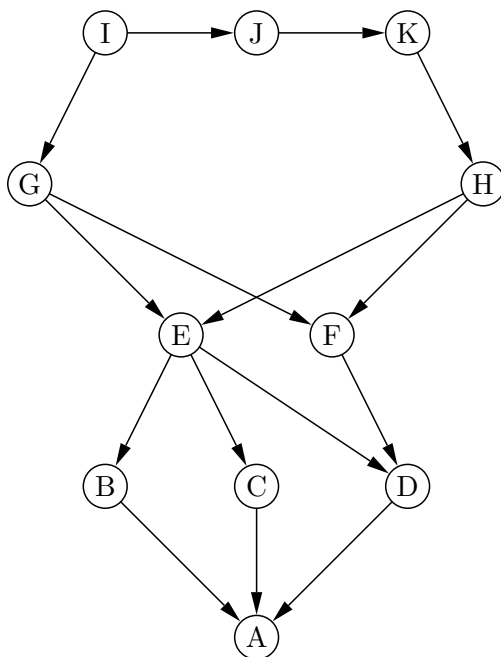


Homework 4 - Graphical Models

Machine Learning - Spring 2010 - Prof. Rosenberg

Due April 16 at 2:00pm

Problem 1) (30 pts.) Draw a Junction Tree based on the following graphical model. Show the steps of moralization, triangulation and construction of the junction tree.



Problem 2) (45 pts.) Hidden Markov Models.

Assume a hidden markov model with discrete states and observations. There are 3 possible states $\{X, Y, Z\}$ and 4 possible observations $\{A, B, C, D\}$.

Using the given α , η and π tables and 6 observations, determine the marginal likelihoods for each state $q_0, q_1, q_2, q_3, q_4, q_5$, given the following observations: A, B, A, B, D, C (Note: observations are numbered 0 through 5). Show your work.

X	Y	Z
.5	.3	.2

Table 1: π Table

		q_{t+1}		
		X	Y	Z
q_t	X	.5	.3	.2
	Y	.1	.8	.1
	Z	.3	.3	.4

Table 2: α Table

		x_t			
		A	B	C	D
q_t	X	.3	.4	.1	.2
	Y	.1	.2	0	.7
	Z	.1	.1	.4	.4

Table 3: η Table