STAT 431 — Applied Bayesian Analysis — Course Notes

Summary of Model Graphs

Fall 2022

Model Graphs

A graph has **nodes** (variables) and **edges** (relationships).

A model graph should be a **directed acyclic graph (DAG)**:

- All edges have one-way arrows.
- There are no **cycles**, such as ...

  [Draw graph with cycle ...]

Edges represent "parent/child" relationships:

[Draw relationships ...]

A "founder" node has no parents.

Kinds of nodes:

throughout Markov Chain

- constant (rectangle): do not change in value, have no distribution, usually have no parents
- stochastic (oval): have an assigned distribution
- logical/deterministic (usually oval): computed purely from other nodes, and get their distribution from those nodes only

Kinds of edges:

- stochastic ($\rightarrow$): each parent helps define the assigned distribution of the child
- logical/deterministic ($\Rightarrow$): the parents are used to compute the child (deterministically)

Plates (big rectangles) indicate replication.

They can be nested (one inside another).