**INVESTIGATION OF POST DISASTER SPATIAL CHANGE BY IMAGE EVALUATION AND SEMANTIC DIFFERENTITATION METHODS**

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**ABSTRACT**

As technologies and the products offered increase, it is becoming more and more difficult to distinguish between features such as purposes, fields of service, and reasons for use. At the end of the last century, the purpose of computers; was to convert precisely defined commands into inputs and present the resulting output; it is used effectively in all areas of life today. With the features added to mobile phones produced only for voice calls, it is possible to fulfil the requirements of professions such as photography and reporting today. With the advancement of technology, the shrinkage of processors, integration with portable devices, and wireless networks communicating with each other and making them compatible with communication devices have led to the inclusion of information system devices in almost every part of our business and private lives. At this point, adding additional artificial intelligence to processors is a natural process. The transition process to artificial intelligence, accepted as natural by society, has expanded the application areas of information systems. At the same time, it has opened up discussion about the fact that a machine can think like a human (McCarthy, 1989). Even though they are produced for good purposes, we frequently encounter technological tools in all areas of life that also contain potential security violations in practice. Security problems can be physical or economic, as well as ethical violations that cause discrimination and inequality among people. When the relevant literature is examined, it is seen that the foundations of the concept of ethics are a process that goes back approximately five thousand years. It ıs not only regulates commercial relations in society and also develops the whole of the rules that must be followed for the welfare of people. These first rules, which we can also call the basis of ethical principles in our age, significantly impacted the formation of our current ethical system (Polanyi, 1944). Artificial intelligence, which enters our lives as a different actor from the people in the society, is a concept integrated with different technologies and connected with many sciences. On the way to understanding artificial intelligence, scientific research and inferences on the brain and neurons, which are the centre of human intelligence, in order to reveal the concept of intelligence better; it will transform machines from imitating artificial intelligence to autonomous systems that think and learn like us (Lake, Ullman, Tenenbaum & Gershman, 2017). In this study, an ethical perspective that can be applied in order to use autonomous systems safely in social areas in the digital age has been revealed. It aims to fill the gap in the related literature by examining the relations between the related variables theoretically and practically. The application part of the study, in which a six-step ethical model is presented, it is aimed to integrate some technical engineering processes with ethical rules, thereby identifying potential ethical problems and preventing them without causing sensitivity.

**Keywords:** Artificial Intelligence, Autonomous Systems, Ethics, Reliability, Openness.

**INTRODUCTION**

With the industrial revolution, machines were primarily produced to perform specific technical and repetitive factory tasks successfully. However, industrialization continued to strive to minimize errors and produce machines unaffected by fatigue and other human phenomena (Ford, 2016). As a result, the need for human labour in factories has decreased, but a new mode of production emerged; the rise of the industry has opened up countless new jobs for humans. Industrialization, which started with the fear that it would cause people to be unemployed, has become a phenomenon that needs to be developed by people in a short time with the numerous professions it has brought with it.

Today one step beyond industrialization, there are intelligent machines modelled based on the human mind but can operate at much higher speeds. Although we conclude that there is a time before us to make robots that fully carry human possibilities and capabilities, it is not difficult to predict that these technologies will reflect human intelligence and reach a point soon. Nanorobots, which can be injected into the blood and used to control human functions, are a clear example of the absence of an upper point where artificial intelligence and machines can reach. Furthermore, a robot in the future will be able to make more objective decisions; while thinking and acting like a human by processing more data without being affected by some human-specific deficiencies and emotional gaps and without getting tired (Simborg, 2017).

According to Barrat (2015), machines equipped with artificial intelligence can process data and behave like humans. However, the added ability to change their software will gain self-awareness and perhaps personality to machines. From this definition, it is possible to conclude that artificial intelligence will become devices that learn independently of us. When we expand our thinking, machines can inevitably imitate the human mind, think like humans and process their sensitivities as data.

Intelligence machines can expand their abilities in new directions, just like humans do in nature, but at a much faster speed in the digital world. In the new situation, which has been reshaped by technology, scientific developments and artificial intelligence applications have necessitated a careful study of the use and protection of personal data to ensure accountability and equality in society.

