

Scientific Methodology in Computer Science

MO430

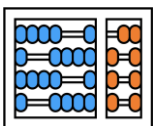
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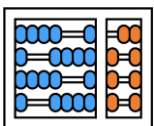
Agenda

- Introduction to Research Ethics
- Key Principles of Research Ethics
- Informed Consent in Computer Science
- Confidentiality and Privacy
- Data Ownership and Usage
- Ensuring Diversity in Technology
- Emerging Technologies and Ethical Challenges
- Global Perspectives on Research Ethics
- Institutional Review Board
- Codes of Ethics
- Informed Consent
- Social Impact of Research
- Social Responsibility of the Researcher
- Ethics in Publications
- Research Ethics Committees
- Case Studies
- Contemporary Challenges in Research Ethics
- Conclusion
- Future Directions in Research Ethics



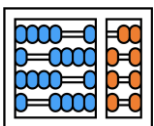
Definition of Research Ethics

- Research Ethics governs the ethical conduct of research involving human subjects, animals, and data.
- Ensures adherence to principles that protect the rights, well-being, and confidentiality of participants.



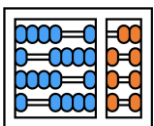
Importance of Research Ethics

- Welfare of Participants: Ensuring ethical treatment of individuals involved in studies.
- Integrity of Findings: Upholding the honesty and reliability of research results.
- Trust in Research Community: Building confidence among researchers, participants, and the public.
- Regulatory Compliance: Meeting legal and ethical standards.



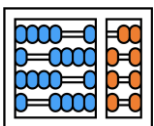
Key Principles of Research Ethics

- Respect for Autonomy:
 - Informed Consent: Clearly explaining research goals and obtaining voluntary agreement.
 - Obtaining consent for data collection, analysis, and potential sharing.
 - Providing clear information about the study's purpose and potential risks.
 - Withdrawal Rights: Ensuring participants can leave the study at any point.
 - Clearly communicating the right to withdraw without penalty.
 - Providing ongoing opportunities for participants to withdraw.



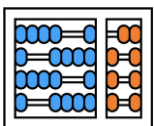
Key Principles of Research Ethics

- Beneficence:
 - Maximizing Benefits: Striving to achieve positive outcomes for participants and society.
 - Ensuring research contributes to knowledge advancement or societal betterment.
 - Considering the potential positive impact on participants and communities.
 - Risk-Benefit Analysis: Balancing potential harms with anticipated benefits.
 - Thoroughly assessing potential risks to participants and mitigating them.
 - Ensuring that potential benefits outweigh any foreseeable harms.



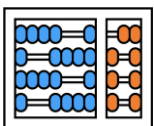
Key Principles of Research Ethics

- Justice:
 - Fair Participant Selection: Ensuring diverse representation without bias.
 - Actively seeking diverse participants to avoid underrepresentation.
 - Addressing potential biases in recruitment processes.
 - Equitable Distribution: Fairly sharing the benefits and burdens of research.
 - Ensuring that benefits are distributed fairly among participants and communities.
 - Minimizing any disproportionate burdens on specific groups.



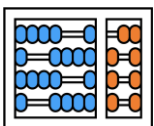
Informed Consent in Computer Science

- Informing participants about data collection methods and potential uses.
 - Detailing the types of data collected, such as personal information, usage patterns, or preferences.
 - Providing examples of how the collected data will be utilized in the study.
- Obtaining explicit consent for collecting personal information in machine learning studies.
 - Clearly explaining the role of personal information in training machine learning models.
 - Offering options for participants to consent or opt-out of specific data collection activities.



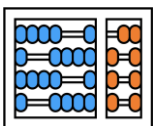
Confidentiality and Privacy

- Encrypting sensitive data to protect participant privacy.
 - Implementing encryption algorithms to secure personally identifiable information.
 - Ensuring that only authorized personnel have access to decryption keys.
- Ensuring that anonymization techniques are applied to datasets before sharing.
 - Using methods like data anonymization, pseudonymization, or aggregation to protect participant identities.
 - Conducting thorough checks to prevent re-identification of individuals in shared datasets.



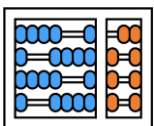
Data Ownership and Usage

- Clearly defining who owns the data generated during the research.
 - Establishing data ownership agreements in collaboration with participants, organizations, or funding agencies.
 - Communicating clearly how the data will be used, stored, and shared.
- Discussing responsible data storage and disposal practices in computer science.
 - Adhering to secure data storage protocols, including encryption and access controls.
 - Outlining procedures for data disposal, ensuring compliance with legal and ethical standards.



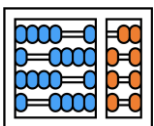
Ensuring Diversity in Technology

- Promoting diversity in research teams and technology development.
 - Establishing inclusive hiring practices to ensure diverse perspectives in technology development.
 - Encouraging collaboration with underrepresented groups in STEM fields.



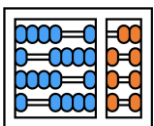
Emerging Technologies and Ethical Challenges

- Discussing ethical considerations in emerging fields like quantum computing and biotechnology.
 - Addressing potential ethical implications of manipulating genetic information in biotechnology.
 - Exploring ethical considerations in the development and use of quantum computing technologies.



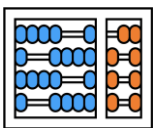
Global Perspectives on Research Ethics

- Considering cultural differences in ethical norms and practices in international research collaborations.
 - Understanding cultural variations in attitudes toward privacy and informed consent.
 - Collaborating with international partners to establish ethical guidelines that respect diverse cultural perspectives.



