An Exploration of Stein's Paradox
Consideration of a variety of distributions and loss functions

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Alternative Loss Functions

- Is the paradox a result of a poor choice of loss function? If so, could this be resolved using another loss function of the form

$$\ell(\hat{f}(X), Y) = \sum_{i=1}^{d} |\hat{f}_i(X) - Y_i|^{\delta} = ||\hat{f}(X) - Y||_{\delta}^{\delta}$$

where $\delta \in \mathbb{R}^{+}$?

Alternative Distributions

- Does the paradox extend to other multivariate (but still independent) distributions?

- Can we get a rough idea of how the dominance of the James-Stein estimator is affected by the spread of the means? How about the dimension of X, d?

- Can we get a rough idea of how the dominance of the James-Stein estimator is affected by the value of σ^2?

- We offer results for three other two-parameter distributions: *uniform*(a, b), *cauchy*(x_0, γ), and *gamma*(α, β).

- With these, we can at least probe into whether things like support, tail thickness, and symmetry.