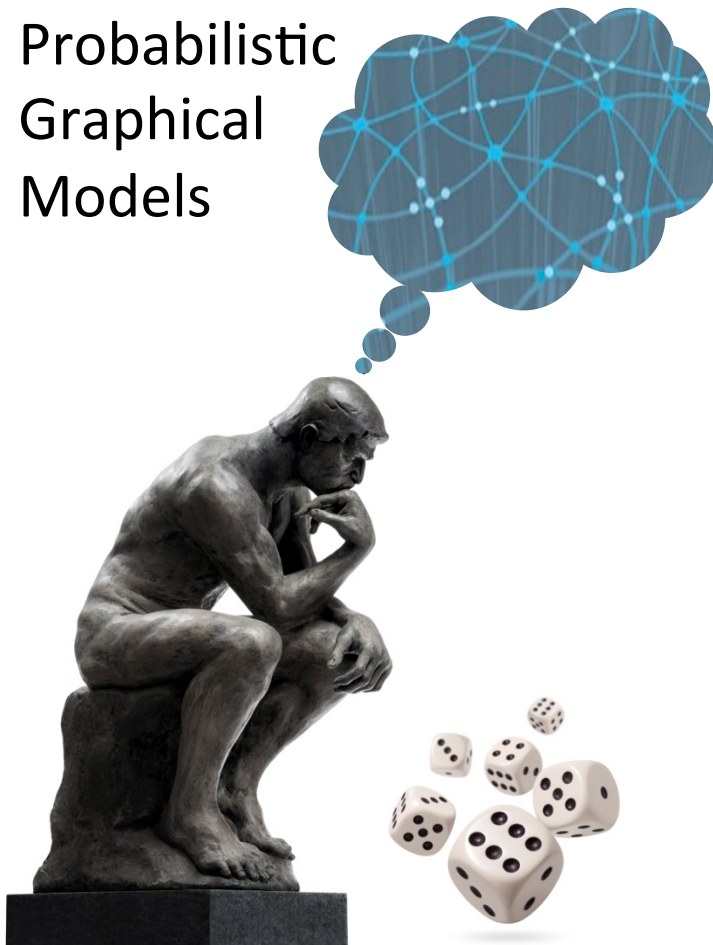


Probabilistic  
Graphical  
Models



Representation

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Local Structure

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局部结构.

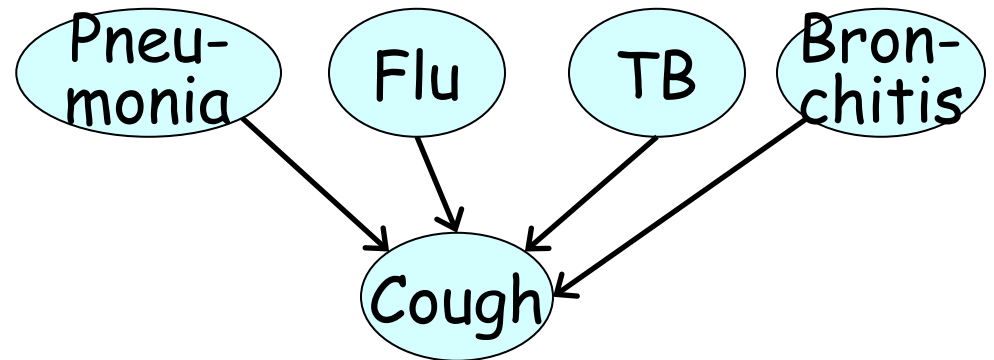
# Overview

# Tabular Representations

$\mathcal{G}$

	$g^1$	$g^2$	$g^3$
$i^0, d^0$	0.3	0.4	0.3
$i^0, d^1$	0.05	0.25	0.7
$i^1, d^0$	0.9	0.08	0.02
$i^1, d^1$	0.5	0.3	0.2

$k$  parents  
 $\mathcal{O}(2^k)$  entries




# General CPD

- CPD  $P(X \mid Y_1, \dots, Y_k)$  specifies distribution over  $X$  for each assignment  $y_1, \dots, y_k$
- Can use any function to specify a factor  $\phi(X, Y_1, \dots, Y_k)$  such that

$$\sum_x \phi(x, y_1, \dots, y_k) = 1 \text{ for all } y_1, \dots, y_k$$

联合分布

# Many Models

- Deterministic CPDs  $D \rightarrow D$
- Tree-structured CPDs 
- Logistic CPDs & generalizations
- Noisy OR / AND
- Linear Gaussians & generalizations

为独立.

# Context-Specific Independence

$$P \models (\underline{X} \perp_c \underline{Y} \mid \underline{Z}, \underline{c})$$

assignment to  $c$

$$\begin{aligned} P(X, Y \mid Z, c) &= P(X \mid Z, c) P(y \mid Z, c) \\ P(X \mid Y, Z, c) &= P(X \mid Z, c) \\ P(Y \mid X, Z, c) &= P(Y \mid Z, c) \end{aligned}$$