RIS
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for Developing Countries
www.ris.org.in/abdr.html

Asian Biotechnology and Development Review
Vol. 9 No. 1, pp 37-44

Printed in India

Ethics of Bioinformatics: A Convergence between Bioethics and Computer Ethics

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Abstract: The emergence of bioinformatics as both a field of study and a system of practice has also given rise to a convergence of bioethics and computer ethics, which are the two major strands in applied ethics nowadays. Such a convergence calls for a reflection on the methodological point of what actually constitutes either bioethics or computer ethics as a way of deliberating about normative issues arising from advances in the technology. Moor's view that computer ethics should be independent from traditional ethics is discussed. This problem is further exacerbated by the rise of bioinformatics. It is proposed that the distinction between computer ethics and bioethics is arbitrary from the beginning; hence the emerging ethics of bioinformatics will perhaps always retain its provisional character.

Keywords: Computer Ethics, Bioethics, Bioinformatics, History, Academic Discipline.

Introduction

Bioethics and computer ethics are two main branches of what can be called 'applied ethics'. Broadly construed, applied ethics is an attempt to use the vocabularies, theories and argumentative methods normally used in philosophy to tackle 'real world' problems such as those of nuclear proliferation, pollution, economy and crimes related to these, as well as those traditionally associated with bioethics and computer ethics, such as abortion, euthanasia, cloning, privacy, hacking, copyright issues, and so forth. The list is endless, since applied ethics deals with any social or ethical issues that crop up when we are faced with problems of value. It is self evident that applied ethics are highly important, even necessary, in today's world when we are faced with a

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plethora of problems not seen before. However, applied ethics was not individually distinguished as an area of study by philosophers earlier, as ethics was then more concerned with the 'metaethical' problems to do with the analysis of evaluative concepts and on ethical theories in the line of, say, Kant or Mill. To these traditional philosophers, ethicists have no professional business to pronounce any judgments on the contemporary issues of the day; instead ethicists should pay more attention to the timeless issues in the field, such as how the term 'good' is defined, or how objective ethical judgment is possible. Nonetheless, many philosophers have become rather uneasy with these ways of thinking about ethics, because this would mean that ethics, and philosophy in general, tends to divorce itself from the issues that grip the society around them. Since ethics deals directly with what should be done, it is all the more surprising to see traditional ethics shunning this first-order question and focusing its attention on purely conceptual and theoretical problems. Applied ethics arose as a response to this traditional trend, and nowadays it has established itself as a field in its own right.

What applied ethics aims to accomplish then, is to provide the public with first-order ethical judgments on a number of contemporary issues of relevance. For example, during the Cold War when the threat of nuclear annihilation was palpably real, many philosophers raised their voice to pronounce their professional judgments on the topic. This was done not merely from their status as citizens in a democracy, to which everybody is entitled, but rather in their capacity as philosophers. That is to say, philosophy or ethics is used to tell the public what ought to be done, something that philosophers in the West had avoided doing since the time of the positivists or earlier. Philosophical vocabularies were employed and as a result issues which had been murky became much clearer when flooded with the spotlight of philosophical analysis.

The emergence of bioethics and computer ethics clearly illustrates this trend. According to Robert Martensen (2001), the term 'bioethics' was first used by Sargent Shriver in his living room in 1970, when he and his wife met with Andrée Hellergers, then President of Georgetown University and discussed the idea of establishing an institute "for the application of moral philosophy to concrete medical dilemmas" (p.

168). It is clear, then, that bioethics emerged out of the need for philosophical reflection on the problems posed by modern medicine. On the other hand, James Moor, whom many regard as the father of computer ethics, wrote that computer ethics arose as a response to the emergence of computers as the technology that defines contemporary society.[1] Computers, and more recently the global network such as the Internet, have had a tremendous impact on the lives of many people. The technology is at least as powerful scope to alter human society as is modern medicine or the life sciences. Consequently, as biotechnology and biomedicine, as well as computer technology are increasingly penetrating perhaps every aspect of our physical and social lives, it is clear how bioethics and computer ethics are the two most relevant branches of applied ethics today.