With the use of technology, it is possible to prevent user communications and the publication of messages containing specific keywords by the powerful when desired. In line with the rapid development of technology, academic research focuses on the fundamentals of many morally essential issues, such as the relationship between ethics and artificial intelligence, privacy protection, equality of access to problem-solving algorithms, and systems' stability (Kizza, 2010). However, failing to take the necessary measures to protect ethical principles has led to social concerns. Identifying the ethical problems that autonomous systems may cause, reducing inequalities arising from ethical dilemmas and making the necessary corrections will provide substantial progress in overcoming the problems.

# MATERIAL AND METHOD

## Ethical System and Ethical Behavior

Ethics can be defined as being honest with others from different perspectives, being free from personal desires and ambitions, pursuing excellence by acting under objective facts, being of good character, being aware of moral responsibilities and respecting the environment, and establishing actions that can affect other people on moral grounds. (Mahmutoglu, 2009). Ethics refers to a process that includes the concept of morality, which expresses the entirety of the rules, such as behaving under the rules of society, avoiding behaviours that are not accepted, and respecting the concerns of others (Yıldırım & Kadıoğlu, 2007). Nevertheless, despite all these definitions, ethics and ethical principles are among the issues that are not fully understood, can not be made to a concrete judgment, and are considered complex (Santiago, 2019). Ethics rules start with regulating commercial relations; it focuses on issues such as human rights, the fight against injustice, health, safety and environment, and most importantly, society's living in harmony in our age. Ethics also emerges as a set of both theoretical and applied principles that includes written and unwritten rules of law. In other words, ethics consists of rules decisively employed to reveal the principles that regulate the lives of individuals in society.

The primary purpose of ethics is to investigate the basic facts that cause social behaviour and the values ​​that cause society to act appropriately (Ülgen & Mirze, 2004). While it is possible to define the concept fundamentally, it becomes possible to derive definitions that are shaped according to the society or situation. All definitions of ethics can conform to the basic definition and create systems that are different from each other. According to Al Lawati, Sayed and Caldwell (2019), there are at least 16 different approaches and different ethical systems related to business ethics alone. Different ethical subsystems significantly show people's different perceptions of ethics. The different perspectives and subjective evaluations that individuals show towards the behaviours of others and the personal decision-making situation and ethical behaviour criteria induce diversification of the rules and different interpretations of them. The formation process of ethical perception results from a subjective decision, and as a result, it creates similar but different subsystems. While considering the structure of the moral environment, ethics is seen as a subjective framework in which individuals evaluate and interpret the actions of others from different perspectives (Caldwell & Clapham, 2003).

## The Concept of Intelligence and Artificial Intelligence

Intelligence is called the ability of people to keep up with environmental changes, which is accepted as intrinsic to continuing their lives appropriately (Taşdemir, Yıkılmaz & Cekmecelioglu, 2019). It is affected by various processes like genetic predisposition, the level of satisfactoriness of the nutrients the brain and body need, physical and mental attitude, age, and other environmental factors. Once accepted as a unique trait to humans, thanks to changes in information systems, it is now thought to be a feature that can be modelled artificially (Cerka, Jurgita & Gintarė, 2015). Frequently used in different disciplines, an absolute truth definition for the concept is challenging, and reaching a formal or concrete definition is unattainable. Various definitions exist in the literature according to the required aspects of the field in which it is used. In biology, it is expressed as the number of nerve connections in the brain, and the number of neural ties will increase with new learning while the unused ones will shrink and disappear (Şimşek, 2007).

As for social sciences, intelligence is the ability to adapt to the environment and is also accepted as a capacity; in the educational sciences, it is a distinct ability specific to living things. Intelligence is thought to be developed over time from birth to adulthood, and according to the form and state of development, it causes reconstruction in the abilities of humans (Schmidt, 2012). With the help of the reconstruction process, as a result, people can be more talented, knowledgeable, intelligent, and creative.

The term Artificial Intelligence (AI) was first coined by McCarthy et al. (1955) in the article "A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence". However, generally accepting the birth of the field of artificial intelligence science was at the Dartmouth conference held in 1956 (Crevier, 1993; Russell & Norvig, 2003; McCorduck, 2004). From the chronological view, artificial intelligence is considered as constructing decision-making skills in autonomous systems (Bellman, 1978), transforming machines into thinking systems (Haugeland, 1985), creating machines that can perform intelligence operations (Kurzweil, 1990), and science examining machine behaviours that show intelligence (Luger & Stubblefield, 1993), producing machines that can perform human cognitive operations (Nilsson, 1998).