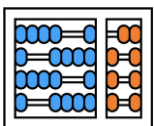
Institutional Review Board (IRB)

- Obtaining IRB approval for studies involving human subjects.
 - Collaborating with the IRB to ensure that research protocols align with ethical standards.
 - Clearly documenting IRB-approved procedures in research proposals.



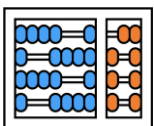
Codes of Ethics

- In the realm of computer science research, adherence to established codes of ethics is paramount.
- ACM Code of Ethics and Professional Conduct:
 - The Association for Computing Machinery (ACM) provides a comprehensive code that outlines ethical considerations for computing professionals.
 - Key principles include integrity, transparency, fairness, and the responsibility to use computing resources for societal benefit.



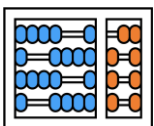
Informed Consent

- Informed consent is a cornerstone of ethical research, ensuring participants have a clear understanding of the study and willingly participate.
- Importance of Informed Consent:
 - Respects autonomy and ensures voluntary participation.
 - Provides transparency about the research purpose and potential risks.
- Obtaining and Documenting Consent:
 - Clearly articulate the study's objectives and procedures.
 - Use comprehensible language and allow for participant questions.
 - Document consent through signed forms or electronic means.



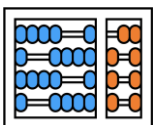
Social Impact of Research

- Acknowledging the broader societal implications of computer science research is essential for ethical considerations.
- Ethical Considerations in Technological Development:
 - Examining how technology may impact marginalized communities.
 - Evaluating potential biases in algorithms and AI systems.
- Public Engagement:
 - Including public input in the development process.
 - Addressing concerns related to job displacement, privacy, and accessibility.



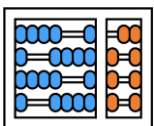
Social Responsibility of the Researcher

- Researchers play a pivotal role in shaping the societal impact of their work, emphasizing ethical and responsible conduct.
- Contributing Positively to the Community:
 - Engaging in projects that address societal challenges.
 - Sharing knowledge and expertise to benefit local and global communities.
- Balancing Innovation and Ethical Considerations:
 - Striving for technological advancements that align with ethical standards.
 - Participating in public discourse on the responsible use of technology.



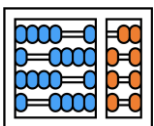
Ethics in Publications

- The ethical conduct of researchers extends to the dissemination of research findings through publications.
- Ethical Guidelines for Authorship, Review, and Publication:
 - Authorship: Proper attribution and acknowledgment of contributors.
 - Review Process: Conducting fair and constructive peer reviews.
- Consequences of Misconduct:
 - Addressing plagiarism, data fabrication, and other forms of academic misconduct.
 - Potential repercussions for individuals and the academic community.



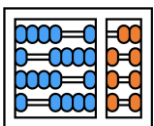
Research Ethics Committees

- Ethical oversight is provided by Research Ethics Committees (RECs), ensuring that studies involving human subjects adhere to ethical principles.
- Role of RECs:
 - Reviewing research proposals to ensure ethical standards are met.
 - Protecting participants' rights, safety, and well-being.
- Ethical Review Process:
 - Documentation of study objectives, methodologies, and participant protections.
 - Ensuring informed consent procedures and data protection measures.



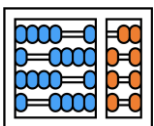
Case Studies

- Examining real-world case studies in research ethics helps researchers navigate complex ethical dilemmas.
- Relevant Case Studies:
 - Privacy Concerns in Data-Intensive Research: Addressing challenges in protecting participant privacy.
 - Bias in Algorithmic Decision-Making: Strategies to identify and mitigate algorithmic biases.
- Group Discussion:
 - Encourage participants to analyze and discuss ethical approaches in response to the presented case studies.



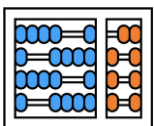
Contemporary Challenges in Research Ethics

- As technology evolves, new ethical challenges emerge in computer science research that require proactive consideration.
- Identifying Emerging Ethical Challenges:
 - Ethical implications of advanced technologies like brain-computer interfaces.
 - Navigating the ethical landscape of augmented reality and virtual reality technologies.
- Discussion on Addressing Challenges:
 - Collaborative efforts to establish ethical frameworks for emerging technologies.
 - Ongoing dialogue and adaptability to address evolving ethical concerns.



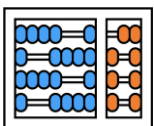
Conclusion

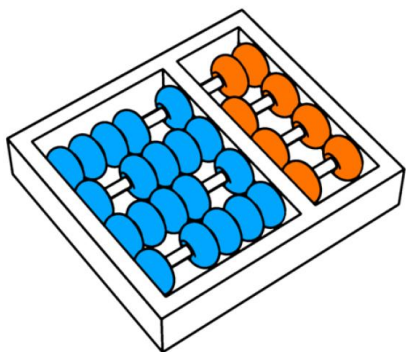
- Research ethics is foundational in computer science for responsible and impactful technological advancements.
- Adhering to ethical principles is vital for building public trust in the field.



Future Directions in Research Ethics

- Discussing the evolving landscape of research ethics in the context of advancing technologies.
- Exploring the ethical implications of emerging technologies such as augmented reality and brain-computer interfaces.
- Anticipating future challenges and developing proactive ethical frameworks.





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