Computer Ethics

An interesting topic of discussion and debate in computer ethics is one concerning its status as an autonomous field of study. According to Moor, the field needs to be autonomous, since the nature of computer technology is such that dealing with it adequately requires that the attempt to employ novel conceptual tools. He goes on to say:

> The mark of a basic problem in computer ethics is one in which computer technology is essentially involved and there is an uncertainty about what to do and even about how to understand the situation. … In one sense I am arguing for a special status of computer ethics as a field of study. Applied ethics is not simply ethics applied. But I also wish to stress the underlying importance of general ethics and science to computer ethics. Ethical theory provides categories and procedures for determining what is ethically relevant. … On my view, computer ethics is a dynamic and complex field of study which considers the relationships among facts, conceptualizations, policies, and values with regard to constantly changing computer technology. Although computer ethics is a field between science and ethics and depends on them, it is also a discipline in its own right which provides both conceptualizations for understanding and policies for using computer technology.[2]

The idea is that when computers are essentially involved, there seems to be a need for a special kind of tools that can adequately deal with case. Such a set may include discussions on the nature of computer

and information technology. When a burglar comes into a house and steals a computer, that does not constitute a problem for computer ethics, but when a hacker uses his expertise to steal a lot of personal data, that is a problem. Deliberating effectively on the ethical evaluation of the latter action requires that one possess a set of conceptual tools which are not available for the former case.

Bioinformatics

What is special in the case of bioinformatics is that it is consciously an amalgam of these two powerful technologies. Simply put, bioinformatics is an attempt to harness the power of information technology and the Internet to solve problems posed by biotechnology and biomedicine. The success of the Human Genome Project, where the entire genome of human beings has been decoded, gave rise to attempts to harness computers to manipulate and process all the data that suddenly have become available. It is very curious to see how the two technologies are merged together. On the one hand there is the public perception of a computer scientist as a 'geek' who lives his (or her) entire life in front of a computer screen; on the other, there is the perception of a biotechnologist dressed in immaculate white with white masks holding a test tube. These two perceptions are getting blended into each other.

Ethical issues posed by bioinformatics are those concerned mainly with the use of computers to manipulate genetic data. Privacy is perhaps the topmost concern, but so are discrimination, genetic profiling, development of drugs that target specific individuals that might lead to stratification, and so on. These issues have been dealt with elsewhere.[3] In this paper, I shall discuss mainly the methodological issue. If these issues posed by bioinformatics are real and are relevant to our lives, then there will be an ethics that discusses them. But what should it be? Should it be computer ethics or bioethics? Or is this distinction between two major applied ethical activities rendered outmoded by bioinformatics? My answer at this point is that the distinction between the two 'ethics' is arbitrary from the beginning; hence, the question whether the 'ethics of bioinformatics' that will undoubtedly emerge should enjoy a special status of its own or whether it should be a species of either computer ethics or bioethics (or both) is an empty one. One can deal with the ethics of bioinformatics from a number of perspectives. There will most probably be a new special vocabulary se to deal with

issues in bioinformatics, in the same way as there emerged such a special set with the other, older issues. But the point is that, since the issues themselves are getting mixed with each other, the disciplines that discuss them (the various ethics) are getting mixed up too, and thus it does not seem to make much sense to make a distinction among them.

The issue encourages a reflection on the difference between computer ethics and bioethics. Basically, the only difference there is seems to be that one discusses a certain range of problems, while the other discusses another. But if that is the case, then Moor's view that computer ethics employs a distinctive vocabulary set seems to be skimming only the surface. The special set seems in this case to be only that of the subject matter talked about, computer technology rather than biotechnology. However, Moor's point goes deeper. His view is that computer ethics requires a special set of tools and vocabulary that sets it apart from traditional or theoretical ethics. It is the nature of the computer itself that requires such a special set.[4] If this is so, then as bioinformatics requires a lot of computer use, its ethics should also be considered a part of computer ethics and thus, according to Moor, requires a special set.

What is interesting is that, in the case of bioethics, there does not seem to be much debate on its methodological nature, its distinction from traditional, theoretical ethics. There seems rather to be a tacit agreement among bioethicists that their discipline, at least its philosophical foundation, lies well within the domain of traditional ethics. Thus we hear philosophers such as Thomas Pogge or Onora O'Neill pronouncing their views on bioethical matters as if they were addressing a purely philosophical audience. Their use of tools and vocabularies lies fully within the mainstream of ethics or political philosophy, and they do not claim that what they are doing should be categorized as a new kind of ethics, in the way that a computer ethicist such as Moor would do.

