $\bar{x}$ ... sample mean
- s ... standard deviation of the sample

The z-transform is also called **standardization** or **auto-scaling**. z-Scores become comparable by measuring the observations in multiples of the standard deviation of that sample. The mean of a z-transformed sample is always zero. If the original distribution is a normal one, the z-transformed data belong to a standard normal distribution (m=0, s=1).

The following example demonstrates the effect of the standardization of the data. Assume we have two normal

distributions, one with mean of 10.0 and a standard deviation of 30.0 (top left), the other with a mean of 200 and a standard deviation of 20.0 (top right). The standardization of both data sets results in comparable distributions since both z-transformed distributions have a mean of 0.0 and a standard deviation of 1.0 (bottom row).


cnt
m = 10.0
s = 30.0
cnt
m = 200.0
s = 20.0
Standardisation
Standardisation
cnt
m = 0.0
s = 1.0
cnt
m = 0.0
s = 1.0
comparable distributions
(m = 0.0, s = 1.0)

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Last Update: 2009-Mär-28