Unit 1: Introduction to Research Methods. The Scientific Investigation and Ethics in Computing

Required Reading

Dawson, C. (2015) Projects in Computing and Information Systems: A Student's Guide. Harlow: Pearson.

- Chapter 2 p 24-25.
- Chapter 2 p 38-40.

Summary

Pages 24-25 of Chapter 2 discuss the reasoning processes behind research, particularly the roles of inductive and deductive reasoning. Inductive reasoning involves drawing general conclusions from specific observations, forming theories and models based on collected data. In contrast, deductive reasoning starts with existing knowledge and applies it to predict or explain phenomena. The text highlights that intellectual discovery is a complex process, often requiring a combination of these reasoning approaches. Additionally, it introduces alternative problem-solving techniques, such as assuming a problem is solved and working backward or assuming a solution is impossible and attempting to prove why. These strategies help refine research questions and approaches, emphasizing the importance of critical thinking and logical analysis in research.

Pages 38-40 focus on ethical considerations in research, particularly when involving participants. The chapter stresses the need for integrity, honesty, and respect in conducting research, ensuring that data is handled responsibly and participants are treated ethically. Issues such as plagiarism, data fabrication, and selective reporting are highlighted as unethical practices that must be avoided. The section also covers ethical concerns when dealing with human participants, emphasizing informed consent, confidentiality, and the protection of vulnerable groups. Researchers must ensure that data collection follows ethical guidelines, including compliance with data protection laws and institutional review boards. The chapter reinforces the idea that ethical research is not only about following rules but also about upholding the integrity and credibility of the research process.

Reflection

Reflecting on these sections, they emphasize the intellectual rigor and ethical responsibility required in research. The discussion on inductive and deductive reasoning highlights the need for a balanced approach to problem-solving, encouraging researchers to remain open to new interpretations and solutions. The ethical considerations serve as a reminder that research is not just about producing results but also about ensuring fairness, accuracy, and respect for those involved. This reinforces the importance of both analytical thinking and ethical responsibility in conducting meaningful and credible research.

Correa, N. et al. (2023) Worldwide AI ethics: A review of 200 guidelines and recommendations for AI governance.

Summary

The paper conducts a meta-analysis of 200 AI ethics guidelines from various stakeholders worldwide. It explores the ethical principles shaping AI development and governance, highlighting key concerns such as transparency, accountability, privacy, and fairness. The study identifies 17 commonly recurring ethical principles and presents an open-source database for further research. The authors critique the lack of practical implementation strategies, the over-reliance on soft regulatory measures, and the underrepresentation of perspectives from certain regions, particularly Latin America, Africa, and the Middle East. The paper underscores the need for enforceable AI regulations and continued efforts to address ethical concerns globally.

Reflection

Reflecting on this study, it is evident that while the ethical discourse surrounding AI has expanded significantly, major challenges remain in translating principles into actionable policies. The overrepresentation of Western perspectives in AI governance raises concerns about inclusivity and the global applicability of ethical frameworks. Additionally, the dominance of private corporations in setting AI ethics guidelines suggests a need for stronger governmental oversight to ensure public interests are safeguarded. The study highlights the importance of balancing ethical considerations with technological advancement, reinforcing the idea that AI governance should be both adaptive and inclusive to accommodate diverse societal needs.

Finn, M., & Shilton, K. (2023). Ethics governance development: The case of the Menlo Report. Social Studies of Science 53(3): 315-340.

Summary

The article examines the creation and impact of the 2012 Menlo Report, which established ethical guidelines for information and communications technology (ICT) research. The report was developed by computer scientists, lawyers, and U.S. government officials in response to past ethical controversies in cybersecurity and network measurement research. It sought to integrate ethical principles into governance structures by adapting the Belmont Report's framework, adding a fourth principle of "respect for law and public interest." The Menlo Report's development process was shaped by both practical concerns—such as the need for funding and stakeholder involvement—and conceptual challenges, including defining network data as human subjects' data. While the report influenced academic conference policies and ethical review processes, it also introduced new uncertainties about the role of Institutional Review Boards (IRBs) and the applicability of human subjects research principles to computing fields.

