RCMOS
Revista Científica Multidisciplinar o Saber

ISSN 2675-9128
DOI 10.51473

Volume 4 - Número 4
Abril de 2021

PROPOSAL OF A STRUCTURE ETHIC COMPUTATIONAL

PROPOSAL FOR A COMPUTER ETHICS FRAMEWORK

TOLEDO, Thiago Ferreira de [1]

[1] Master in Electrical and Computer Engineering

SUMMARY

Today's society is immersed in technological means, with countless inventions created since the last century, which have brought with them unprecedented ethical dilemmas. From the advent of computers to their popularization and routine use, it transformed many aspects of human life, as the way in which individuals interact and the way they work – just to cite examples – changed in a short period, compared to time. which comprises the first civilization to the present one. The speed with which computational means were introduced into society was not accompanied by a solid and consistent ethical analysis so that their use could be correctly evaluated, in the sense of using them for the prosperity of civilization, and, under no circumstances, use them for purposes that do not contribute to good purposes. Within this context, this work aims to present a Computational Ethics Framework, comprising the ethical principles of respect, tolerance, freedom, responsibility, justice and privacy, to be used to help professionals in this field of activity to verify the ethicality of their undertakings, being able to evaluate them from conception to completion. For this purpose, a narrative review of the literature was carried out, as well as the consideration of some ethical principles of Logosophical Science. Then, with the purpose of testing the Computational Ethics Framework, it was applied to find out whether an Application *Web* can be considered ethical from the perspective of the proposed structure, which was found that the application needs to improve in some points to meet the principles of respect, freedom and privacy.

Key words: Applied Ethics. ethic in Computing. Logosophy. Moral.

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

ABSTRACT

The current society is immersed in technological means, with numerous inventions created since the last century, which have brought with them unprecedented ethical dilemmas. From the advent of computers to their popularization, and routine use, many aspects of human life have been transformed, as the form of interaction between individuals and the way of working – just to cite examples –, have changed in a short period, if compared with the time between the first civilization and the present one. The speed with which computer means were introduced into society was not accompanied by a solid and consistent ethical analysis so that their use could be correctly evaluated, in the sense of using them for the prosperity of civilization, and, under no circumstances using them for ends that do not contribute to good purposes. Within this context, this work aims to present a Computer Ethics Framework, comprising the ethical principles of respect, tolerance, freedom, responsibility, justice and privacy, to be used to help professionals in this field verify the ethicality of their projects, evaluating them from conception until after its conclusion. For this, end a narrative review of the literature was undertaken, as well as consideration of some ethical principles of Logosophical Science. After that, with the purpose of testing the Computer Ethics Framework, it was applied to verify if a Web Application can be considered ethical under the perspective of the proposed framework, which was found that the application needs to improve in some points to meet the principles of respect, freedom and privacy.

Keywords: Applied Ethics. Computer Ethics. Logosophy. Moral.

1. INTRODUCTION

Today's society is marked by the extensive use of information and communication technologies, which are present in different moments of everyday life, being used for various purposes, from work and study to moments of leisure and relaxation, whose accentuated technological incorporation has created situations hitherto unprecedented for humanity, because, if we consider only digital computers, created about eight decades ago, from that time to the present day, there has been an accelerated change in society.

This rapid transformation was driven, to some extent, by the introduction of computers, the implications of which deserve special attention and deep reflection on their consequences, as the possibilities arising from these technologies can be used for both good and evil. Therefore, dealing with ethical issues regarding computational use is essential so that it does not become a harmful tool, on the contrary, it should serve as an instrument to favor the prosperity of civilization.

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

In this context, this work aims to propose a Computational Ethics Framework to help professionals in the field evaluate the ethics of their work. The idea is for the development team to consider fundamental ethical points when they are designing and developing a technological solution, as well as investigating some work already completed in order to find issues that had not previously been noticed. This article is organized as follows: the next section explains the topic of computational ethics, in addition to mentioning some suggested readings and proposed approaches for applying ethics in this area, whose works were selected through a narrative review of the literature. Next, the Computational Ethics Framework is presented and a way to use it is exemplified. And the last section brings the conclusion.

