

# Section Handout: Bayes Nets

CS 188

March 13, 2006

## 1 The structure of Bayes nets

Bayes nets are a graphical way of showing independence among random variables. They also tell you how to decompose a large probability table into smaller ones (called factorization).

### 1.1 Important skills to master

1. Look at a graph and state the factorization (rewriting the big joint probability table).
2. Determine whether two variables are independent, depending on whether you know some other variables.
3. Figure out correct graph structure for a problem.
4. Compute probabilities of particular random variables in a Bayes net.

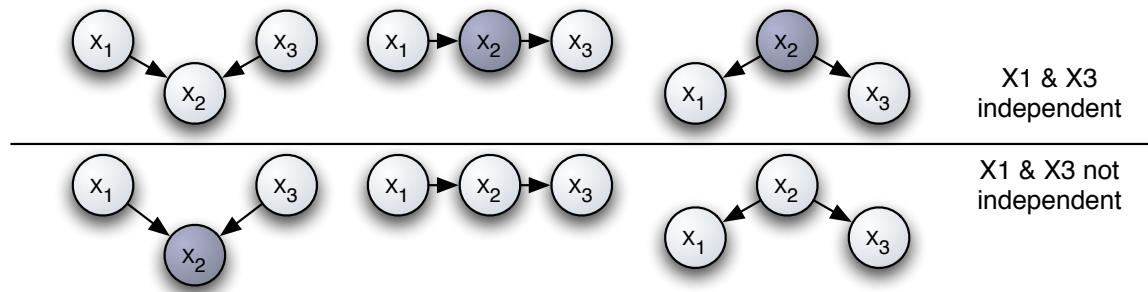


Figure 1: Determining independence in a Bayes net

## 2 Which descriptions go with which networks below?

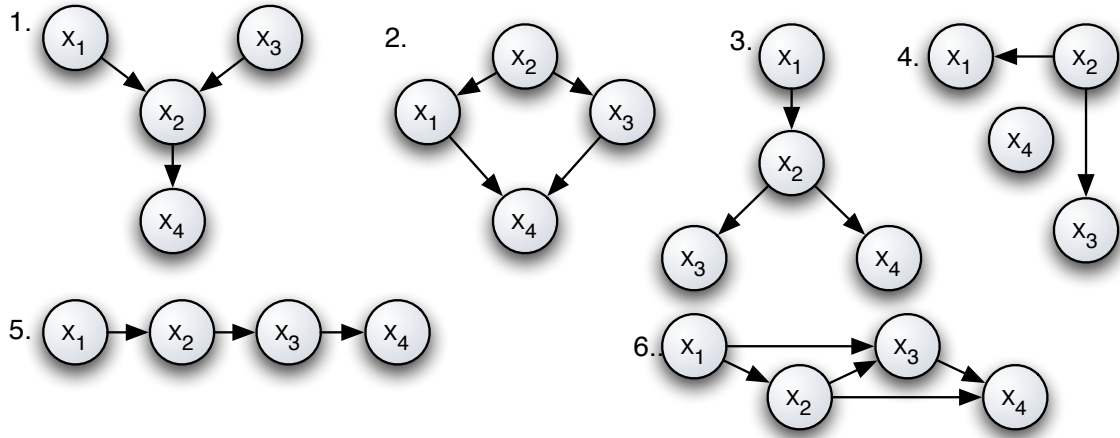


Figure 2: Some four-node Bayes net structures

**Buying a car** Two kinds of people tend to buy the Toyota Prius: yuppies and environmentalists. People often become environmentalists because of the caring influence of hippie parents. People often become yuppies by rebelling against their hippie parents.

**Getting Dressed** A protesting Berkeley student wears up to four pieces of clothing: a shirt, a pair of pants, and two Birkenstocks. The shirt is worn 90% of the time. Then, for each subsequent piece of clothing, it goes on 50% of the time if the last one was put on and 90% of the time if the last piece was left off.

**Candy Factory** (adopted from '02 final) Candies from Surprise Inc. are strawberry or anchovy flavored (70% / 30%). They are either square or round and have different wrappers: 80% of strawberry are round and 80% have red wrappers. 90% of anchovy are square and 90% have brown wrappers. Candies are placed randomly into pink or black boxes without regard to their characteristics.