Reflection

Reflecting on this case study, it is evident that ethical governance in ICT research is an ongoing and complex process. The Menlo Report demonstrates how ethical guidelines evolve through negotiation, compromise, and adaptation of existing frameworks. However, its challenges highlight the difficulty of establishing universally accepted ethical norms, particularly when balancing legal constraints, public interest, and the evolving nature of technology. The report's reliance on human subjects research principles, while useful, may not fully address the broader social and institutional harms posed by network and cybersecurity research. This case underscores the importance of continuous ethical reflection and the need for diverse perspectives in shaping governance mechanisms that are responsive to technological and societal changes.

Fjeld, J., Achten, N., Hilligoss, H., Nagy, A. & Srikumar, M. (2020) Principled artificial intelligence: Mapping consensus in ethical and rights-based approaches to principles for AI. Berkman Klein Center Research Publication.

Summary
The article "Principled Artificial Intelligence: Mapping Consensus in Ethical and Rights-Based Approaches to Principles for AI" examines 36 AI principles documents from various global stakeholders to identify common themes and emerging sectoral norms. The study highlights eight key principles frequently referenced in these documents: privacy, accountability, safety and security, transparency and explainability, fairness and non-discrimination, human control of technology, professional responsibility, and the promotion of human values. The research reveals that while AI governance documents originate from different actors—governments, corporations, advocacy groups, and intergovernmental organizations—they converge on core ethical concerns. The authors also emphasize the growing influence of international human rights law in shaping AI ethics and governance frameworks. However, they caution that while principles are important, their real impact depends on how they are integrated into legal, policy, and institutional frameworks.
Reflection
Reflecting on this study, it is clear that while there is growing consensus on the ethical dimensions of AI, the challenge lies in translating these principles into enforceable regulations and meaningful governance structures. The convergence of ethical guidelines suggests progress toward a global normative framework, yet the effectiveness of such principles remains contingent on their implementation. Furthermore, the emphasis on human rights highlights the need for AI governance to be rooted in established legal frameworks rather than relying solely on voluntary commitments from corporations and governments. The study underscores that ethical AI development is not just about crafting idealistic principles but about ensuring accountability, inclusivity, and protection against potential harms.

Deckard, R. (2023) What are Ethics in AI. BSC.

Summary
The article by Richard Deckard explores the principles and professional avenues related to AI ethics. It highlights the importance of integrating fairness, transparency, and accountability into AI technologies. Deckard outlines key steps for becoming an AI ethicist, such as developing a strong foundation in ethics and technology, staying informed about AI developments, understanding the social context of AI ethics, and building effective communication skills. The piece also emphasizes collaboration across disciplines and engagement in public policy to foster ethical AI practices.
Reflection
Reflecting on this piece, it becomes clear that AI ethics plays a vital role in shaping the responsible use of rapidly evolving technologies. The intersection of social science and technical innovation underscores the need for thoughtful consideration of power dynamics and cultural sensitivities. As AI increasingly affects human lives, professionals in this field bear the responsibility to create practical solutions while navigating complex ethical challenges. This multidisciplinary career path is not only intellectually stimulating but also essential for ensuring a socially responsible technological future.

BCS. (2021) The Chartered Institure for IT. The Code of Conduct.

