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Quiz 5

1. Joint distribution P(E,G,V,N,W,C) = P(E)*P(G)*P(V|E,G)*P(N|V)*P(W|V)*P(C|N,W)
2. The three types of reasoning discussed in the lecture are:
    a. Causal reasoning: Causal reasoning refers to the reasoning about the effect, when the cause is given, like in the example in the slides, the probability of a good letter, *given* the cause that the student is less intelligent, causes the *effect* of lowering the probability of getting a good letter. Taking the information about a cause and reasoning about the effect is causal reasoning. It is not necessary, and in pretty much all practical cases, there will be more than one cause for an effect, like different difficulties and intelligence *causing* effects in the probability of getting a good letter.
    b. Evidential reasoning: Evidential reasoning is essentially the opposite of Causal reasoning, in that it is reasoning about the causes of a particular effect, given this effect. Using the example in the slides, the information about the grade of a student can be used to reason about the difficulty of the course and the intelligence of the student.
    c. Intercausal reasoning: Intercausal reasoning is reasoning between mutual causes causing a single common effect. As in the example, given the effect of the grade of the student, the intelligence of the student can be reasoned about using information about another cause difficulty and the effect grade.
3. In practice, there can be scenarios, and in most cases this probably will be true that there are many different dendrograms that have roughly equal likelihoods. If there is such a case in which there are more than one dendrograms with likelihoods very similar to that of the highest likelihood one, it would be wasteful to simply focus on the one that happens to have the highest numerical likelihood. These dendrograms may be similar in structure or could be incredibly varied relative to each other, and this is a wealth of information that could reveal so much more about the dataset. This is why it is advantageous to sample the distribution of the dendrograms.