*Christoph F. Eick*

COSC 4368: Fundamentals of Artificial Intelligence Spring 2022

Problem Set3 (Individual Tasks)

Second Draft

Deadlines: Task 5: Saturday, April 30, Task 6: Thursday, May 5

Last updated: April 22, 1p

5. Ethical Problems of AI (25 points) Steve

Write a short essay of 480-600 words, focusing on the Ethics, Governance and Societal Aspects of Artificial Intelligence Systems; you have three topics to choose from:

1. How to ensure that AI systems follow our principles when making decisions[[1]](#footnote-1)?

2. What can be done to alleviate the negative impact of fake news on our society?

3. What should be done to distribute the wealth created by AI Innovation fairly?



Fig. 1: AI & Ethics

Be aware of the fact that plagiarism will not be tolerated in this course; however, this does not mean that you are not allowed to use material on the internet or taken from the scientific literature when writing your essay; you just need to cite the material you used and you will need to use quotations, if you use (parts of) sentences “unchanged” from other publications in your essay!

15. Using a Belief Network Tool (25 points) Nathan



Fig. 2: Four Astronomers Looking at the Sky

Assume we have 4 astronomers in different parts of the world who make measurements M1, M2, M3 and M4 of the number[[2]](#footnote-2) of stars N in some region of the sky. Normally[[3]](#footnote-3), there is a probability of 0.05 that the astronomer counts a single star twice (overcounts by one star; you can assume that the four astronomers never undercount; moreover, if there is no star visible (N=0) the astronomer never overcounts). Moreover, there is a 10% probability (P(Fi=1)=0.1 for i=1,2,3,4) that a telescope is out of focus (represented using random variables F1, F2, F3, and F4), in which the astronomer undercounts by 3 or more stars (e.g. if N is 4 and the astronomer’s telescope is out of focus, the astronomer will count 1 or 0 stars; if N, on the other hand, is 2 an astronomer with an out of focus telescope will count 0 stars). You can assume if information is missing that each case has the same probability. Design a belief network, and compute the probability of the other variables assuming the following pieces of evidence are given (feel free to use *Netica (*<http://www.norsys.com/download.html> ) or any another belief network tool to compute your answer[[4]](#footnote-4)!):

1. M1=5 M2=4 M3=1
2. M1=4 M2=4 M3=0, M4=1
3. N=4, M2=1, M3=0
4. M1=0 M2=5 M3=5 M4=4
5. N=4 F1=0 F2=0 F3=1 F4=1
6. N=5
7. No evidence

Submit the complete Belief Network you created—including all its probability tables—, and the findings you obtained for the seven cases listed above!

1. E.g. they do not discriminate and follow other principles, such as saving lives is more important than avoiding property damage. [↑](#footnote-ref-1)
2. You can assume that N is limited to 5—but the astronomer do not know that: M1, M2, M3 and M4 are therefore limited to values 0 through 6 [↑](#footnote-ref-2)
3. Assuming the astronomer’s telescope is not out of focus [↑](#footnote-ref-3)
4. Including the answer ‘inconsistent’ in the case that the evidence is inconsistent, e.g, the evidence N=1 M1=3 is inconsistent—as it is ‘impossible’, because astronomer1 never overcounts by more than 1 star! [↑](#footnote-ref-4)