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CO643 – Week 2
Ethics

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Outline

- Ethics
- Computer Ethics
- Ethical Research
- Ethical Software & AI
- Conclusions

Some of the materials are inspired by previous years' lectures

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Learning Outcomes

- After this lecture, you will be able to
  - Define ethics and describe what ethical research is
  - Compare traditional ethics with computer ethics
  - Understand the principles behind ethical software development
  - Review scenarios for ethical decision-making

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Definitions

- Ethics as a branch of philosophy
- Philosophy of science: How to carry out research, logic and reasoning
- “The aim of philosophical inquiry is to gain insight into questions about knowledge, truth, reason, reality, meaning, mind, and value”

Anthony Clifford Grayling

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Definitions

- "Philosophy is a study of problems which are ultimate, abstract and very general"
  - Nature of existence
  - Knowledge
  - Morality
  - Reason
  - Human purpose

Teichmann and Evans

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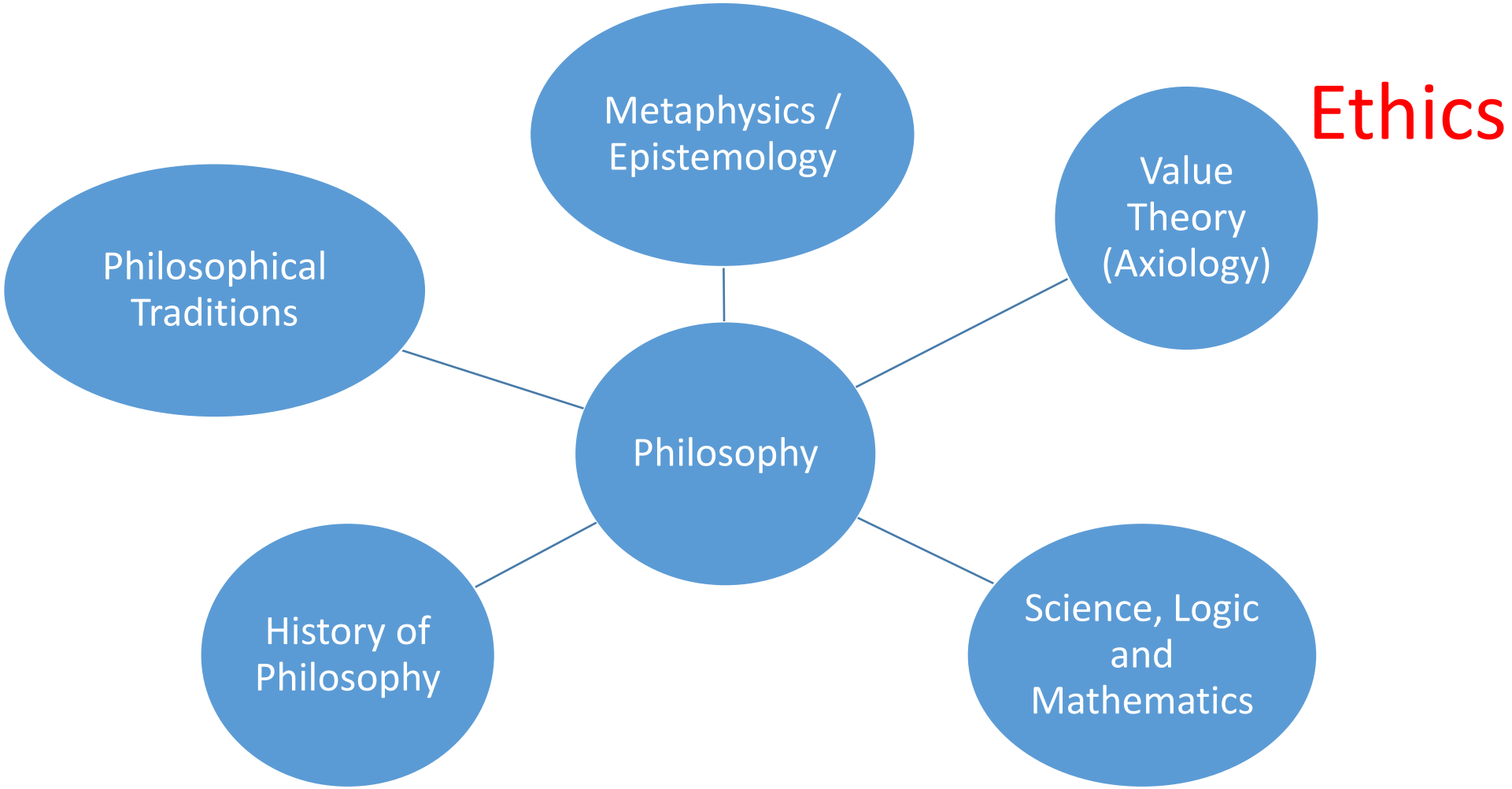
Areas of Philosophy



