

Course Title:

Research Methodology in Computer Science.

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Assignment Report:

Ethical and Future Issues of Emerging Technologies.

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Summary:

This research aims to analyze the ethical and future issues associated with emerging technologies, especially artificial intelligence, big data, robotics, and the Internet of Things. Technological advancements are accelerating at an unprecedented rate, creating ethical challenges related to privacy, algorithmic bias, legal liability, and the impact of automation on the labor market. The research reviews the modern literature, analyzes knowledge gaps, and proposes a methodological framework for understanding these issues and anticipating their future. The research also provides predicted results that contribute to promoting the responsible use of emerging technologies, with a timeline for the implementation of the study.

Chapter One:

1. Introduction:

The world is witnessing an accelerating technological revolution led by artificial intelligence, robotics, cloud computing, and the Internet of Things. While these technologies have significant benefits, they raise deep ethical questions related to privacy, fairness, transparency, and accountability. These challenges require in-depth studies to understand their future implications and to put in place regulatory and ethical frameworks that ensure safe and responsible use. This research aims to analyze these issues from a scientific perspective, anticipate their future, and make evidence-based recommendations.

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2. Background:

The ethical issues of emerging technologies have emerged since the beginnings of computing, but they have become more complex with the development of data-driven AI. The scientific background of the topic includes:

- Artificial intelligence has evolved from expert systems to deep learning.
- The use of big data has expanded in decision-making.
- The entry of robots into sensitive sectors such as health and security.
- Concerns about algorithmic bias, invasion of privacy, and job loss.

This background highlights the need for scientific research that balances innovation with ethical responsibility.

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3. Problem Statement:

Despite the wide spread of emerging technologies, current ethical and regulatory frameworks are insufficient to address the challenges they pose. The research problem is:

"There is a clear gap between the rapid evolution of emerging technologies and the ability of existing ethical and regulatory frameworks to keep pace with this evolution, leading to risks of privacy, bias, accountability, and unforeseen future impacts on society."

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4. Research Objectives:

1. Analyze ethical issues associated with emerging technologies, especially artificial intelligence and robotics.
2. Foreseeing the future impacts of these technologies on society and the economy.

3. Assess existing ethical and regulatory frameworks and identify their weaknesses.
4. Propose a future ethical framework that ensures the responsible use of emerging technologies.

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5. Scope of Research:

The research includes:

- Emerging technologies: Artificial intelligence, robotics, big data, Internet of Things.
- Ethical issues: privacy, bias, transparency, accountability, impact of automation.
- Future Analysis: Expectations, Scenarios, Potential Risks.

The research does not cover purely technical aspects or detailed industrial applications.

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Chapter Two: Review of the Extensive Literature on Ethical and Future Issues of Emerging Technologies:

- **General Introduction to Literature Review:**

The last two decades have seen an unprecedented boom in emerging technologies, led by artificial intelligence, big data, robotics, and the Internet of Things. This boom has led to a reshaping of social, economic, and political structures, and the emergence of complex ethical issues that require in-depth study. This review aims to analyze the scientific literature that has addressed these issues, with a focus on algorithmic bias, privacy, transparency, accountability, and the impact of automation on the future of work. The review also reviews the proposed ethical frameworks globally and discusses their effectiveness in addressing future challenges.

- **Ethical Issues in Artificial Intelligence: A Comprehensive View:**

The study by Mittelstadt et al. (2016) is one of the most prominent works that has drawn a comprehensive map of the ethical issues associated with artificial intelligence. The researchers categorized the challenges into six main axes: privacy, manipulation, bias, lack of transparency, responsibility, and influence on work. These issues are not new, but they are becoming more complex with the development of deep learning technologies that rely on massive amounts of data.

This view is consistent with that put forward by O'Neil (2016) in her book *Weapons of Math Destruction*, where she asserted that algorithms can invisibly reproduce social and economic discrimination, especially in areas such as employment, education, and criminal justice. This is one of the most pressing ethical issues, given the fact that organizations rely on algorithms to make fateful decisions.

