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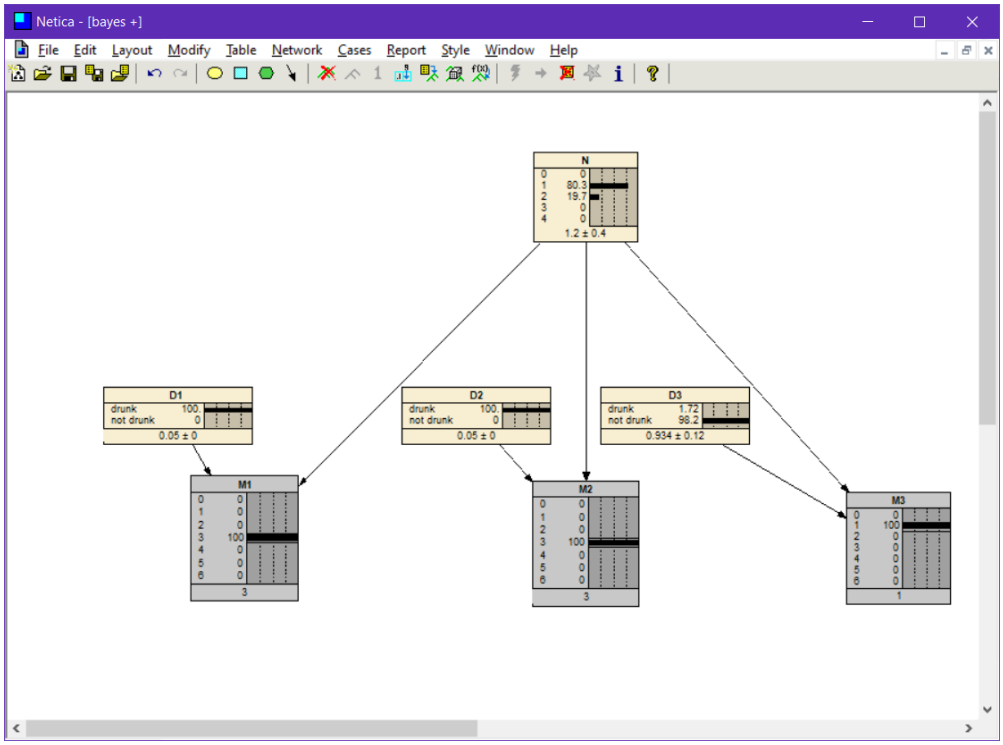
Task 6 – Belief Network
COSC 4368
April 29, 2021

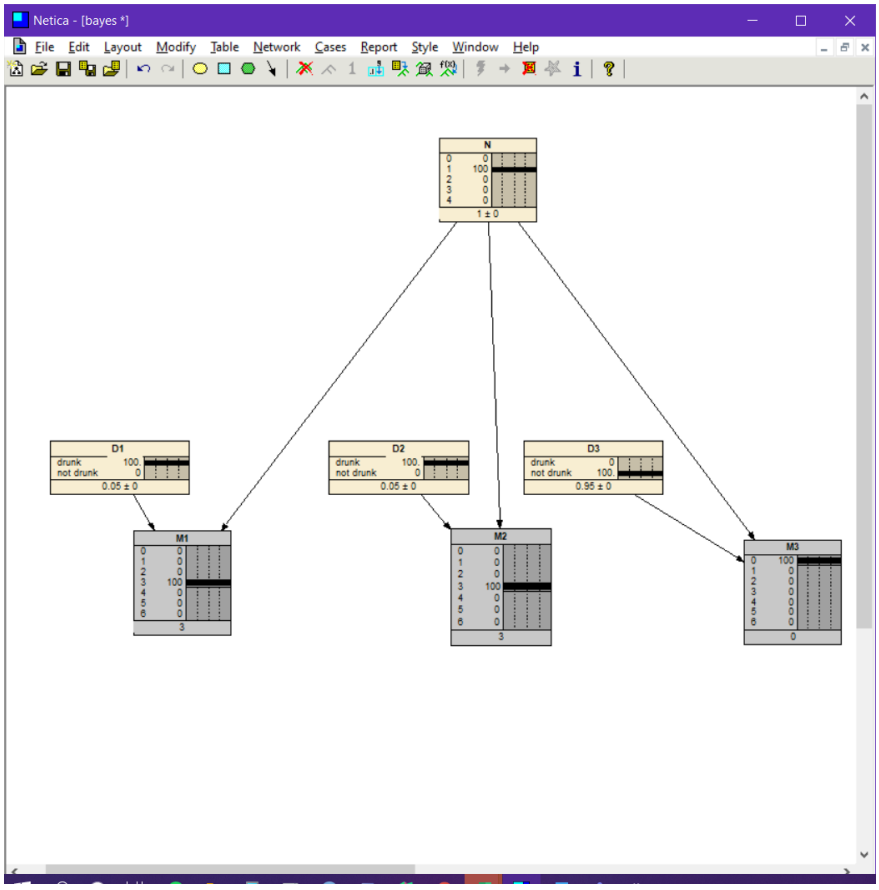
Please see the .neta file for the tables from the N, D_i, M_i's.

