**Bayesian Decision Analysis**

A site for an oil well is under consideration to drill or not to drill. The outcomes defined for the well in this region are dry, small reserve well and large reserve well. Since no information on the probability of the states of reserves is available in this region, a non-informative prior is assumed as a uniform distribution. The payoffs estimated for this region are given in the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  | Reserves | | |  |
|  | Payoff | Dry | Small | Large |  |
|  | Drill | -$2000K | $500K | $3000K |  |
|  | NoDrill | 0 | 0 | 0 |  |
|  |  |  |  |  |  |

Information may be purchased from geophysical companies operating near the region under consideration. However, reported performance from available companies indicate poor discrimination for the states of reserves in the region.

A small geophysical company can provide a positive or negative recommendation in the area after exploration for $50K. Past performance for the small company based on a positive recommendation is given as 0.70, 0.75 and 0.88, for Dry, Small Reserves and Large Reserves, respectively. (Past performance is defined as in all the dry, small and large reserves observed, the percentage of positive recommendations were reported.)

A large geophysical company can provide a positive or negative recommendation in the area after exploration for $100K. Past performance for the small company based on a positive recommendation is given as 0.40, 0.64 and 0.70, for Dry, Small Reserves and Large Reserves, respectively. (Past performance is defined as in all the dry, small and large reserves observed, the percentage of positive recommendations were reported.)

A decision analysis reported the following results.

|  |
| --- |
| Purchasing no information, the decision is Drill with an expected profit of $500K.  Purchasing information from the small geophysical company, the decision is to:  Drill after a positive recommendation with an expected profit of about $693K-$50K=$643K.  NoDrill after a negative recommendation with a net profit of -$50K.  The expected value of the sample information is about $38.33K with a purchase price of $50K  Purchasing information from the large geophysical company, the decision is to:  Drill after a positive recommendation with an expected profit of about $931K-$100K=$831K.  NoDrill after a negative recommendation with a net profit of -$100K.  The expected value of the sample information is about $40K with a purchase price of $100K  . . . |



