Homework 4

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Is Computer Science Science?

Introduction

Today we will discuss the topic of computer science and whether or not it can actually be considered science. This debate has spawned from the fact that computer science meets every criterion for being a science, but it has a self-inflicted credibility problem [1]. Now, what does it mean that it has a credibility problem? Well, in the 1960s computer scientists claimed that they could create AI systems that could potentially rival human experts. In the 1980s they further claimed that libraries, universities, paper and so forth would all be rendered obsolete due to new and secure software systems [1]. However none of these things have happened, so when it was claimed (as of present day) that computer scientists can e.g. alter DNA design [1, 2] and bionics, why should people believe them?

Questions

1. *Regarding the introduction above, do you agree or disagree with what was stated? Is the credibility issue alone as bad an issue that it renders computer science not science? What do you think?*

2. *As technology is manmade [1] and not included in nature, is it really science or is it something else?*

Argumentation

Argument 1) Computer science could simply be considered technology; not science. This is based around the fact that science deals with fundamental laws of nature [1].

Counter Argument 1) Computer science is the science of information processes and how they proceed to interact with the world. Many of these are natural information processes whereas computers are simply tools to implement and study them (the technology is a scientific tool in this sense).

Argument 2) Computer science has a self-inflicted credibility problem because of many claims that have not been met in history [1].

Counter Argument 2) While this might be true and there have been a lot of claims during the years. Many of them are simply exaggerated bold claims for their corresponding times and many of these things have actually turned out true (just not in that particular specified time frame e.g. 1960s and the creation of AI systems capable of replacing human experts). Bold claims should not render something as non scientific.

Argument 3) Computer science is just a branch of mathematics determined to find algorithms and architectures [4].

Counter Argument 3) While it might be true that computer science has its basis in logic and mathematics it does actually follow patterns of classical scientific fields combined with meeting every criterion for being a science, thus rendering it a science [1, 3].

Can AI algorithms be allowed to make sensitive decisions involving humans?

Introduction

As software development gets bigger and bigger and even AI algorithms get formed there are bound to be some technical imbalances along the way. However, one of these imbalances is worse than the others. The development of AI algorithms can spawn several types of biases, these range from racial- to gender biases and so forth [6]. Furthermore they can be very well embedded into the created systems. Today we will discuss the topic and try to determine whether or not these biases render the AI algorithms useless or not when it comes to making sensitive decisions with humans.

Questions

1. *While it might be true that algorithms suffer from these biases there are people who do too. Do you think that AI might be able to achieve a higher degree of fairness due to this fact?*

2. *Would you trust an AI algorithm more than a real doctor (who could potentially suffer from biases) to perform surgery on you?*

Argumentation (for AI systems reaching higher degree of fairness than humans)

Argument 1) AI systems being biased in a certain way is commonly caused by a technical failure in the designed system. It does not have a personal quarrel with the person in front of it, it simply does not recognize the person (in some cases) as the developers can have forgotten to account (or just been lazy) for any visual differences in different people [5]. People on the other hand can be extremely biased causing potential major unfairness [7].

Counter Argument 1) It could be argued that the developers themselves suffer from biases and choose not to take certain people into consideration while developing the algorithm in question. This is not the same as being lazy, they simply do not include certain people in the training sets.

Argument 2) These AI systems can be used to identify criminals without having to interact with them at all. This way, the police do not need to face potentially dangerous people unnecessarily. Furthermore, less people will be falsely accused of crimes.

Counter Argument 2) While it might be true that such algorithms could be used to identify criminals without interaction they can also pick the wrong person [5]. This is not something to play around with as it could lead to extreme accusations and even wanted criminals getting away. This could potentially ruin the fairness provided by the addition of such an AI system.

Argument 3) This should not be trusted to 100% as if you are a person who differs a bit from the training set used to form the AI system your cancer could go undetected. Therefore it is better to turn to a "real" doctor instead as they will not treat you differently just because you are not part of a certain set of people.

Counter Argument 3) While it might be true that computer science has its basis in logic and mathematics it does actually follow patterns of classical scientific fields combined with meeting every criterion for being a science, thus rendering it a science [1, 3].

References

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