

Likelihood and Log Likelihood

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Background

The likelihood is the probability that a given set of parameters would give rise to a given data set.

Formally, the likelihood is a product of probabilities.

$$\mathcal{L}(\beta) = \prod p(\beta|x, y)$$

Maximum Likelihood Estimation

Maximum Likelihood Estimation is essentially the process of finding the combination of parameters (e.g. β) which maximizes the likelihood of producing the data.

Log-Likelihood

Because probabilities are by definition < 1 , the likelihood \mathcal{L} tends to be a very small number. For a variety of reasons, it is often easier to work with the logarithm of the likelihood: $\ln \mathcal{L}$.

Visualizing the Likelihood and Log-Likelihood

Conclusion

Higher values of the *log-likelihood* closer to 0 represent models with a better fit.

Joint Likelihood of Two Parameters

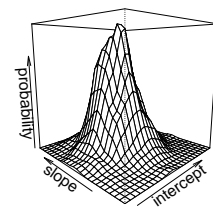


Figure 1: Joint Likelihood of Two Parameters

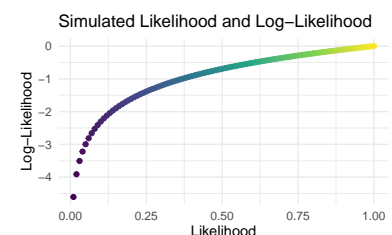


Figure 2: Likelihood and Log-Likelihood