1. M1=3 M2=3 M3=1



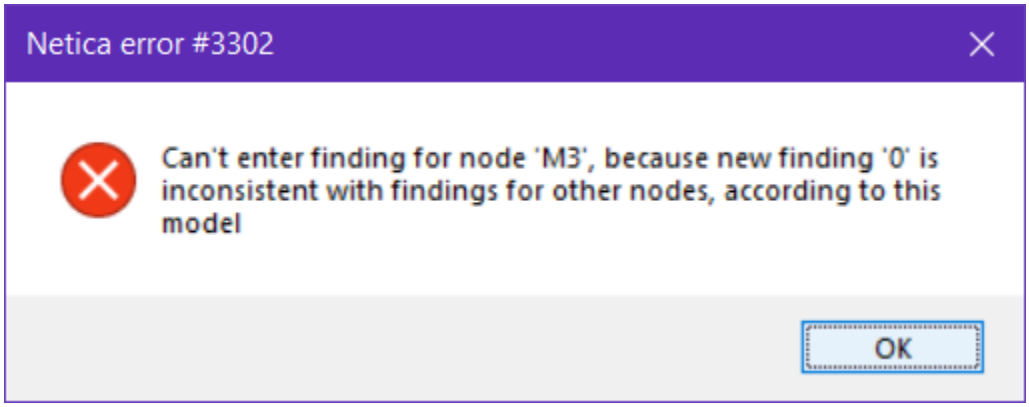
These finding are just what the likeliness of stars in the sky would be given that the third astronomer's findings is 1 star and theyre likely not durnk; the second astronomer's findings of 3 stars and that they are drunk, meaning they are likely to overcount; and the first astronomer's finding, given that they too are drunk, and had the same measurement as the second astronomer—then it emphasizes the likeliness of there having been at least one star in the sky since the astronomer never overcounts when theyre sober (M3) and overcounts by at maximum of 2 (M1 and M3) when they drunk.

2. M1=3 M2=3 M3=0



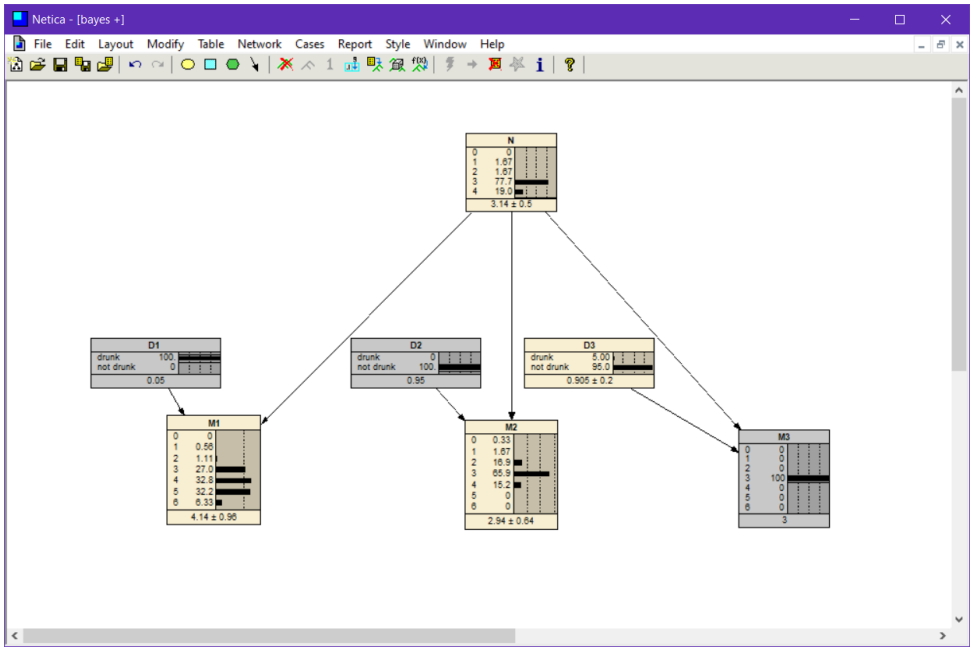
Given that an astronomer reported no stars (M3), and two other astronomers gave the same measurements (M1 and M2) of 3 stars, begs the question of who is likely drunk and who isn't. Since 20% of the time an astronomer naturally undercounts by one star, and 80% of the time they do not undercount, then likely—the sky had one star at least because we cannot rule out that possibility. However the astronomers more likely overcount if they're drunk. In this case, if there is at least one star (N= 1) in the sky, then at most the astronomer can overcount is 3, therefore we deduce from the measurement findings that the first and second astronomers are drunk (D1 and D2) and the third astronomer (D3) is not drunk.

