

# Uncertainty

## Chapter 13

# Uncertainty

Let action  $A_t$  = leave for airport  $t$  minutes before flight  
Will  $A_t$  get me there on time?

Problems:

1. partial observability (road state, other drivers' plans, noisy sensors)
2. uncertainty in action outcomes (flat tire, etc.)
3. immense complexity of modeling and predicting traffic

Hence a purely logical approach either

1. risks falsehood: " $A_{25}$  will get me there on time", or
2. leads to conclusions that are too weak for decision making:

" $A_{25}$  will get me there on time if there's no accident on the bridge and it doesn't rain and my tires remain intact etc etc."

( $A_{1440}$  might reasonably be said to get me there on time but I'd have to stay overnight in the airport ...)

# Probability to the Rescue

- Probability
  - Model agent's degree of **belief**, given the available evidence.
  - $A_{25}$  will get me there on time with probability 0.04

Probability in AI models our **ignorance**, not the true state of the world.

The statement “With probability 0.7 I have a cavity” means: I either have a cavity or not, but I don’t have all the necessary information to know this for sure.