Prediction interval = credible interval?

Asked 8 years, 11 months ago Modified 8 years, 6 months ago Viewed 4k times

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I am wondering if prediction interval and credible interval evaluate the same thing.

For instance with a linear regression, when you estimate the prediction interval of a fitted values, you estimate the $(1-\alpha)\%$ limits of the interval in which you expect your value to fall. Conversely to a confidence interval, you do not focus on a distribution parameter such as the mean value, but on the value that your explained variable could take for a given X value (supposing that $Y = a + b.X$).

When you estimate the fitted value for a given X value within a Bayesian framework, from the posterior probability distribution, you can estimate a credible interval. Does this interval give you the same information on the fitted value or not?

bayesian | linear-model | prediction | prediction-interval | credible-interval

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edited Feb 27, 2014 at 0:56

Nick Stauner
11.6k 5 47 106

asked Sep 26, 2013 at 14:14

droopy
121 1 4

1 Answer

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18

They live in different spaces and mean different things.

A credible interval $[a, b]$ is a subset of the parameter space such that

$$P(a \leq \Theta \leq b \mid X_1 = x_1, \ldots, X_n = x_n) = \alpha\,,$$

and it means that, after seeing the data, you believe that with probability α the parameter value is inside this interval.

A prediction interval $[u, v]$ is a subset of the sampling space such that

$$P(u \leq X_{n+1} \leq v \mid X_1 = x_1, \ldots, X_n = x_n) = \gamma\,,$$

and it means that, after seeing the data, you believe that with probability γ the value of a future observation X_{n+1} will be inside this interval.

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answered Jan 23, 2014 at 20:12