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Definitions

- Ethics:
  - Derived from the Greek word Ethos
  - Branch of philosophy that involves systematising, defending, and recommending concepts of right and wrong conduct
- Morality:
  - Derived from the Latin word Mores
  - A system of rules for guiding human conduct, and principles for evaluating those rules

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Examples of Ethical Choices

- Money falling out of a person's pocket
  - Tell them
  - Pick it up and keep it
  - Do nothing
- Doctor and patient
  - Tell them they have 3 months to live
  - Tell them everything is fine

http://rickhendershot.com/?p=1767

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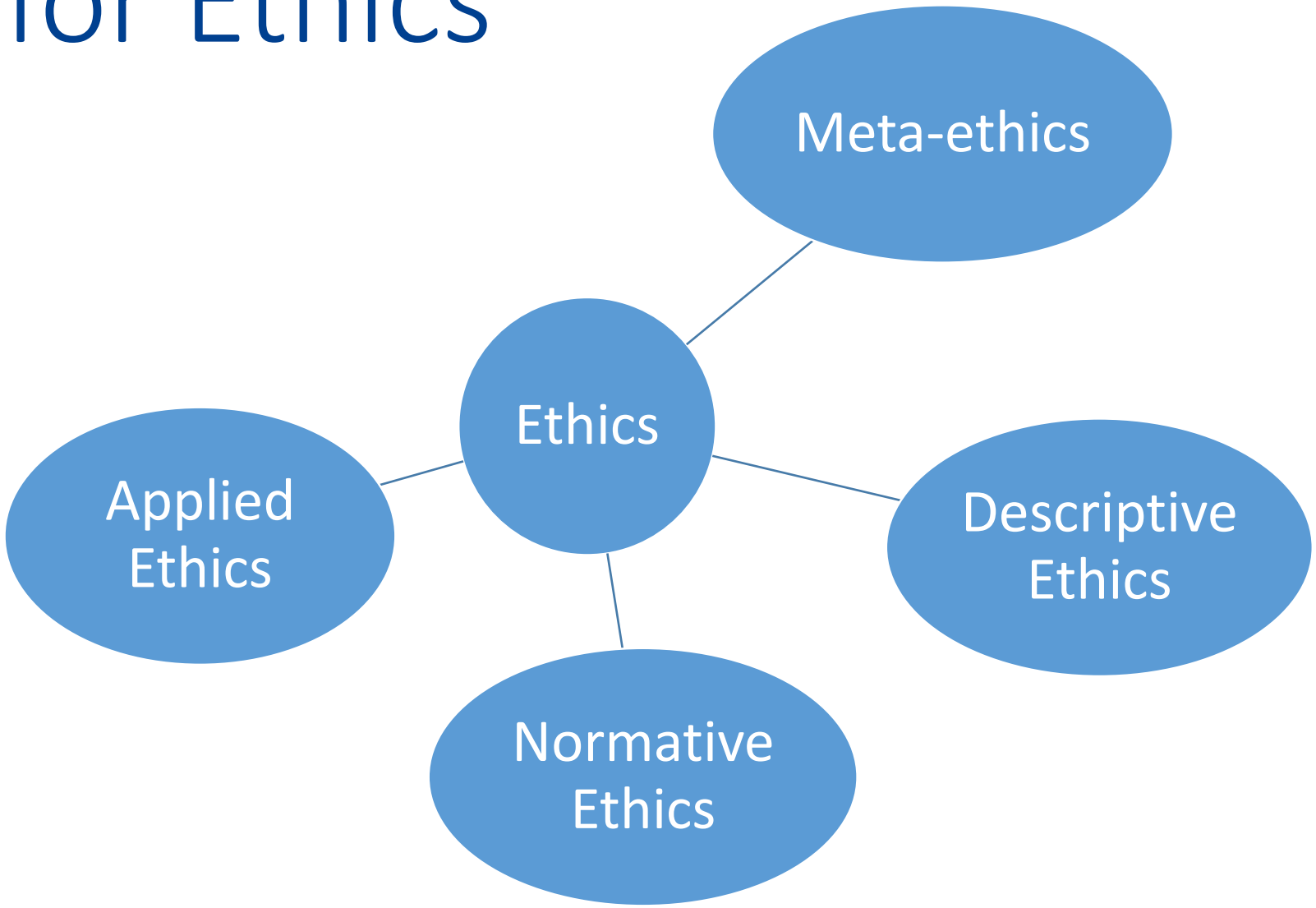
Areas for Ethics



