State of nature

This choice of an action by a decision maker must be made in the face of uncertainty, because the outcome will be affected by random factors that are outside the control of the decision maker. These random factors determine what situation will be found at the time that the action is executed. Each of these possible situations is referred to as a possible state of nature.

For each combination of an action and a state of nature, the decision maker knows what the resulting payoff would be. The payoff is a quantitative measure of the value to the decision maker of the consequences of the outcome. For example, the payoff frequently is represented by the (net monetary gain) profit, although other measures also can be used . If the consequences of the outcome do not become completely certain even when the state of nature is given, then the payoff becomes an expected value (in the statistical sense) of the measure of the consequences. A payoff table commonly is used to provide the payoff for each combination of an action and a state of nature

1. The decision maker needs to choose one of the alternative actions.

2. Nature then would choose one of the possible states of nature.

3. Each combination of an action and state of nature would result in a payoff, which is given as one of the entries in a payoff table.

4. This payoff table should be used to find an optimal action for the decision maker according to an appropriate criterion.

Diff bt game theory and DA

. The decision maker generally will have some information that should be taken into account about the relative likelihood of the possible states of nature. Such information can usually be translated to a probability distribution, acting as though the state of nature is a random variable, in which case this distribution is referred to as a prior distribution. probabilities for the respective states of nature provided by the prior distribution are called prior probabilities.