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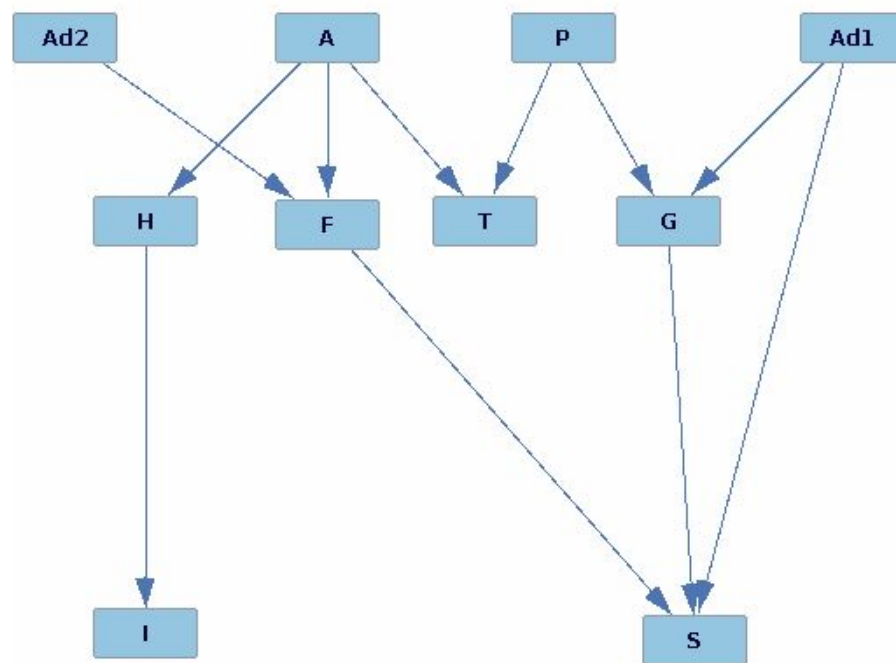
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# Report

## Bayesian Network Modeling

1. Take a screenshot of a **topologically sorted** arrangement of the nodes in the resulting network structure for your report (seeing nodes in their parent-child topologies is useful from a causal perspective).



- a.
2. Without having to look up the PC Structure Learning algorithm, examine and then explain why the system was able to orient the direction of some edges, but not others.
    - a. Given enough samples, the system can effectively work on determining dependence by removing rows of data and columns of variables. But there is a limit to this, as certain parameters may have obvious impact (dependence) on others. However, some may be less certain, and it is uncertain on which way the

dependence flows. For example, some parameter  $X$  may be independent of  $Y$  given  $Z$ , but the system may not be able to determine if it is independent because  $Z$  is the ancestor of both  $X$  and  $Y$ , or if it's independent because  $X$  and  $Z$  are ancestors of  $Y$  and  $X$  is an ancestor of  $Z$ .

3. **Repeat Step 3 (in the same Tetrad Session / Document, but using a new Pipeline) above using only the first 10,000 samples in the dataset**, then answer the following:

Is your model the same or not? Explain why it is the same or different.

- a. The model is different. When only using the first 10,000 samples in the data set the ad music choice became independent of the network. However in the first model, the ad music choice was a parent of whether there was a perceived threat of foreign invasion. This must be because the first 10,000 samples in the data set did not establish the relationship between music choice and perceived threat, but the entire data set proved the relation.

## Decision Network Programming

1. Using your Ad-Engine, decide and explain your answer to the following:
  - If Facebook charges you \$2 per-person to learn their stance on Gun control, if available, is the juice worth the squeeze?
    - i. Yes the juice is worth the squeeze to learn the stance on gun control. The VPI of learning this information (in dollars) is \$20.77. The \$2 sale of this data is a good deal and should be purchased.
  - If you \*knew\* someone to be in support of Gun Control ( $G=1$ ), and Google is offering \$0.25 per person to tell you their political affiliation, is the juice worth the squeeze?
    - i. No, the juice is not worth the squeeze to learn a person's political affiliation if we know they support gun control. The VPI of this is 0, so learning political affiliation even at \$0.25, it is a loss.
2. Finally (scratching some flag requirement for this course, probably): In a small paragraph, argue for whether or not you believe this practice should be considered ethical, especially if each individual's characteristics were collected via social media. Compare this practice to targeted political advertising wherein ads are curated based on perceived in-group. If your group does not have a consensus on this question, log your discussion for this problem instead.
  - This practice should be considered ethical. People sign up for social media for free, and these companies need a way to generate profit in order to keep investors happy, and create new features for their users. It's a two way street;

when people use social media applications for free they should know that free means that they are paying with their data. Convenience and entertainment is not cheap. While it may seem that this practice is similar to targeted political advertising, the key difference between the two is the ability to reverse the decision. A political election is much harder to revert because if people are swayed by ads and it determines the election, they have to wait until the next election to revert the decision. By then it would be too late because that person would have already affected laws. Additionally, it is harder to vote an incumbent out once they have been voted in, so this adds to the layer of difficulty in reverting that decision. However, in the case of ads, if you don't like the product, just return it. Or sell it. Or repurpose it. There is minimal damage done if someone is swayed into buying a product.