Assignment 2: Probabilistic Graphical Models

Machine Learning

Fall 2019

Learning Objectives

- TODO

1 Motivation and Context

- We've learned how probabilities can be used to describe uncertainty in the world
- We've learned how Bayes rule can be used to reason about hypotheses, models, or other things that cannot be directly observed.

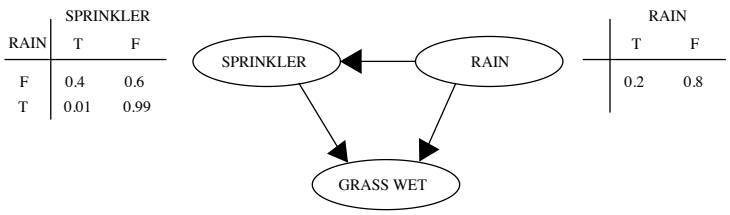
2 Generative versus Discriminative Models

We should make more concrete the distinction between these two things. p(y|x) versus p(x|y)p(y)

3 Conditional Independence of Random Variables

4 Bayesian Networks

4.1 Simple Example



RAIN	SPRINKLER T	SPRINKLER F
F	0.4	0.6
T	0.01	0.99

RAIN T	RAIN F
0.2	0.8

SPRINKLER	RAIN	GRASS WET T	GRASS WET F
F	F	0.0	1.0
F	T	0.8	0.2
T	F	0.9	0.1
T	T	0.99	0.01

- Link to external resources
- D-separation

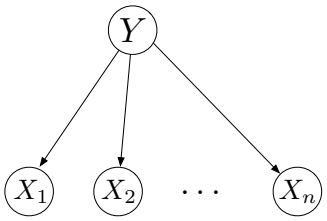
External Resource(s)

- Read d-Separation without Tears.
- Pieter Abbeel Lecture (not sure how clear this is)
- This one seems pretty good

- State the main conditions
- Do some exercises to determine when things are conditionally independent

Exercise 1

The alarm problem (need to find this one from CSE250A) (This has the description of the same network). More detail on the same network.



5 Naïve Bayes

6 Probabilistic frameworks for Fairness in ML

7 Compas Model of Recidivism