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Meta-ethics

- Seeks to understand the nature of ethical properties, statements, attitudes, and judgments
  - What do the words “good”, “bad”, “right” and “wrong” mean?
  - How do we know if something is right or wrong?

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Descriptive ethics

- What do people think is right?
- Study of moral belief and practices of different people and cultures
- Non-judgemental: Why do people hold particular moral beliefs?

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Applied Ethics

- Address pressing moral problems in society and in professional ethics
  - Medical ethics
  - Business ethics
  - Social issues

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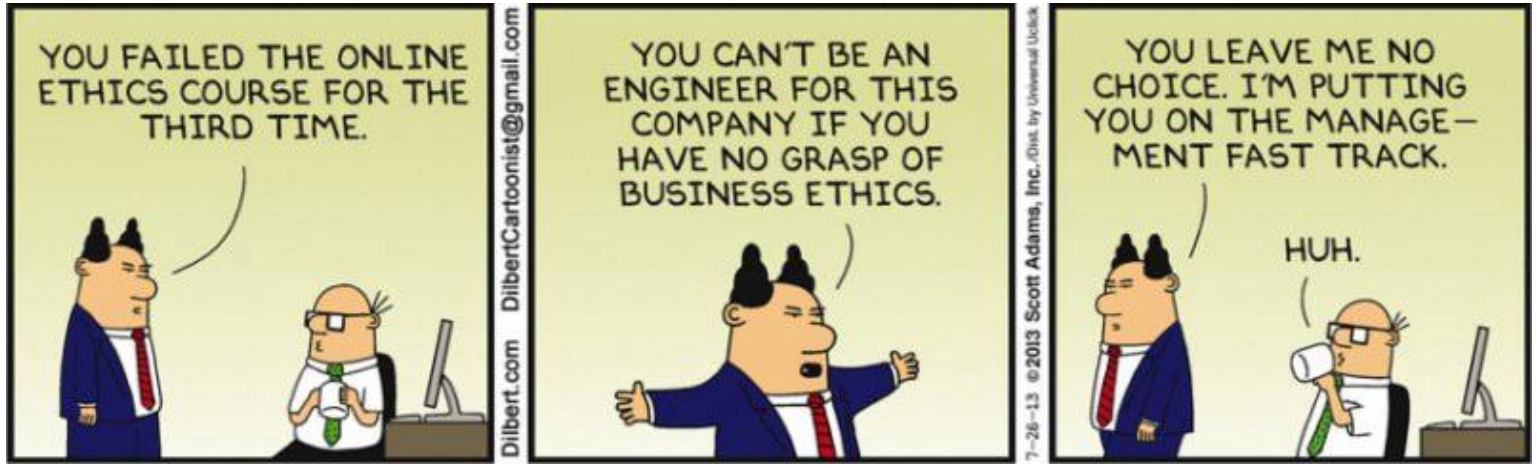
Normative Ethics

