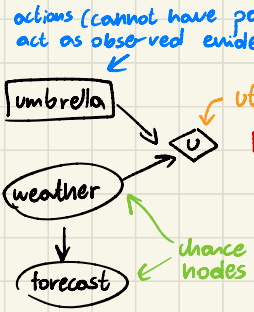
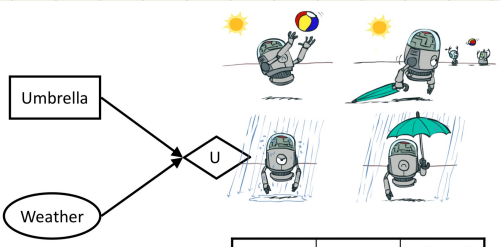


Mew: choose the action which maximises the expected utilits given the evidence

Bayes' nets with nodes for utility and actions

Action selection

- instanciate all evidence
- set action node(s) each possible way
- calculate posterior for all parents of utilits node, given the evidence
- calculate expected utility for each action
- choose maximizing action



W	P(W)
sun	0.7
rain	0.3

A	W	U(A,W)
leave	sun	100
leave	rain	0
take	sun	20
take	rain	70

Umbrella = leave

$$EU(\text{leave}) = \sum_w P(w)\, U(\text{leave}, w) = 0.7 \cdot 100 + 0.3 \cdot 0 = 70$$

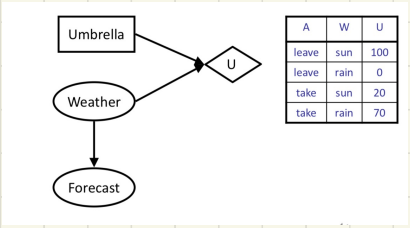
Umbrella = take

$$EU(\text{take}) = \sum_w P(w)\, U(\text{take}, w) = 0.7 \cdot 20 + 0.3 \cdot 70 = 35$$

$$MEU(\emptyset) = \max_a (a) = 70$$

Value of information

idea: compute value of acquiring evidence (can be done directly from decision network)



A	W	U
leave	sun	100
leave	rain	0
take	sun	20
take	rain	70

example:

MEU with no evidence

$$MEU(\emptyset) = \max_a EU(a) = 70$$

MEU if forecast is bad

$$MEU(F=bad) = \max_a EU(a|bad) = 53$$

MEU if forecast is good

$$MEU(F=good) = \max_a EU(a|good) = 95$$

forecast distribution

F	P(F)
good	0.59
bad	0.41

$\Rightarrow$ $0.59 \cdot 95 + 0.41 \cdot 53 - 70 = 7.8$

$$VPI(E'|e) = \left(\sum_{e'} P(e'|e) MEU(e,e')\right) - MEU(e)$$