Propositional logic
Wednesday, October 5, 2016   9:34 AM

Propositional Logic

- Knowledge representation language in which a possible world is represented by a number of propositions that are true or false

- Primitives:
  - atoms ————— symbols P : "It is sunny"
                           Q : "It is raining"
- → • ∧, ∨, →, ¬, ↔,
- → • TRUE, FALSE
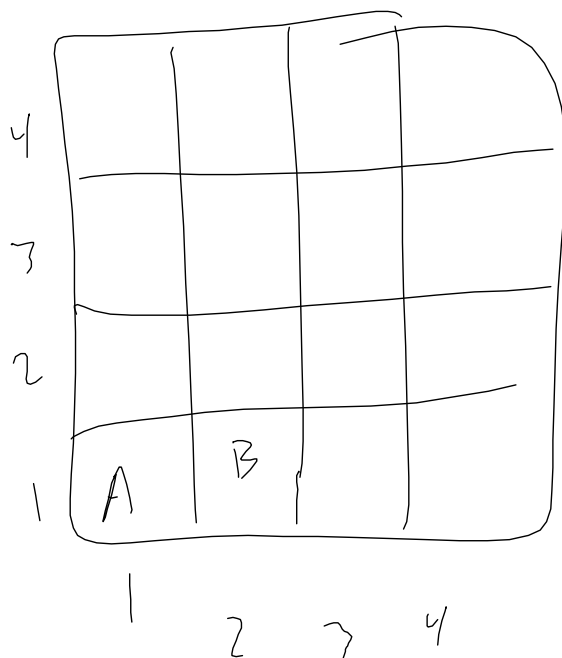- ↪ • ( )

- Formulae $Q \rightarrow \neg P$ It is never the case that it is sunny when raining

- Agent sense atoms and infers the truth of other atoms that are not directly observable

- Query: Am I in a world in which P is true, given that I have observed Q?

Proof   Resolution Algorithm

P_{11} : Pit in (1,1)

P_{12} :

P_{21} :

P_{13} :

B_{11} : breeze at (1,1)

B_{21} :

$\vdots$

W_{11} : wumpus at (1,1)

W_{12} : ...

sensed

Observation:
$\neg B_{11}$
$\neg W_{11}$
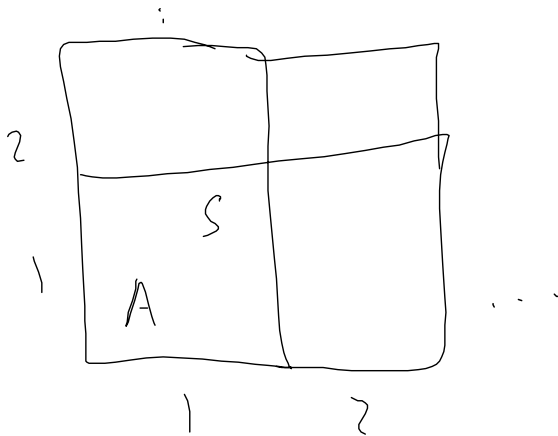$\neg P_{11}$
B_{21}

In the K.B.

"A square is breezy iff there is a pit in an adjacent cell"
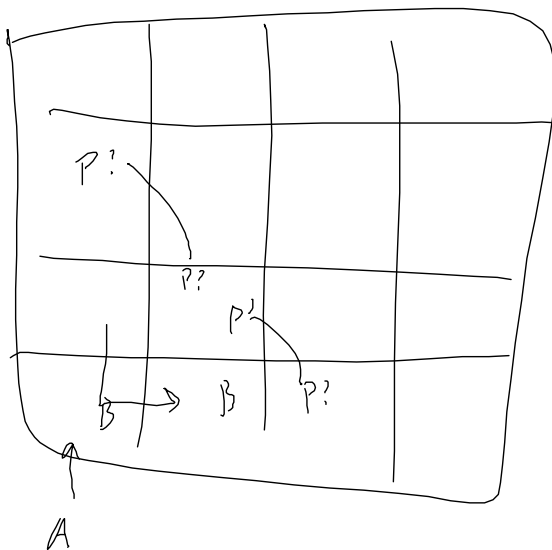
"B_{21} is breezy iff a pit in (3,1) or (2,2) or (1,1)"

$B_{21} \longleftrightarrow P_{31} \vee P_{11} \vee P_{22}$

"B_{11} is breezy ..."

Query "Is $(3,1)$ safe" $S_{31} \rightarrow \neg P_{31} \wedge \neg W_{31}$

Shoot Right
"Coercing the environment"

Can't handle this
situation w/
probabilistic reasoning.

Can we add probability to logic?

Shoot Arrow $\xrightarrow{0.3} \neg W$

Sprinkler $\xrightarrow{0.99}$ wet grass

Wetgrass $\xrightarrow{0.7}$ Rain

Sprinkler $\xrightarrow{0.693}$ Rain