2 THEORETICAL FOUNDATION

2.1 Computational Ethics

The work produced by James H. Moor, in 1985, published in the journal Metaphilosophy, won the competition for essays on computational ethics, which, in his words, is defined as:

> In my opinion, the**computer ethics**is the analysis of the nature and social impact of computing technology and the corresponding formulation and justification of policies for the ethical use of such technology. I use the phrase "computer technology" because I take the subject of the field generally to include computers and associated technology. For example, I include concerns about *software*, as well as*hardware*and concerns about networks that connect computers as well as the computers themselves. (MOOR, 1985, p. 266, our translation, emphasis by the author).

The central role of computational ethics is to have adequate policies on how computers should be used, since their introduction into society has provided new options for actions to individuals, and therefore, it is necessary to formulate appropriate policies to guide the performances. To achieve this, a coherent conceptual structure is necessary as the lack of policy and concepts are basic problems that need to be addressed. The absence of these factors results in a kind of political vacuum (MOOR, 1985).

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

As computers perform a wide range of tasks, new applications may emerge where there is not enough maturity, such as in cases where there is no ethical preparation to deal with the new situation, thus creating an ethical gap due to there not being a clear idea of what a suitable performance would be like. A gap can also arise when society makes some adaptation to existing technology, creating a political vacuum, and, to fill it, it is necessary to propose a policy that is ethically justifiable, legally based and socially acceptable (MOOR, 1998a). Furthermore, a good start towards creating responsible ethical conduct begins by avoiding policies that could result in harm to other individuals (MOOR, 1998b).

In turn, Johnson (1991) adds that a vacuum occurs when there are no laws or policies to guide conduct in certain circumstances, and it is therefore necessary to ascertain the rights of each party involved in the issue. The opposite meaning of vacuum is complexity, that is, when there are conflicting attitudes and opinions, or a mixture of values and ideas, attitudes and opinions. In complex situations, you can resort to analyzing other cases that can help with the current one, or ask yourself how the conflict would be resolved if computers had not been introduced.

Computer ethics encompasses both personal and social policy considerations. It is, therefore, a dynamic and complex field of study, which also considers the relationships between facts, conceptualizations, policies and values with regard to computational technology, as its introduction transformed the basic nature, or purpose, of many activities. humanities, and social institutions (MOOR, 1985). In other words, the way individuals relate to each other and to organizations is modified, because direct human contact is reduced or eliminated. Thus, when moral rules related to an issue that is not obvious, or when moral principles conflict with each other, a philosophical and ethical analysis is necessary (JOHNSON, 1984).

With regard to people's behavior, beliefs and attitudes, Johnson (1984) states that there may be a type of empirical and descriptive claim about these issues, which are commonly based on data obtained through observation, and not theoretically. And when it comes to how people should behave, claims can be philosophical and prescriptive, which can be based on the acceptance of some principle or rule.

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

underlying moral, which, although not directly expressed, is implied. For example, it is wrong to make an illegal copy of a computer system because people have a right to the products of their labor.

Moor (1998b) suggests empirical investigation when there are situations where there is a dispute between ethical policies to assess what the real consequences are if the proposed policy is implemented. He also suggests other techniques, such as taking a position when evaluating the policy, for example, imagining yourself as an individual who would not benefit from its implementation, or, worse, being harmed; and resolution by analogy.

Regarding the analogy, later Moor (2005) adds that it can be used to resolve some conceptual confusion when a new technology is introduced that requires ethical attention. However, this technique may not be decisive or convincing, requiring another approach, such as considering several policies that could be appropriate to the given problem and selecting the best one, the choice of which would be based on the analysis of the consequences, or other justification methods.

However, Maner (1996) argues about the failure to find useful analogies that can be used in computational ethics, due to the uniqueness of this area; That is why it is necessary to discover and formulate new moral values, develop new policies and find possible ways to resolve new situations.

Computers, like any other technological creations, create both desired and unwanted possibilities. Even though both of these issues are related to each other, it is possible to distinguish them between sociological and ethical, the first of which refers to the impact generated by the introduction of computers in society, and the ethical issue deals with themes related to the changes that have already occurred and started to being part of society, as well as the resulting impact on human relationships and institutions, so that such influences challenge common moral notions, especially on conceptions of individual rights and responsibilities. Furthermore, the introduction of computers may also have changed ideas about valued assets and the strategies used to maintain existing institutions (JOHNSON, 1991).