When it comes to recent studies, there are many promising and guiding studies like Marblestone et al. (2016), Hassabis et al. (2017), and Glaser et al. (2019). on how neuroscience, artificial neural networks, and machine learning can benefit and support each other. Contrary to general predictions about artificial intelligence dragging people into poverty, the fact that artificial intelligence is becoming increasingly common in social life has not eliminated the business lines. It has changed how jobs are performed and made many jobs more permanent for society (AI Now Institute, 2017). Also, artificial intelligence sometimes causes resource and economic inequality but creates several new jobs. Thanks to the intensive use of technology in human communication, the use of artificial intelligence in e-mails, widely employed in business life, has become a practical application when filtering and separating spam mail at the necessary times. The developed algorithms control and classify the contents; only those deemed necessary are delivered to the users. Artificial intelligence is also put into action in organizing land and transportation activities. In addition to the simulators, which are developed to train pilot candidates and achieve results close to real flight experience, artificial intelligence with navigation aid autonomous systems can take over all the controls from the take-off of the aircraft. On the highways, artificial intelligence regulates human life by measuring and controlling traffic density, determining speed limits, detecting inappropriate situations in line with license plate recognition systems and lane control mechanisms, and adjusting the duration of traffic lights.

Furthermore, artificial intelligence is used in maintenance and repair activities. In order to deal effectively with maintenance and repair expenses that cause high costs, automatically calculated business hours, part replacement times, and factors are determined by artificial intelligence-based systems, thus increasing productivity and reducing costs. Systems with artificial intelligence coordinate activities in business life, meet planning and perform future profit and loss forecasts to determine the possible direction of stock prices (Holmes, Bialik, & Fadel, 2019).

# RESULTS

## Data collection and examination of ethical principles

In order to establish a model, studies and information sources related to ethical problems in the literature are reviewed by examing the theories put forward, the ways and methods presented, the contributions to the field, and the tools considered functional for ethical artificial intelligence modelling. After reviewing the four main projects about ethics in artificial intelligence, "Asilomar Artificial Intelligence Principles", "Montreal Declaration for Responsible Artificial Intelligence", "Socially Responsible Development of Artificial Intelligence Project", and "IEEE Principles", it can be noticed that ethical problems, which prioritized by executors among each other, frequently exist in different fields of security.

Ethical problems are mainly related to privacy protection, data security, accuracy, and using data for malicious purposes or insecurity that may turn out to be a public concern (Stahl, 2021). By the systematic reevaluation according to the frequency of methods for overcoming ethical issues, it has been indicated that the principles of openness (explicability), justice (fairness), being harmless (non-maleficence), and providing the benefit (beneficence) are the main principles. In addition to these methods, responsibility, the ability to work autonomously, and openness to control are also examined significantly (Royakkers et al., 2018; Jobin et al., 2019). Assuming the possibility and effects of its occurrence, ethical violations in autonomous systems may cause a social vulnerability.

Ethical management, the process of setting and evaluating ethical standards against security vulnerabilities, is one of the practical tools that can be used to prevent violations and establish a method to minimize unethical conduct (Treviño & Weaver, 2001). The purpose of designing the ethical management model in the study is to identify the ethical risks encountered during autonomous systems' modelling and to determine the necessary steps to reduce unethical behaviours. "Asilomar Artificial Intelligence Principles" put forward by the Future of Life Institute, "Montreal Declaration for Responsible Artificial Intelligence" developed by the University of Montreal within the scope of the Socially Responsible Development of Artificial Intelligence Project, Autonomous and Intelligent The IEEE Principles developed by the Vision of Prioritizing Human Wellbeing with Systems and Floridi et al. (2018) evaluated in determining the essential minimum values ​​that artificial intelligence should carry while determining ethical problems. The four main principles: benefit (beneficence), do no harm (being harmless), justice, and explainability (openness) determined as the core of the model. Another issue examined in the study is the determination of the methodology to detect security vulnerabilities in systems and identify risk factors.

The risk management process of the model focuses on identifying and understanding potential risks and ensuring that necessary precautions are taken. The NIST Security Framework, required to be used by companies that provide critical infrastructure, indicates industry standards and best practices and is approved in the US Cyber ​​Security Improvement Act (US Public Law, 2014), is chosen for the detection and mitigation of model security risks which includes threats, vulnerabilities, and impacts. The NIST Framework is a guide and regulatory approach to assessing and managing accounts and other cybersecurity risks.

