Estimating The Mean of A Single Population: Unknown Variance

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

The point estimate of μ is $\overline{y} = 17.9167$.

Since we don't know σ, we estimate it using the sample standard deviation $s = 3.6296$, which means that the estimated standard error of $\overline{y}$ is $\hat{\sigma}(\overline{y}) = \frac{3.6296}{\sqrt{12}} = 1.0478$. In addition, $t_{n-1,\frac{1+L}{2}} = t_{11,0.975} = 2.2010$, so a level 0.95 confidence interval for μ is

$$= (17.9167 - (1.0478)(2.2010), 17.9167 + (1.0478)(2.2010))$$
$$= (15.6105, 20.2228).$$

Based on these data, we estimate that μ lies in the interval (15.6105,20.2228).

We are 95% confident in our conclusion, meaning that in repeated sampling, 95% of all intervals computed in this way will contain the true value of μ.