Sensitivity to discrete prior

Prior $\{c_1, \ldots, c_k\}$, criterion of interest $Q(c; y)$, where y are data. Change c_1, say, to $c_1(1+\epsilon)$. Make compensating changes proportionally. That is for $j \neq 1$ change c_j to

$$c_j\{1 - \epsilon\frac{c_1}{(1-c_1)}\}.$$

Recompute Q for some suitable ϵ and hence find D_1 measure of sensitivity to c_1. Repeat for $D_2, \ldots, D_k$.

Other changes possible, for example proportional to st error of $\hat{c}_1$.

Analytically find

$$\nabla_1 = c_1\frac{\partial Q}{\partial c_1} - \Sigma_{j\neq 1}\frac{c_1 c_j}{(1-c_1)}\frac{\partial Q}{\partial c_j}.$$

Merging of information

- Explicit or implicit combination of information common.
- Prior and likelihood in Bayesian calculations one example.
- Any differences between the information merged should be adequately represented in the stochastic model

Consistency of independent estimates

Let $T_1, \dots, T_m$ be estimates of nominally the same θ with estimated variances $s_1^2, \dots, s_m^2$ and let $w_j = 1/s_j^2$. Then

$$\Sigma w_j T_j^2 - \frac{(\Sigma w_j T_j)^2}{(\Sigma w_j)}$$

has approximately a chi-squared distribution with $m-1$ degrees of freedom. Beware estimated variances based on very small numbers of degrees of freedom

If chi-squared test suggests heterogeneity

- resolve inconsistency
- model extra variability but requires m not to be too small