Tolerance Interval Example

A computer scientist is investigating the usefulness of a design language in improving programming tasks. Twelve expert programmers are asked to code a standard function in the language, and the times (in minutes) are recorded. The data are:

17 16 21 14 18 24 16 14 21 23 13 18

We will assume these data were generated by the C+E model:

\[ Y = \mu + \epsilon. \]

Before using the normal theory tolerance interval, it is very important to verify that the data follow a normal distribution. The normal quantile plot in Figure 1 shows no reason to suspect nonnormality.

![Normal quantile plot, programming time data.](image)

The mean of the \( n = 12 \) times is 17.9167, and the standard deviation is 3.6296. For a level 0.90 normal theory tolerance interval for a proportion 0.95 of the population times, the constant \( K \) is 2.863. The interval is then

\[
(17.9167 - (2.863)(3.6296), 17.9167 + (2.863)(3.6296))
\]

\[
= (7.5252, 28.3082).
\]

We are 90% confident that this interval contains at least 95% of all population times. In other words, in repeated sampling, 90% of all intervals computed will contain at least 95% of population times.