



► RESEARCH STAY WEEK 4, MAXIMUM LIKELIHOOD ESTIMATION

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► **CONTEXT**

With maximum likelihood estimation, we have some data and a set of possible probability distributions, and we find which is the best fit for that given data.

► SEARCH METHODOLOGY

The bias prevention and correction techniques mentioned in [1] left me wondering, what other ways have we found to handle biases. Have we been able to find some sort of generalized solution?

► COMPARISON

In [2] "A comprehensive review of bias reduction methods for logistic regression." we have another look at adjusting score functions as "preventive" steps for bias, instead of corrective ones. The original method devised by [1] is explored again but this time with another alternative. [3] compared to [2] preserves the equivariance of the MLE. This means that the entire estimation process does not have to be carried out again when the data is reparameterized. However this method works by correcting over the median, which is not generalizable to higher dimensions. The authors set up a system of equations with is able to generalize the technique even at higher dimensions.

► BIBLIOGRAFÍA

[1] Firth, D. (1993). Bias Reduction of Maximum Likelihood Estimates. Biometrika 80 27-38.

<https://www.jstor.org/stable/2336755>

[2] Marieke Stolte, Swetlana Herbrandt, Uwe Ligges. "A comprehensive review of bias reduction methods for logistic regression." Statistics Surveys, 18(none) 139-162 2024. <https://doi.org/10.1214/24-SS148>

[3] Kenne Pagui, E. C., Salvan, A. and Sartori, N. (2017). Median Bias Reduction of Maximum Likelihood Estimates. Biometrika 104 923-938.

<https://doi.org/10.1093/biomet/asx046>