Assumption-based reasoning

Assumption-based reasoning – solving problems consisting of uncertain, incomplete or inconsistent information.

Assumptions – to express possible interpretations, unknown risks, uncertain events, unpredictable circumstances, etc.

Task: Given a knowledge base – logic program + assumptions, the problem is then to find **arguments** for hypotheses (queries). Arguments
– are built from the assumptions – can also be considered as explanations for predictions in the future.

Assumptions

usualy variables with a certain set of possible values

argument – a conjunction of the form "A1=value1 AND A2=value2 AND A3=value3 ...".

supports – arguments for which the hypothesis is certainly true

doubts – arguments for which the hypothesis is certainly false

plausibilities – arguments for which the hypothesis is possible (or plausible)

assumption-based reasoning– computing sets of supports, doubts, etc.

Examples

1. "Tomorrow the barbecue only takes place if it is not raining"

   assumption W = tomorrow's weather, $W \in \{rain, no-rain\}$.

   hypothesis B = "the barbecue takes place"

   "W=no-rain" is a support for B, "W=rain" is a doubt of B.

2. f an aeroplane with two engines, each of them with a failure prob. 0.5

   assumptions E1 and E2 with two possible values $\{$faulty,intact$\}$

   p(E1=faulty)=p(E2=faulty)=0.005, p(E1=intact)=p(E2=intact)=0.995.

   We know that the aeroplane only crashes when both engines are faulty at the same time, then

   the hypothesis "the aeroplane crashes" has exactly one support "E1=faulty AND E2=faulty"

   the corresponding degree of support is 0.005*0.005=0.000025.