It is worth highlighting that to resolve the issues introduced by computational technologies, other themes are involved, such as applied ethics, sociology

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

digital, technological values and crimes involving computers. Thus, computational ethics is a field of investigation that encourages scholars to constantly review technologies and their values in order to provide principles for understanding, conceptualization and use (KUZU, 2009).

For greater depth on the subject, the following works elucidate the history of computational ethics: Bynum (2020), Vacura (2015) and Ramalho (2013). And some examples of approaches proposed to help resolve ethical issues can be found in Masiero (2004), Friedman, Kahn and Borning (2006), Brey (2012) and Rehg (2015).

2.2 Computational Ethics Framework

The term computational ethics was coined by Walter Maner in the mid-1970s (BYNUM, 2020). He was the first to teach this field of study as a university discipline, thus marking the first generation of computational ethics, where limits were suggested for the use of computerized means in life, so as not to compromise the privacy of individuals (VACURA , 2015). Furthermore, as this was a factor of interest to all human beings long before the possibility of the existence of any calculating machine, its importance became even more evident with the advent of computational technologies, which, due to the ease of storage, retrieving and even crossing information between different databases can greatly compromise user privacy.

Just to mention some examples of authors who considered privacy in their work, we have: Johnson (1984), Mason (1986), Huff (1996), Moor (1997) and Masiero (2004).

Given its relevance, privacy was incorporated into the Computational Ethics Framework, which is composed of other elements originating from Logosophical Science, starting with the triad: respect, tolerance and freedom, which are the guiding ethical principles of

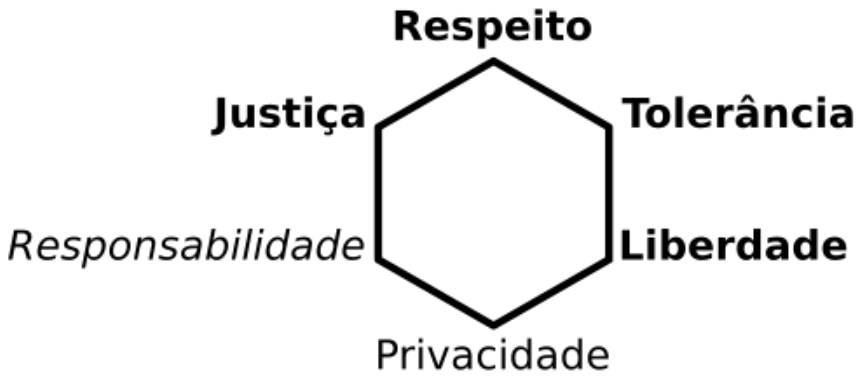
RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

Logosophical Foundation[1](PECOTCHE, 2012), whose qualities form the basis for a good coexistence (TOLEDO, 2021).

For an individual to enjoy the right to freedom, they must first know their duties, which require responsibility on their part. Furthermore, it is necessary for the individual to act fairly, so that they do not abuse their freedom, and do not fail to be responsible by assuming an attitude of partiality. With these two principles, responsibility and justice, they form the whole of the Computational Ethics Framework, as illustrated in Figure 1 (TOLEDO, 2021).

The detailed study of how the set of ethical principles of respect was formed, tolerance, freedom, responsibility and justice, can be seen in the article "Proposal for an Ethical Framework in Research" (TOLEDO, 2021).

Figure 1: Computational Ethics Framework.



Source: Adapted from Toledo (2021).

The ethical principle of respect was addressed in a previous work, which aimed to suggest how to apply it in the development of computational systems (TOLEDO, 2020).

1https://logosofia.org.br/

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

2.3 Example of Using the Computational Ethics Framework

The example case is the development of an Application *Web* in order to generate medical reports regarding the examination of a patient, using speech recognition systems, which, upon identifying speech, automatically convert it into text. This system can be seen in detail in the book "Integrating Automatic Speech Recognition Systems in Applications *Web*" (TOLEDO, 2019), or easily accessible in the dissertation available in Toledo (2017).

