Likelihood: $f(y \mid \theta)$

Prior: $p(\theta)$

Utility: $U(s, \theta)$

Posterior: $p(\theta \mid y) = \dfrac{f(y \mid \theta) p(\theta)}{\int f(y \mid \theta) p(\theta) \, \mathrm{d}\theta}$

Decision: $\hat{s} = \operatorname*{argmax}_{s} \int U(s, \theta) p(\theta \mid y) \, \mathrm{d}\theta$