Introduction

- Probabilistic reasoning is a fundamental concept in AI that deals with uncertainty and incomplete information.
- It’s used in various AI applications, such as medical diagnosis, weather forecasting, and spam filtering.

Uncertainty in AI

- Uncertainty arises in AI due to several factors, including noisy sensor readings, incomplete knowledge, and nondeterministic environments.
- Probability theory provides a framework for representing and reasoning with uncertainty.

Probability Basics

- Probability is a measure of the likelihood of an event occurring.
- Key concepts include:
    - Prior probability: The initial probability of an event.
    - Conditional probability: The probability of an event given some evidence.
    - Joint probability: The probability of two or more events occurring together.

Probabilistic Inference

- Probabilistic inference is the process of deriving new knowledge from uncertain information using probability theory.
- Various techniques exist for probabilistic inference, including:
    - Bayes’ Theorem (covered in the next lecture)
    - Bayesian networks

- Markov models

Applications of Probabilistic Reasoning

- Probabilistic reasoning is used in various AI applications:
  - Medical diagnosis
  - Weather forecasting
  - Spam filtering
  - Machine learning

Conclusion

- Probabilistic reasoning is a powerful tool for dealing with uncertainty in AI.
- It allows AI systems to make informed decisions even when faced with incomplete information.

References:

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- Nilsson, N. J. Artificial Intelligence: A New Synthesis. Morgan Kaufmann.

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