## Analysis of the research problem

While evaluating potential unethical behaviours in systems with artificial intelligence by using the model, the first step is determining the system's scope and defining the usage scenario. Resources and units that make up the autonomous system and its limits are determined by evaluating the hardware, software, user interface, collected data, the people involved, and significantly the task. Creating the usage scenario provides vital information necessary to narrow down possible unethical behaviour and specify the actions that can be taken. In the second step, threats and vulnerabilities are two critical topics to prevent ethical violations. Threats are the dangers that can cause an ethical violation in the system by internal or external factors for the autonomous system. The weaknesses that can potentially be exploited are called vulnerabilities. Potential threats and vulnerabilities should be identified and listed in the design process. All potential threats and vulnerabilities during the evaluation, like unauthorized data access, data integrity problems, bias and discriminatory transactions, and lack of confidentiality, appear to be risky actions (Stoneburner, 2002).

The third step is to control the potential ethical issue and align them with the goals of the ethical system. The ethical risks must be fully identified, and the security requirements necessary to overcome perilous situations must be formed at this stage. Another main point is that artificial intelligence systems are designed, programmed, or developed according to their purpose. In determining the ethical possibilities, the design and architecture of the artificial intelligence system should be analyzed according to the possibilities of inducing any ethical violations. The system's potential to meet security requirements should be evaluated, and if necessary, it must be reconfigured and validated.

The process of preventing ethical violations, which includes the measures of the autonomous system against the determined situations, should be completed before the system is constructed or operated. At this stage, four predetermined basic principles should be evaluated in the model. The purpose of the autonomous system is the basis of the principle of benefit and goodness. According to this principle, the benefit of the system to society should be clear and explicit. Compliance with the do non-maleficence principle requires work in various fields. All units interacting with the autonomous system should be examined, and their effects on each other should be evaluated. The system must be revealed, passing the audit stages to be used in creating the harmlessness step and marking it as safe as a kind of control mechanism. Justice; means right and legality, accuracy and fairness (Turkish Language Society, 2022). In order to construct an inclusive artificial intelligence ethics system for society, it is of great necessity that considers all who are affected by the autonomous system.

Correct identification of all stakeholders who may be directly or indirectly affected by the system and obtaining their opinions will contribute to the process. During the design process, the correct application of the principle of justice can be provided by equal representation. In order to create an ethical and reliable autonomous system, there must be carefully defined data collection plans free of bias. It is necessary to carefully analyze the constraints, requirements, and decision points. The principle of openness covers the traceability and transparency of artificial intelligence systems, designing models, and data used in the systems. In addition to collecting and classifying data, all processes increasing openness, controllability, and transparency are among the foremost essential aims of the principle. In order to provide clarity in artificial intelligence systems, it is necessary to improvise control mechanisms and facilitate auditing.

The fourth step is impact analysis and creating high-quality applications that mature with the changing needs. This analysis must be performed during the application design phase. Impact Analysis is the phase of identifying and evaluating the potential effects of ethical violations. The impact analysis can measure how the ethical violation in the autonomous system will affect the workflow, and the potential impacts are determined. During the analysis, the usage fields of the autonomous system are checked, and sensitive issues are revealed by including all the essential components. The actions to determine, evaluate, prevent or reduce the impact of violations on the autonomous system are transferred to the algorithm.

In the fifth step, several methods that come with the emergence of risks should be determined. The method can choose depending on the resources available, the criticality of the ethical threat, or other factors such as the allocated budget status, known technological capabilities, and the availability of an expert to perform the examination. In the application, automatic scanning tools can monitor and detect security vulnerabilities, and special scanning applications adapted to the current culture also can be used.

The final step is to evaluate the consequences of the threats. Incorrect data, misinformation, improper hardware, and unsuitable software that cannot be fixed may need to be omitted. The disposal process; may include archiving errors, discarding or destroying inconvenient data, and terminating the autonomous system.

## Model of the Research

In the research, “Asilomar Artificial Intelligence Principles”, “Montreal Declaration for Responsible Artificial Intelligence” developed by the University of Montreal within the content of the Socially Responsible Development of Artificial Intelligence Project, IEEE Principles developed by the Vision of Prioritizing Human Wellbeing with Autonomous and Intelligent Systems, the promising study of Floridi et al. (2018) and the NIST Framework, which was approved in the US Cyber Security Improvement Act (Public Law, 2014) as a requirement for private sector companies and businesses, are used.

