

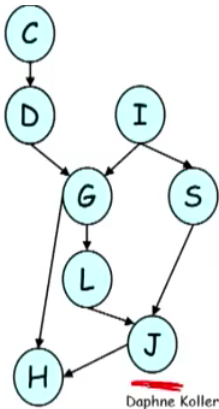
Variable Elimination in Chains

Elimination in Chains



$$\begin{aligned}
 P(E) &\propto \sum_D \sum_C \sum_B \sum_A \tilde{P}(A, B, C, D, E) \\
 &= \sum_D \sum_C \sum_B \sum_A \phi_1(A, B) \phi_2(B, C) \phi_3(C, D) \phi_4(D, E) \\
 &= \sum_D \sum_C \sum_B \phi_2(B, C) \phi_3(C, D) \phi_4(D, E) \underbrace{\sum_A \phi_1(A, B)}_{\tau_1(B)} \\
 &= \sum_D \sum_C \sum_B \phi_2(B, C) \phi_3(C, D) \phi_4(D, E) \tau_1(B) \\
 &= \sum_D \sum_C \phi_3(C, D) \phi_4(D, E) \left(\sum_B \phi_2(B, C) \tau_1(B) \right) \\
 &= \sum_D \sum_C \phi_3(C, D) \phi_4(D, E) \underbrace{\left(\sum_B \phi_2(B, C) \tau_1(B) \right)}_{\tau_2(C)}
 \end{aligned}$$

$$P(E) \approx \tau_4(E)$$



Daphne Koller

Eliminate C, D, I, H, G, S, L
 $\sum \phi_j(j, L, S) \phi(L, G) \phi(G, I) \phi(I, D) \phi(H, G, J) \phi_3(I) \phi_0(C, D) \phi(C)$
~~L, S, G, H, I, D, C~~