- **Privacy and Regulatory Capital:**

Privacy is one of the most sensitive ethical issues in the age of big data. Zuboff (2019) addressed this issue in depth in her book *The Age of Surveillance Capitalism*, where she described how personal data has become a commodity to be bought and sold, and how large companies use data to predict and influence user behavior. Zuboff argues that this economic model threatens the autonomy of individuals and undermines the principles of personal freedom.

These concerns are consistent with what Cath (2018) put forward, who discussed the ethical challenges of AI in the public sector, especially in the areas of security and surveillance. He noted that the use of AI to monitor citizens could lead to serious privacy violations, creating an imbalanced balance between security and freedom.

- **Algorithmic bias and digital justice:**

Algorithmic bias is one of the most prominent issues addressed in the recent literature. O'Neil (2016) asserts that algorithms are not neutral, but rather reflect biases in the data they are trained on. This leads to

unfair results, especially in systems that are used to make sensitive decisions such as loans, hiring, or performance appraisals.

As pointed out by Mittelstadt et al. (2016) suggests that algorithmic bias may be invisible, making it difficult to detect and correct. The importance of transparency is highlighted here, an issue that Floridi & Cowls (2019) discussed within their ethical framework based on the principles of justice, benefit and harmlessness.

- **Global Ethical Frameworks: A Critical Analysis**

Jobin, Ienca & Vayena (2019) presented one of the most extensive studies that analyzed more than 80 ethical frameworks for AI around the world. The study concluded that most of these frameworks agree on general principles such as fairness, transparency, and accountability, but lack clear implementation mechanisms. This means that ethical principles are still in the theorizing stage, and there are no practical policies to guarantee their implementation.

This finding supports the study of Whittlestone et al. (2019), which emphasized that ethical principles alone are not enough, and that practical tools and regulatory procedures are needed to ensure adherence to them. The researchers also noted that some principles may conflict with others, such as transparency vs. intellectual property protection.

- **Digital Trust and Responsibility:**

Taddeo & Floridi (2018) discuss the concept of "digital trust", emphasizing that building reliable AI systems requires adherence to the principles of transparency and accountability. The researchers argue that trust is not just an ethical value, but a prerequisite for the widespread adoption of emerging technologies.

In the same vein, Bryson (2018) argued that AI should be treated as a tool rather than as an independent entity, and that ethical responsibility should remain with humans. This view is important in discussions of legal accountability, especially in cases of error or damage caused by intelligent systems.

- **Future Impacts on the Labor Market and Society**

Brynjolfsson & McAfee (2020) addressed the impact of automation on the labor market, predicting the disappearance of many traditional jobs and the emergence of new high-skilled jobs. They noted that digital transformation could lead to an economic gap between those who possess digital skills and those who do not.

Cave & Dignum (2019) also discussed future scenarios for AI, stressing that its impact will not be limited to the economy, but will extend to social values, human relationships, and governance. The researchers predicted that society will face challenges related to over-reliance on intelligent systems and the loss of human control over some decisions.

- **Critical analysis of gaps in the literature:**

A literature review reveals several important research gaps:

1. Lack of clear implementation mechanisms for ethical frameworks

Although there are dozens of ethical principles, most lack practical tools to apply.

2. Lack of studies linking ethics to future foresight

Most of the literature focuses on current problems, while future issues need deeper analysis.

3. The Weakness of Arab and Gulf Studies in this Field

Despite the importance of the subject, Arabic literature is still limited compared to developed countries.

4. The need for applied studies

Most studies are theoretical, and there are not enough practical experiments to test ethical frameworks.

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Summary of previous studies :

1. Bostrom (2014):

He discussed the dangers of super-AI, and emphasized the need to establish ethical controls before reaching advanced levels of AI.

2. O'Neil (2016):

The author addressed algorithmic bias in decision-making systems, and explained how algorithms can reinforce social injustice.

