Ethical and Legal Implications of Learning Models Applied to Medicine

Introduction

The rapid evolution of artificial intelligence algorithms and technologies has led to different scientific fields and practices attempting to find ways that computing can optimize and even evolve their work or research. In particular, Machine Learning is a technique that has been proven to be effective and helpful in many different fields. The core idea is that these algorithms can find underlying patterns in a given set of data, effectively "learning" how this data behaves, therefore allowing them to replicate this behavior.

In our case of study about lung cancer detection, artificial intelligence is used essentially as a system for improving the decision-making process undertaken by human operators. A model can be trained on medical data and "learn" to predict, for example, how likely a certain lung node is to be malignant. Using modern hardware and algorithms, evidence suggests that these models can assist on the diagnosis of cancer in a non-invasive approach. Following this brief explanation, we present several ethical and legal topics of discussion around the use of these AI systems in healthcare.

Social Inequalities

Since these learning systems have the goal of capturing underlying patterns in data, they might capture not only the desired functions for their learning tasks, but also other patterns that might exist in the data that are not relevant for the learning task but that exist for separate reasons. This means that the models often learn and reinforce social values and biases based on race or gender, for example. In healthcare, this is no different.

Responsibility

Responsibility in AI systems is a very debated topic. In a clinical setting, there are established rules and guidelines to determine responsibility, both legally and morally. In the usage of an AI system, there are extra steps both in its usage and in the consideration of its outcome for decision making that need to be considered. How is the data inputted to the machine and can we ensure that it is inputted in the expected form and how can that affect the output? Can a medical professional trust the decision made by the system? How much should the system impact the final decision? And perhaps the most important yet unanswered question of all, who is responsible for failure should the system fail? The fact is that these systems are often "black boxes", meaning that it is difficult to determine the steps it took to reach a certain decision. For this reason, we see a shift towards the need for models that not only perform very well but are interpretable for the human agents.

Privacy

The question of data or, more particularly, privacy is also very relevant. We have previously discussed that to achieve very good performance, a learning algorithm depends on large amounts of good quality data. This means that a model which accurately predicts lung cancer might need to, for example, use thousands of radiomic images and medical histories from patients as data. This raises questions of privacy and possible misuse of personal and sensitive data. There of course need to be regulations in place to ensure data protection and control how this data is used, who provides it, where it is stored and many other such issues. This problem has been given a lot of attention, due to its possible severeness, therefore creating the current solution that we all know as the General Data Protection Regulation (GDPR).

Conclusion

The modern world is full of data everywhere, generating more and more each second. All this information should always be treated sensibly and in a safe manner, as failing to do so might have severe consequences. These can range from a patient's address being known by your doctor or nurse, to someone being misdiagnosed with a terminal disease and not getting the treatment they need. Although there are already great laws and rules that make everyone's data be well secured and used properly and transparently, there are still regulations and specific cases that still need attention and ruling.

References

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