: What technologies are used for decision automation?

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Software and system designers can use a number of differing technologies to build a system to automate decision making. Technologies range from very simple to complex and the inputs may be one or a few values to many values based on queries of a database. Designers need to be familiar with the range of technologies and distinct benefits and limitations of each. With decision automation it is easy to focus on one technology like business rules and ignore other possibilities that may have different implementation trade-offs. Quantitative models, heuristics, IF-THEN rules, statistical approaches and other Artificial Intelligence technologies can all potentially be used to build a decision automation system.

Decision automation is a broad term that refers to computerized systems that make decisions and have some capability to independently act upon them. Tasks that can be automated include setting loan amounts, determining credit line increases, developing contingency plans for product recalls, or establishing new premiums for insurance policy renewals. When human decision makers are kept in the decision making loop the system is more appropriately called a decision support system or decision aid.

Some possible technology approaches are:

Artificial neural network. ANN are computational models that mimic the the structure biological neural networks. According to Orr (1999), neural network "is a broad term which includes many diverse models and approaches." She focuses on a feedforward network trained by backpropagation of error. The basic computational neuron unit (program) receives input from other units (programs) or an external data source. Each input has an associated weight. The neuron unit computes a specified function of the weighted sum of its inputs.

Bayesian model. Prior probabilities are combined to determine a likelihood of an event or outcome and hence make a choice among alternatives that have been prespecified.

Business rules. Business rules are more complex heuristics that are often sequenced. Rules prescribe or constrain an automated choice. According to the Business Rules Group (1993) "A business rule is a statement that defines or constrains some aspect of the business. It is intended to assert business structure or to control or influence the behavior of the business. The business rules that concern the projec tare atomic -- that is, they cannot be broken down further."

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Decision table. A table framework that can summarize decision logic. A decision table associates conditions with actions to perform.

Decision tree or classification tree. The tree is dividing the data into subsets based upon attribute variables. Based upon analysis a predictive model is developed that relates observations about an event, item or object to conclusions about a a predicted variable. Classification and Regression Tree (CART) analysis is an umbrella term used in data mining. The CART model can be used in decision automation.

Optimization model. This type of model is used to find the "best" possible choice out of a set of alternatives. The goal is to maximize or minimize an objective function subject to constraints. The mathematical or analytical model describing the factors impacting effectiveness is called the objective function.

Regression model. Regression models are statistical models which describe the variation in one (or more) variable(s) when one or more other variable(s) vary. Inference based on such models is known as regression analysis (cf., Larsen, 2008).

Simple heuristic rules. A rule of thumb is implemented in software that evaluates a quantitative or qualitative value. An example rule of thumb is markup pricing where the retail price is a 75% markup of the purchase price.

Based on Orr (1999) the following questions should be asked prior to identifying decision automation projects and technologies.

- What tasks are machines/software good at doing that humans are not?
- What tasks are humans good at doing that machines/software are not?
- What tasks are both good at?

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- Have the above tasks changed over time? If so how?

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