SISMID 2022 / Causal Module / Graphs & d-separation (updated)

Breakout Questions - d-separation

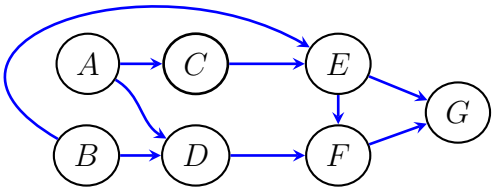

Figure 1: A simple DAG.

1. Consider the DAG shown in Figure 1.

   (a) Find the set of parents of E; find the set of parents of G; find the set of parents of A.

   (b) Find the set of descendants of D. *Hint: recall we define every vertex to be its own descendant.*

   (c) Consider the path $A \rightarrow D \leftarrow B \leftarrow E \leftarrow G$. For each non-endpoint vertex determine whether it is a collider or a non-collider.

   (d) Find a path between A and G on which F is a collider.

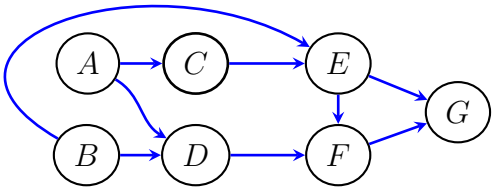

Figure 2: The same simple DAG again.

2. Again consider the same DAG in Figure 2. For each of the following questions, either give a path d-connecting given the conditioning set or explain why there is no d-connecting path.

   (a) Are A and G d-separated given $\{E\}$?

   (b) Are A and G d-separated given $\{E, F\}$?

   (c) Are A and B d-separated given $\{\}$ (the emptyset)?

   (d) Are A and B d-separated given $\{C, E, F\}$?

   (e) For the d-separations that you found in (a),(b),(c),(d) translate these into conditional independence statements: