

Decision making and Influence diagrams

Introduction to Influence Diagrams

An influence diagram is a **simple illustrated representation of a visual problem**. Influence diagrams serve as mutual graphical apparatus for visualizing and scrutinizing complex systems. Decision-making teams require a thorough comprehension of the often-complicated network of interrelated dynamics that administrate system behavior in order to make consistently good decisions. By graphically representing system interaction, an influence diagram facilitates such teams to grasp behaviors far more effortlessly than with unaided intuition. It also presents a methodology for analyzing these interactions to gain system insight for improved decision-making and an intuitive way to identify and display essential elements like decisions, uncertainties, and objectives, and how they influence each other.

Generating Influence Diagrams

Influence diagrams use shapes called **nodes** and arrows called **arcs**, which enable the diagram to function as a graphical representation of a system. Nodes represent **system variables** while arcs represent **influences between variables**. The direction of an arc is vital, as the arc specifies that the value of the node at its head (arrow end) depends directly on the value of the node at its tail. Nodes used to define model inputs are known as "data" nodes and nodes that use values from other nodes to calculate new values are called "calculation" nodes.

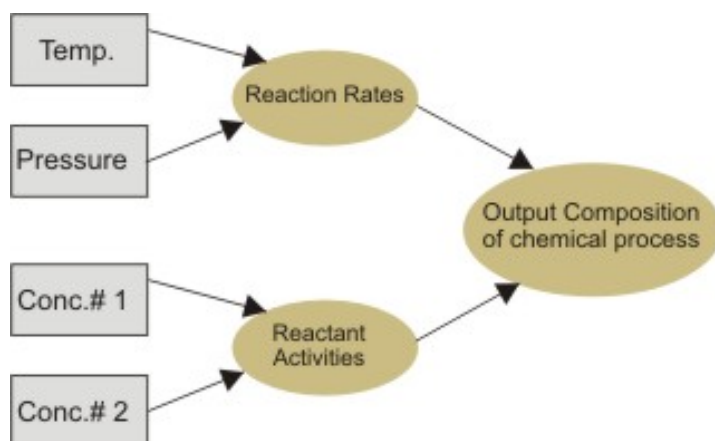


Figure: This diagram is a simplified version of the actual influence diagram representing a system of chemical process. The first model takes Temp. and Pressure, the "data" nodes that calculate the reaction rates for the reaction. Model 2 takes the concentrations of the reactants and calculates their activities. Reaction Rates and Reactant Activities are the "calculation" nodes. Using these two intermediates, it is possible to calculate the output composition of the chemical process, which is the "output" node

Application of Influence Diagrams

These diagrams can be applied in various areas of analysis. These Diagrams can be



Where can I learn more:

- [Uncertainty: A Guide to Dealing in Quantitative Risk and Policy Analysis](#)
- [Decision Making in Qualitative Influence Diagrams](#)
- [Modeling and Valuing Real Options Using Influence Diagram](#)
- [Bayesian Networks and Influence Diagrams](#)

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DecisionCraft Analytics provides intelligent business solutions aimed at helping organizations create and sustain competitive advantage. Our competency lies in solving complex business problems with the help of state-of-the-art mathematical models.

Our focus areas include supply chain management, marketing and finance. We recognize that all organizations are unique entities at various levels of evolution and hence, our solutions are tailored to the specific needs of each organization and its business

applied to Sensitivity Analysis, Mathematical Modeling, Model Fidelity, Improvement Initiatives and Quantifying risk and uncertainty.

Advantages

- It aids in understanding quantitative relationships in math model.
- Influence Diagrams divide a system into logical entities or components- one per node- that can be a single value.
- Further on, smaller sets of calculation nodes can be selected and tested in isolation.
- Modularity helps to maintain and upgrade Influence Diagrams easily.
- Influence Diagrams function as open windows into system understanding rather than being black boxes.

Comparing Influence diagram and Decision tree

When compared to a decision tree, influence diagram proves as a much more simple and compact depiction of analysis. Though the decision tree explains more details of the potential paths or scenarios as series of branches, this detail requires a lot of complex procedure, making it too complicated to display. While, the influence diagram illustrates the dependencies among variables more visibly than the decision tree.

Thus, an overall concluding aspect that can be derived is that the influence diagram is much better than any other decision-making technique.

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