Summary
The BCS Code of Conduct outlines the professional standards required for members of the British Computer Society. The document emphasizes four primary tenets: public interest, professional competence and integrity, duty to relevant authorities, and duty to the profession. It mandates members to prioritize the well-being of individuals, respect diversity, uphold confidentiality, and act responsibly in their professional roles. The code also emphasizes the importance of continuous professional development, fostering ethical behavior, and maintaining the integrity of the IT profession. Members are expected to comply with relevant legislation and contribute positively to the reputation of the field.
Reflection
Reflecting on this code, it becomes apparent how critical ethical principles are in maintaining trust and integrity within the IT profession. As technology plays an increasingly dominant role in shaping society, adherence to such codes helps mitigate risks related to privacy breaches, discrimination, and misconduct. The emphasis on lifelong learning and collaboration further highlights the dynamic and evolving nature of the IT field. This document serves as a reminder that professionalism involves not just technical expertise but a strong ethical compass and responsibility toward society and one's peers.

Miessler, D. (2020) The Difference between Deductive and Inductive Reasoning.

Summary
Daniel Miessler's article, The Difference Between Deductive and Inductive Reasoning, explains two fundamental approaches to problem-solving. Deductive reasoning starts with a general idea or premise, followed by observations and conclusions that are guaranteed to be true if the premises are correct. In contrast, inductive reasoning begins with specific observations that lead to generalizations or theories, though these conclusions lack absolute certainty. Deduction is more precise and suited for structured, scientific contexts, while induction is practical for everyday situations involving incomplete information. Miessler also mentions abductive reasoning, which involves finding the most likely explanation based on evidence.
Reflection
Reflecting on the distinctions between these reasoning methods highlights their complementary roles in human thinking. Deductive reasoning offers clarity and certainty but can be difficult to apply in messy real-world scenarios. Inductive reasoning, though less conclusive, allows for adaptive and creative solutions. The cyclical interplay between these approaches—using induction to form theories and deduction to test their validity—demonstrates the nuanced way humans navigate uncertainty and complexity. Miessler's emphasis on using reasoning responsibly encourages readers to avoid conflating induction with the certainty of deduction, fostering a more thoughtful problem-solving mindset.

ACM (n.d.) Code of Ethics: Case studies.

QuestionPro. (2021) What is research?

Summary
The webpage provides a comprehensive overview of research, its definition, characteristics, purposes, and methodologies. It defines research as a systematic process of inquiry aimed at describing, explaining, predicting, and controlling observed phenomena. The document distinguishes between inductive and deductive methods, associating them with qualitative

and quantitative research, respectively. It outlines three main purposes of research: exploratory, descriptive, and explanatory, each serving different roles in data collection and analysis. Furthermore, it details various research methods, including qualitative techniques like interviews and case studies and quantitative approaches such as surveys and correlational studies. The document concludes with best practices for conducting accurate research, emphasizing validity, reliability, and systematic analysis.

Reflection

Reflecting on this webpage, it highlights the fundamental role of research in generating knowledge and solving real-world problems. The structured approach presented reinforces the importance of using appropriate methodologies to ensure credibility and accuracy. Understanding the distinctions between research types and methods is crucial for making informed decisions, whether in academic studies or business applications. The emphasis on ethics and systematic inquiry serves as a reminder that research should be conducted with integrity and transparency. Overall, this document serves as a valuable resource for anyone looking to develop a deeper understanding of research and its applications.

Additional Reading

Miller, T., Birch, M., Mauthner, M. & Jessop, J. (2012) Ethics in Qualitative Research. 2nd Ed. London: SAGE.

- Chapters 4, 5, 6, 10, and 11.

Anderson, H. & Hepburn, B. (2020) Scientific Method. The Stanford Encyclopedia of Philosophy (Winter 2020 edition). Metaphysics Research Lab Stanford University.

IBM. (n.d.).IBM's Principles for Trust and Transparency

Office for Human Research Protections (OHRP). (2018) The Belmont Report.

Gov.uk (n.d.) Government guidance on Data Protection.

Gov.uk (n.d.) Government guidance on intellectual property.

Legislation.gov.uk (n.d.) UK Data Protection Act 2018.

British Research Methodology (BRM). (2018) Research Approach.

Gray, G. (2014) TEDxVictoria 2014: Trust in research -the ethics of knowledge production.

SAP. (n.d.).SAP's Guiding Principles for Artificial Intelligence