3. Mittelstadt et al (2016)

The researchers provided a comprehensive review of ethical issues in AI, and identified six main areas: privacy, manipulation, bias, lack of transparency, responsibility, and impact on work. This study is one of the most influential works in mapping digital ethics.

4. Cath (2018)

The researcher discussed the ethical challenges of artificial intelligence in the public sector, especially in security and justice, and pointed out the dangers of automated decision-making in sensitive fields.

5. Taddeo & Floridi (2018)

The study addressed the concept of "digital trust" and the importance of building trustworthy AI systems, with a focus on transparency and accountability.

6. Bryson (2018)

The researcher argued that AI should be treated as a tool rather than as an independent entity, and that ethical responsibility should remain with humans and not with systems.

7. Floridi & Cowls (2019):

They provided an ethical framework for AI based on the principles of: benefit, do no harm, justice, and respect for autonomy.

8. Jobin, Ienca & Vayena (2019)

The study analyzed more than 80 global ethical frameworks for artificial intelligence, and found that most of them lack clear

implementation mechanisms, reinforcing the need for actionable policies rather than just general principles.

9. Zuboff (2019)

In *The Age of Surveillance Capitalism*, the researcher analyzes how companies exploit big data to predict user behavior, raising ethical issues related to privacy and control.

10. Whittlestone et al. (2019)

The researchers provided a practical framework for applying ethical principles in AI, focusing on how to turn theoretical principles into actionable policies.

11. Cave & Dignum (2019)

The study discussed the future challenges of AI, especially in the areas of security, employment, and governance, and provided possible future scenarios.

12. Brynjolfsson & McAfee (2020):

They discussed the impact of automation on the labor market, and anticipated the disappearance of traditional jobs and the emergence of new high-skilled jobs.

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Literature Analysis:

- Studies agree that there are real ethical risks.
- There is a gap between technical development and ethical regulation.
- There is an urgent need for a comprehensive framework that balances innovation and responsibility.

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Integrating studies into literature review:

- Analysis of the evolution of ethical frameworks (Jobin et al., Whittlestone et al.)
- Risks of bias and transparency (O’Neil, Mittelstadt et al.)
- Privacy and regulatory capital (Zuboff)
- Future impacts on work and society (Brynjolfsson & McAfee, Cave & Dignum)
- The Concept of Trust and Responsibility (Taddeo & Floridi, Bryson)

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Literature Review Summary:

The literature shows that the ethical issues of emerging technologies are complex and multidimensional, and include privacy, bias, transparency, accountability, and the impact of automation on society. Studies also confirm that current ethical frameworks are inadequate, and that clear practical policies and implementation mechanisms are needed. Foresight is important to understand potential risks and develop proactive strategies.

Chapter Three:

1. Research Methodology:

The research will be based on a qualitative methodology that includes:

- Content analysis of modern scientific literature.
- Compare current ethical frameworks.
- Using the Future Foresight Approach (Foresight) to anticipate scenarios.
- Analyze the gaps between reality and best practices.

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2. Expected Results:

The search is expected to yield the following:

- **Identify current and future ethical issues.**
- **Accurate assessment of the readiness of regulatory frameworks.**
- **Propose a comprehensive and viable ethical framework.**
- **Provide practical recommendations to decision-makers and researchers.**

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3. Gantt Chart:

Duration	Weeks	Stage
1-2	Two weeks	Collecting Literature
3-4	Two weeks	Literature analysis
5-7	3 weeks	Writing the theoretical framework
8	Week	Methodology Preparation
9-10	Two weeks	Analysis of the results
11-12	Two weeks	Writing the Final Draft
13	Week	Review and Coordination

References (APA Style):

Bostrom, N. (2014). Superintelligence: Paths, dangers, strategies. Oxford University Press.

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Mittelstadt, B., Allo, P., Taddeo, M., Wachter, S., & Floridi, L. (2016). The ethics of algorithms: Mapping the debate. Big Data & Society.

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