STEP 1

Determining the Usage Scenario and Examining the System

STEP 6

Reporting of Results, Distribution and Tracking of the System

STEP 3

Ethical Probabilities, Control Analysis, and Detection of Training Data

STEP 2

Design Identification of Threats and Vulnerabilities

STEP 4

 Application Creation and Impact Analysis

STEP 5

Testing and Risk Identification

# DISCUSSION AND CONCLUSION

The pace of technology development should be assessed while modelling. Proactive approaches can be given priority to overcome the situation. The standards and processes must be flexible and innovative and also cutting-edge technology. If the solutions have these qualities, they will prevent society from attributing the responsibility of ethical violations to artificial intelligence. (Doğan, 2018; Ersoy, 2018). In order to prevent ethical susceptibility that has the potential to occur and to develop an unintended social issue, development, innovation, and keeping up-to-date should be based on science with analytical methods (Cath et al., 2018).

Including as many practical ideas as possible before starting the process and a flexible procedure will strengthen the protection. While determining the design tools and methods, transferring ethical principles by business and usage scenarios will lessen the social risks of current practices. This approach identifies the elements of artificial intelligence in the digital environment and creates a common concept of unity that all societies can use and develop. In order to create new ways, methods, and mechanisms which is respectful to social values, open to innovation opportunities, and applicable; technology experts, social scientists, representatives of non-governmental organizations, expert engineers in various fields, also people living in society to designers who model and develop systems have to be coordinated.

The four principles, openness, justice, harmlessness, and beneficence, provide the basis of the ethic model, and these regulations will effectively prevent ethical violations if established in a concrete mechanism. Failure to prevent ethical violations in artificial intelligence can be critical in social life; the possibility of increasing socioeconomic problems by causing inequality in access and use opportunities pave the way for unequal income distribution (Yereli & Şahin, 2019).

The study is mainly related to the ethics of artificial intelligence. Apart from revealing the systemic relations while suggesting a model by determining the risks, it has to be developed by integrating as many distinct fields as possible. In order to benefit the entire society while not causing unwanted secondary harm, artificial intelligence system designers must consider that the values, beliefs, and perceptions belong to human beings and are accepted by society. Considering that ethical rules can change over time, artificial intelligence must also have the ability to adapt itself to new rules. At this point, the inclusion of the moral values ​​of society in the development process of artificial intelligence will prevent the emergence of a situation similar to the generation gap, which is seen from time to time and creates an undesirable situation among people of different ages.

With the effect of technology, the digitization of texts has raised access to data, people from various cultures have come together, and intercultural communication has been strengthened. In this way, human communities connected with technological opportunities have swapped the interaction of values, morals, and ethical rules and increased the benefit for society. Modelling social ethics also includes potential advantages like receiving feedback on our social morality and reasoning behaviours while trying to teach our ethical values to autonomous artificial intelligence systems. In the coming years, developing these systems can reach a potent status that machines can establish moral relations with society and may lead to radical changes in social morality. With the help of social psychology, moral philosophy, and sociology, environmental and situational awareness can be brought to the autonomous system by developing semantic analysis capabilities in the design process. In this way, it can be ensured that the newly designed autonomous systems will contribute to social progress in the coming period.

Mathematical functions are used while modelling social values in autonomous systems. The significant issue which desire to keep in mind is the necessity of correctly defining the relationship between two sides. There must be a balance between mathematical terms and social values ​​without bias (Osoba & Welser, 2017). Artificial intelligence technology is relatively new and powerful. However, it is considered that future studies will make significant contributions to the literature by adding extra ethical sensitivities as a security element in the artificial intelligence programming process, and experimental research about social ethics with autonomous systems can be prolific while devising valuable studies on justice, public order, and equal distribution of resources.

Negligency in the process, especially contrary actions to the morality of social life, may cause irreversible consequences and harm humanity's destiny, the social order, and the most basic ideas, such as equality and justice. Incorporating logical, non-prejudiced, and inclusive moral considerations into the process can ensure a successful ethical model and prevent legal susceptibilities and moral degradation while contributing to social progress and development.

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