The problem of a multiple event network can be computed using the

\[
(f_{\text{event}})(a,b) = \sum_{c} f_{\text{event}}(a,b,c)
\]

Example 10.2.8

Suppose you want to know the probability of a sequence of events. If you know the probability of

\[
(f_{\text{event}})(a,b) = \sum_{c} f_{\text{event}}(a,b,c)
\]

and the conditional probability of \(c\) given \(a, b\), you can compute the

\[
(f_{\text{event}})(a,b,c) = \frac{f_{\text{event}}(a,b) \times f_{\text{conditional}}(c|a,b)}{f_{\text{event}}(a,b)}
\]

Example 10.2.9

We can use the conditional probabilities to compute the

\[
(f_{\text{event}})(a,b,c) = \frac{f_{\text{event}}(a,b) \times f_{\text{conditional}}(c|a,b)}{f_{\text{event}}(a,b)}
\]

probability of \(c\) given \(a, b\), and then use the

\[
(f_{\text{event}})(a,b,c) = \frac{f_{\text{event}}(a,b) \times f_{\text{conditional}}(c|a,b)}{f_{\text{event}}(a,b)}
\]

conditional probabilities to compute the

\[
(f_{\text{event}})(a,b,c) = \frac{f_{\text{event}}(a,b) \times f_{\text{conditional}}(c|a,b)}{f_{\text{event}}(a,b)}
\]

probability of \(a, b, c\) given \(\text{event}\).
An Algorithm for Evaluating Belief Networks

The following is an algorithm for evaluating belief networks. Any of the following numbers can be used to compute the probability of any event in the network:

1. **Compute the probability of each evidence variable.**
2. **Compute the probability of each hidden variable, given the evidence variables.**
3. **Compute the probability of the target variable, given the evidence variables and the hidden variables.**

To compute the probability of a variable, you can use Bayes' theorem:

\[
P(A|B) = \frac{P(B|A)P(A)}{P(B)}
\]

Where:
- \(P(A|B)\) is the probability of \(A\) given \(B\).
- \(P(B|A)\) is the probability of \(B\) given \(A\).
- \(P(A)\) is the prior probability of \(A\).
- \(P(B)\) is the marginal probability of \(B\).

The algorithm can be used to compute the probability of any variable in the network, given the evidence variables. This is useful for decision-making and prediction tasks.
CH. 10 USING UNCERTAINTY KNOWLEDGE
10.4 Making Decisions Under Uncertainty

Any decision-making process involves the selection of a course of action from a set of available options. The process typically involves identifying the decision problem, collecting information, formulating alternatives, and evaluating the consequences of each alternative. Uncertainty is a common feature in real-life decision-making scenarios, as outcomes are often uncertain and may depend on factors that are not fully understood.

The first step in making a decision is to identify the decision problem. This involves defining the objective and determining the constraints and objectives of the decision. Once the decision problem is defined, the next step is to gather information. This may involve collecting data from various sources, conducting surveys, or analyzing existing information.

After gathering the necessary information, the next step is to identify the alternatives. This involves brainstorming and generating possible solutions to the decision problem. The alternatives should be evaluated based on their potential outcomes and the constraints and objectives of the decision.

The final step is to select the best alternative. This involves comparing the alternatives based on their potential outcomes and selecting the one that best meets the decision problem's objectives.

When making decisions under uncertainty, it is important to consider the risks and uncertainties associated with each alternative. This may involve using statistical methods, such as probability analysis, to estimate the likelihood of different outcomes. By considering the risks and uncertainties associated with each alternative, decision-makers can make more informed decisions.

In summary, making decisions under uncertainty involves identifying the decision problem, gathering information, identifying alternatives, and selecting the best alternative. By considering the risks and uncertainties associated with each alternative, decision-makers can make more informed decisions.