Glossary

Bayesian Classifier   A classifier that assigns probabilities to the different object labels based on Bayes rule.

Bayesian network   A directed cycling graph that represents the joint distribution of a set of random variables such that each variable is conditionally independent of its non-descendants given its parents in the graph.

Causal Bayesian Network   A directed acyclic graph in which the nodes represent random variables and the arcs causal relations.

Causal reasoning   A procedure for answering causal queries form a causal model.

Classifier   A method or algorithm that assigns labels to objects.

Clique   A completely connected subset of nodes in a graph that is maximal.

Conditional independence   Two variables are conditionally independent given a third variable if they become independent when the third variable is known.

Conditional Probability   Probability of certain event given that another event has occurred.

Conditional Random Field   A random field in which all the variables are globally conditioned on the observations.

Decision Tree   A tree that represents a decision problem and has three types of nodes: decisions, uncertain events and results.

Directed Acyclic Graph   A directed graph that has no directed circuits (a directed circuit is a circuit in which all edges in the sequence follow the directions of the arrows).

D-separation   A graphical criteria for determining if two subsets of variables are conditionally independent given a third subset in a Bayesian network.

Dynamic Bayesian Network   An extension of Bayesian networks to model dynamic processes; it consists of series of time slices, each time slice represents the state of all variables at certain time.

Expectation-Maximization   An statistical technique used for parameter estimation when there are non-observable variables.

Graph   A graphical representation of binary relations between a set of objects.
**Hidden Markov Model**  A Markov chain in which the states are not directly observable.

**Independent variables**  Two random variables are independent if knowing the value of one of them does not affect the probability distribution of the other one.

**Influence Diagram**  A graphical model for solving decision problems. It is an extension of Bayesian networks that incorporates decision and utility nodes.

**Junction Tree**  A tree in which each node corresponds to a subset of variables of a probabilistic graphical model.

**Limited Memory Influence Diagram**  An influence diagram in which the variables known when making a decision are not necessarily remembered for future decisions.

**Markov Blanket**  A set of variables that make a variable independent of all other variables in a probabilistic graphical model.

**Markov Chain**  A state machine in which the transition between states are non-deterministic and satisfy the Markov property.

**Markov Decision Process**  A graphical model for sequential decision making composed of a finite set of states and actions, in which the states follow the Markov property.

**Markov Network**  A random field represent as an undirected graph that satisfies the locality property—each variable in the field is independent of all other variables given its neighbors in the graph.

**Markov Property**  The probability of the next (future) state is independent of the previous states (past) given the current (present) state.

**Markov Random Field**  Markov network.

**Multidimensional classifier**  A classifier that can assign more than one label to each object.

**Naive Bayes Classifier**  A Bayesian classifier that assumes that all attributes are independent given the class variable.

**Partially Observable Markov Decision Process**  A Markov decision process in which the states are not directly observable.

**Policy**  A function that maps states to actions.

**Probabilistic Graphical Model**  A compact representation of a joint probability distribution of a set of random variables composed by a graph and a set of local probability distributions.

**Probabilistic Inference**  A procedure for calculating the posterior probability of the unknown variables in a probabilistic graphical model given certain evidence (a subset of known or instantiated variables).

**Probability**  A function that assigns a real number to each event (subset of a sample space) and satisfies certain axioms known as the probability axioms.

**Random Field**  A collection of random variables indexed by sites.

**Random Variable**  A mapping form a sample space to real numbers.

**Rational Agent**  An agent that selects its decisions to maximize its expected utility according to its preferences.
**Relational Probabilistic Graphical Models**  An extension of probabilistic graphical models that are more expressive by incorporating some type of relational representation.

**Sample space**  The set of possible outcomes of an experiment.

**Temporal Event Network**  A Bayesian network for modeling dynamic processes in which each node represents the time of occurrence of an event or state change of certain variable.

**Tree**  A connected graph that does not have simple circuits.
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