decision tree

A tree diagram with *probabilities* and *conditional probabilities* on its edges. See figure DCT. The leaf nodes usually contain conclusions. In the figure, they list joint probabilities.

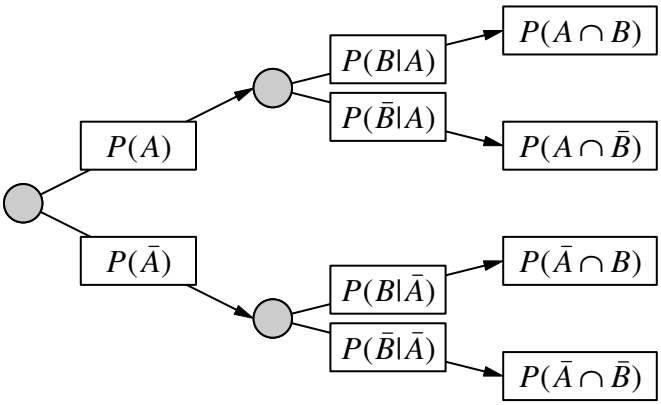

Figure **DCT:** decision tree

The figure shows a decision tree with two variables and hence two levels. The first level, originating from the root node to the left, determines whether or not the *event* A occurs. When the event occurs, the $P(A)$ branch is followed, else the $P(\bar{A})$ branch (→ *complement*) is taken. At the next level A versus $\bar{A}$ is already known, so it lists the probabilities of $P(B|A)$ ("B given A") and $P(\bar{B}|A)$ in the upper branch and $P(B|\bar{A})$ and $P(\bar{B}|\bar{A})$ in the lower one.

At each vertex, the probability of all branches sums up to $p = 1$. For instance, $P(A) + P(\bar{A}) = 1$ and $P(B|A) + P(\bar{B}|A) = 1$. The joint probabilities (like $P(A \cap B)$) are computed by multiplying the probabilities that lead to their respective leaf vertexes (e.g. $P(A \cap B) = P(A) \cdot P(B|A)$.

Decision trees are useful for visualizing conditional probability and *reverse conditional probability*.