3. N=2, M2=1, M3=0



This node shows an error. Inconsistency in the model showed that there were 2 stars (N) in the sky, and the D3 was not drunk, therefore the given values of M3, that the astronomer's measurement of, 0 causes this raise from Netica. Because M2, another astronomer's, measurement was 1—so there must be at least the case for there to be seen at least a star.

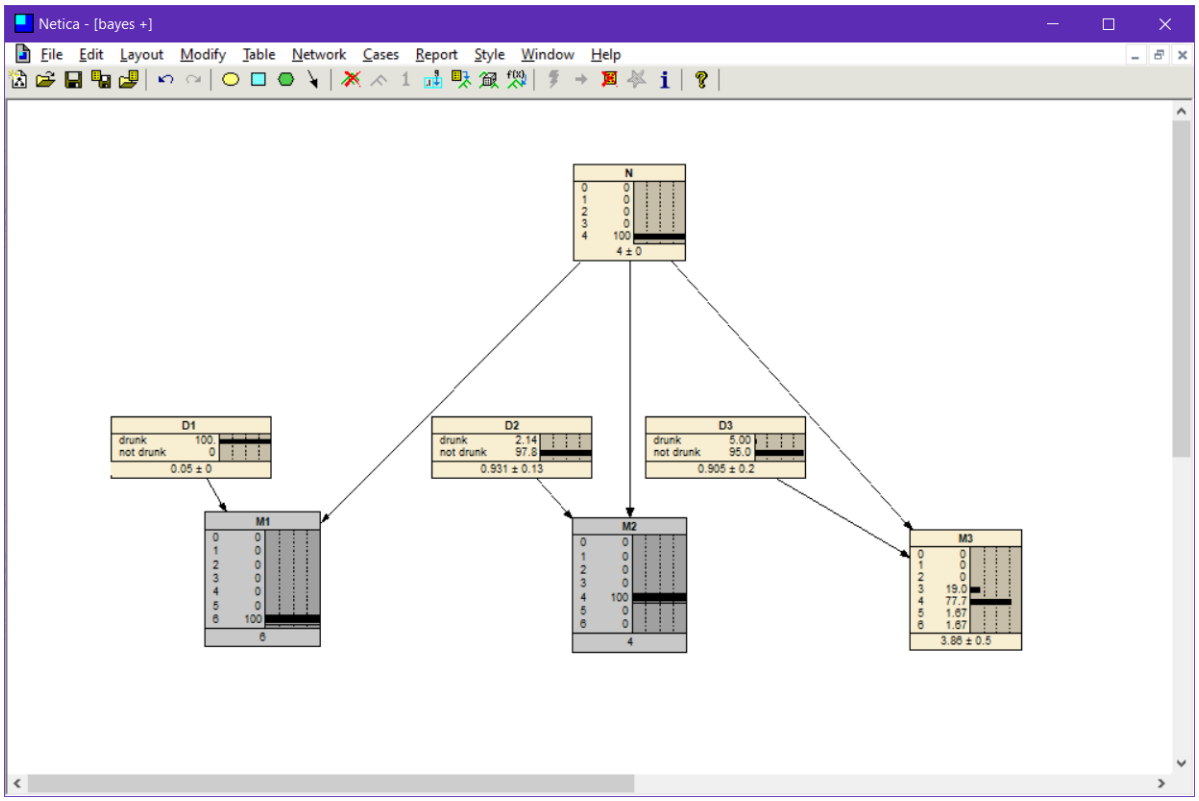
4. D1=1 D2=0 M3=3



We see in this that the astronomer 1 and 2's measurements can be explained that based on M3 being 3, with the assumption that the astronomer (D3) is likely not drunk, that there are at least 3 (N) stars in the sky. And that now the probability of measurements with M1 and M2 vary above or about 3 depending on if the astronomers (D1 and D2) are drunk or not, respectively. The measurement possibilities for D2 show a distribution that is heavily

skewed to the upper range values, but most likely 3 since that astronomer (D2) is not drunk. However (D1) the first astronomer is for sure drunk which

5. M1=6 M2=4 D1=1



This test case confirms our model's assumptions. Starting with M1=6, affirms that the astronomer (D1) is drunk, because in our hypothetical example there are only allowed to be a maximum of 4 stars at a time in the observed night sky. Our findings also affirm our statement that if an astronomer is drunk, they at most count 2 more stars than there are in the sky. Additionally, the second astronomer's measurement of 4 stars (M2) expresses that they are likely not drunk given (D1) drunk astronomer's measurements (M1) and over counted and the astronomer *at least* never undercounts. This leads to also another scenario M3, where under no influence, still has a probability— about 20%, but with 1% point more likely leans towards the astronomer's measurement (M3) of 4 stars.