Using this project as an example, the following describes how to consider each of the principles of the Computational Ethics Framework to ascertain its ethicality:

- Respect: the Application *Web* was designed to be easy to use and with minimal possible visual elements so that the screens contained only relevant information and action options. Of course, the question of "easy to use" is somewhat subjective, because it may not be for everyone. Therefore, it is necessary to test the application for the group of users who will use it, giving them the opportunity to suggest improvements;
- Tolerance: the medical report is generated by recognizing the speech of any individual speaker of Brazilian Portuguese, not requiring prior training to recognize a specific voice;
- Freedom: the Application user *Web* can generate the medical report through dictation, or typing. On the other hand, the patient cannot request the deletion of their registration or their examinations and medical reports;
- Responsibility: when editing a medical report, they are stored in the database all edited versions, as well as the current one. Thus, a history is created with all modifications, containing date and time, and the name of the user who made the changes;
- Justice: the user has the option to choose between two recognition systems speak and correct the generated text, as well as being able to type the medical report, if you prefer;
- Privacy: this principle was considered allowing access to exams and their respective medical reports only for registered and active users in the Application *Web*. However, any authenticated user has access to all exams and can edit them, as well as edit and generate new reports. Furthermore, data was stored without

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

encryption, so someone with access to the database, or some intrusion into it, would compromise the privacy of individuals if their information were exposed.

In conclusion, the Application *Web* failed the principles of respect, freedom and privacy. For the first principle to be met, it is necessary to carry out tests so that users can express their opinions; This would be a respectful attitude when considering their impressions, difficulties and other matters that they deemed relevant, which would serve to improve the usability of the application.

The fact that the patient cannot choose to have their registration deleted, or that of their examinations and medical reports, affects their freedom, in addition to compromising their privacy. Regarding privacy, only the user who created the exam, and the respective reports, could be able to access them, as well as mechanisms that would allow transferring the exam to other health professionals, as long as it was duly authorized by the patient.

Furthermore, in general, to ensure greater security for data stored in the Application *Web*, they should be stored in encrypted form. Therefore, following the Computer Ethics Framework, for the application to meet its principles, the above issues would need to be reviewed.

A final point, perhaps the most important, is that the two speech recognition systems come from third-party companies, so the recognition process necessarily needs to send the recording of the user's speech to the servers of the respective companies for to return the corresponding text. In this way, new loopholes are opened that can compromise patient privacy; for example, if data is intercepted when the communication channel between the Application *Web* and the company's server is open, or if the company stores or uses the data for other purposes.

CONCLUSION

This work presented a Computational Ethics Framework to serve professionals in the field to evaluate their work regarding its ethics. This was achieved considering some ethical principles present in Logosophy, namely: respect,

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

tolerance, freedom, responsibility and justice. Furthermore, privacy was also included, as this element has been a cause for concern since the birth of computational ethics as a field of study in its own right. And today is no different, as this is a common value and a right of every individual; It should be a key point in technological development, as technology cannot be a means to invade other people's privacy.

Therefore, when investigating the ethicality of an Application *Web* with the Computer Ethics Framework, it was possible to verify that some points require attention, namely: respect, freedom and privacy, as it would be necessary to carry out tests, develop new access control functionalities, enable the exclusion of registration, exams and medical reports of patients, as well as storing the information in the database in encrypted form.

Finally, the Computational Ethics Framework can be expanded to receive new elements that satisfy the particular needs of each project given the particular context in which it will be used.

REFERENCES

BREY, PAE Anticipating Ethical Issues in Emerging IT.**Ethics and Information Technology**, v. 14, p. 305-317, 24 May. 2012. https://doi.org/10.1007/s10676-012-9293-y.

BYNUM, T. Computer and Information Ethics. In: ZALTA, Edward N.**The Stanford Encyclopedia of Philosophy**. Summer 2020. ed.

FRIEDMAN, B.; KAHN, PH; BORNING, A. Value Sensitive Design and Information Systems.*In:*ZHANG, P.; GALLETTA, DF**Human-computer Interaction and Management Information Systems**: Foundations Advances in Management Information Systems. United States of America: Routledge, v. 5, 2006, p. 348-372. chap. 16.

HUFF, C. Unintentional Power in the Design of Computing Systems.**ACM SIGCAS Computers and Society**, v. 26, no. 4, p. 1-9, Dec. 1996. "This version has been slightly modified from that original version and includes new references and text. (2003)."

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

JOHNSON, DG Computers and ethics.**National Forum**, v. 71, no. 3, 1991. This article is reprinted with permission from The Encyclopedia of Ethics, edited by Lawrence Becker (New York: Garland Publishing, Inc., 1991).