There may be a reason behind this. Perhaps it is actually the nature of computer and information technology that prompts Moor and his followers to regard computer ethics as being of a special kind. After all, computers have a special characteristic in that they are a second-order device,[5] meaning that they do not deal directly with material objects in the world, but rather with *symbols,* which inside the computer are

represented by whether the switch is turned on or off. In slightly abstract terms, this turning on or off is represented by the number 1 and 0, and it is not surprising that the mathematics of choice among computer scientists is the binary system. What is important is that these ones and zeroes are grouped together and manipulated in various ways, and they function not as themselves but as symbols for anything whatsoever. According to Moor, it is because of the symbolic nature of computers that computer ethics has to have the special status. On the other hand, when bioethicists such as Pogge, O'Neill or Singer air their views on bioethics, they usually do not concern themselves with the question whether bioethics should be an autonomous discipline or not. Their subject matter, whether it be informed consent, global justice, ways for pharmaceutical companies to act more responsibly, vegetarianism, and so on, seem to be the issues that ordinary people usually understand. In any case these issues are not symbolic ones. Even though bioethicists deal with a technology and its aftermath, such as when they deliberate upon the moral worth of genetic modification technology, these technologies are not second-order in the sense that computer and information technologies are.

Toward an Ethics of Bioinformatics

All of the above points to a rather odd case for bioinformatics. If we agree with Moor, then the ethics of bioinformatics is a part of computer ethics, but as a species of biotechnology it should belong to bioethics instead. Perhaps a way out is to find a way to fuse these two fields of applied ethics together, at least where bioinformatics is concerned. What we need to do is, of course, to keep the traditional conceptual tools belonging to traditional, theoretical ethics. These are indispensable. And then we devise a new subset which deals specifically with issues in bioinformatics. It is widely acknowledged that privacy is one of the most important ethical concerns in bioinformatics. Now the question is: Is the conceptual tool that is usually more or less adequate in dealing with privacy in normal domains of computer ethics (stealing identity through hacking, and others of such kind), actually adequate for bioinformatics? For one thing, a hacker can certainly break the protective firewall of a bioinformatic server containing a large amount of personal data. Does it matter that these data are genetic codes of the members of the population, or just their credit card numbers and their names? I think it does because in a way genetic information is part and parcel of

our very identity in a way that credit card numbers are not. After all, if our genetic information changes, then *we* change, but if our credit card numbers change, then nothing about ourselves does change. The genetic information defines the identity of our bodies and our mental characteristics. This makes it much more serious to steal genetic information than to steal credit card numbers.

Thus, if we follow Moor's logic, then there seems to be something inherently different about stealing someone's genetic data than merely external data like credit card numbers, and hence this calls for a special set of vocabularies that enable one to deliberate effectively about these newer issues. However, as bioinformatics also deals with matters in biotechnology and the life sciences, such as the fact that data obtained through bioinformatic techniques are crucial in developing tailor-made drugs that focus on specific individuals or types of individuals, thinking systematically about it also requires techniques already developed in bioethics and related disciplines such as political and social philosophy.

So it appears that the emerging ethics of bioinformatics is an amalgam of the two major strands of applied ethics. It remains to be seen how this new field actually turns out. What is clear, though, is that it cannot but employ the tools and techniques that are already developed in both computer ethics and bioethics. And finally what we learn from this is, then, that disciplines such as applied ethics, bioethics, computer ethics and so on are not ones whose boundaries are set objectively. It is true that these fields of inquiry are defined through their subject matter, but as the subject matter itself does change and many subject matters do fuse together, then these fields should also fuse together. Bioethicists, as well as computer ethicists, traditionally two separate groups of people, are finding themselves closer to each other than before.[6]

Endnotes

1 Moor (2000).
2 Moor (2000) pp. 24-25.
3 Hongladarom (Forthcoming b).
4 Moor (2000) pp. 25.
5 Moor (2000); Hongladarom, (Forthcoming a).
6 Research for this article was partially supported by a grant from the Thailand Research Fund. I am also indebted to Leonardo de Castro for his encouragement and support.

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