JOHNSON, DG Mapping Ordinary Morals onto the Computer Society: A Philosophical Perspective.**The Society for the Psychological Study of Social Issues**, v. 40, no. 3, p. 63-76, 1984.

KUZU, A. Problems Related to Computer Ethics: Origins of the Problems and Suggested Solutions.**Turkish Online Journal of Educational Technology**, v. 8, no. 2, apr. 2009.

MANER, W. Unique Ethical Problems in Information Technology.**Science and Engineering Ethics**, v. 2, p. 137-154, jun. 1996. https://doi.org/10.1007/BF02583549.

MASIERO, P.C.**Computer Ethics**. São Paulo: Edusp, 2004.

MASON, R. Four Ethical Issues of the Information Age.**MIS Quarterly**, v. 10, no. 1, Mar. 1986. https://doi.org/10.2307/248873.

MOOR, JH If Aristotle were a Computing Professionals.**ACM SIGCAS Computers and Society**, v. 28, no. 3, Sept. 1998a. https://doi.org/10.1145/298972.298977.

MOOR, JH Reason, Relativity, and Responsibility in Computer Ethics.**ACM SIGCAS Computers and Society**, v. 28, no. 1, p. 14-21, Mar. 1998b.

MOOR, JH Towards a Theory of Privacy in the Information Age.**ACM SIGCAS Computers and Society**, v. 27, no. 3, p. 27-32, Sept. 1997. https://doi.org/10.1145/270858.270866.

MOOR, JH What is computer ethics? [What is Computational Ethics?].**Metaphilosophy,**v. 16, no. 4, p. 266-275, 4 Oct. 1985.

MOOR, JH Why we Need Better Ethics for Emerging Technologies.**Ethics and Information Technology**, v. 7, p. 111–119, Sept. 2005.

PECOTCHE, CBG**Logosophical Exegesis**. Logosófica Foundation Translation. 11. ed. São Paulo: Logosófica, 2012. Translation of: Exégesis Logosófica.

RCMOS
Revista Científica Multidisciplinar o Saber
ISSN 2675-9128
DOI 10.51473
Volume 4 - Número 4
Abril de 2021

RAMALHO, RAS**Technology and Society**: Responsibilities and Challenges in the Digital Information Age. São Carlos: UAB-UFSCar, 2013. Available at: http://livresaber.sead.ufscar.br:8080/jspui/handle/123456789/2664. Accessed on: 26 Mar. 2021.

REHG, W. Discourse Ethics for Computer Ethics: A Heuristic for Engaged.**Ethics and Information Technology**, v. 17, p. 27–39, Dec. 2015.

TOLEDO, TF de.**Development of a Web System Prototype for Preparing Medical Reports Using Automatic Speech Recognition Systems**. Foz do Iguaçu, 2017. Dissertation (Electrical Engineering and Computing) - State University of Western Paraná, Foz do Iguaçu, 2017. Available at: http://tede.unioeste.br/handle/tede/3399. Accessed on: 23 Mar. 2021.

TOLEDO, TF de.**Integrating Automatic Speech Recognition Systems into Web Applications**. Curitiba: Appris, 2019.

TOLEDO, TF de. Proposal for a Research Ethics Framework.**Multidisciplinary Scientific Journal O Saber**, v. 3, no. 3, p. 1-11, Mar. 2021. https://doi.org/10.51473/rcmos.v3i3.39.

TOLEDO, TF de. Respect as an Ethical Principle in System Development.*In:*18TH JOHANNESBURG INTERNATIONAL CONFERENCE ON SCIENCE, ENGINEERING, TECHNOLOGY AND WASTE MANAGEMENT (SETWM-20). 2020.**Proceedings [...]**nov. 16-17, 2020 Johannesburg (South Africa), 2020. 151-154 p. Available in:

https://doi.org/10.17758/EARES10.EAP1120234. Accessed on: 26 Mar. 2021.

VACURA, Miroslav. The History of Computer Ethics and its Future Challenges

Computing and its Future Challenges].*In:*CONFERENCE INFORMATION TECHNOLOGY AND SOCIETY INTERACTION AND INTERDEPENDENCE, 23rd Interdisciplinary InformationManagement Talks. 2015. **Proceedings [...]**Linz, Austria, 2015.