- How should we act?
  - Depends on the context
  - Depends on the available set of actions
- Governed by social norms and regulations
  - Silence your phone in the library
  - Don’t disclose sensitive health information to strangers

Areas of Normative Ethics

- Virtue ethics
- Consequent-based (utilitarianism)
- Duty-based
- Contract-based
- Role-based
- Pragmatic ethics
- Care-based



https://medium.com/@standardoftrust/business-ethics-is-now-more-important-than-ever-deaf35f954a9

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Virtue Ethics

- Focus on virtues of mind and character
- Studies the virtue or moral character of the person carrying out an action
  - How are virtues acquired?
  - How are they applied in real life contexts?

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Utilitarianism

- Focus on the consequences
- The primary goal of a moral system is to produce desirable consequences, e.g. maximum happiness for the society

John Stuart Mill
Jeremy Bentham

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Utilitarianism

- "An individual act X or a social policy Y is morally permissible if the consequences that result from X or Y produce the greatest amount of good for the greatest number of persons affected by the act or policy"

Herman Tavani

Example Utilitarianism

- If Policy Y encourages the development of a certain kind of computer software, which in turn would produce more jobs and higher incomes for those living in Community X, then Policy Y would be considered socially useful and thus the morally correct policy

https://www.psychologytoday.com/us/blog/ulterior-motives/201305/your-ethical-mindset

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Types of Utilitarianism

- Act utilitarianism
  - "An act, X, is morally permissible if the consequences produced by doing X result in the greatest good for the greatest number of persons affected by act X"
- Rule utilitarianism
  - "An act, X, is morally permissible if the consequences of following the general rule Y, of which act X is an instance, would bring about the greatest good for the greatest number"

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Flaws of Utilitarianism

- A fictional policy is under consideration in a legislative body in some nation, where 1% of the population would be randomly selected to work in a manufacturing facility to produce computer chips at a minimum wage
- Proponents of this policy argue that, if enacted as law, it would result in lower prices for desktop computers
- It would also likely result in more overall happiness for the nation's citizens because the remaining 99% of the population, who are not selected, would be able to purchase PCs at a much lower price

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Deontology (Duty-based)

- Focus on the rightness or wrongness of actions themselves
  - As opposed to the rightness or wrongness of the consequences of those actions (utilitarianism)
  - Or to the character and habits of the actor (virtue ethics)

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Social Contracts

- Rational human beings enter into contracts with one another and give up some freedoms to be protected under a system of rules
- Governments are capable of enforcing these rules

Thomas Hobbes

www.flaticon.com

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Conflicting Moral Obligations

- What we should do when two or more duties conflict?
- Weigh the evidence at hand to determine which course of action would be required in a particular circumstance

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Ethics and the Law

- Are ethics and the law the same?
  - An act can be ethical, although in the eyes of the law illegal
  - An act may be considered unethical, and yet in the eyes of the law it remains legal

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Computer Ethics

- How does it all connect to computing?
- We use computers to help with our choices
- Computers make choices too
  - Increasingly on their own due to new advances in machine learning
  - We do not necessarily know how they make those choices

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Definitions

- *"The analysis of the nature and the social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology"*

James Moor

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Definitions

- *"The study of the ethical questions that arise as a consequence of the development and deployment of computers and computing technologies"*
  - *Identifying and bringing into focus the issues and problems that fall within its scope, raising awareness of the ethical dimension of a particular situation*
  - *Providing an approach to these issues, a means of advancing our understanding of, and suggesting ways of reaching wise solutions to these problems*

Deborah Johnson

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Uniqueness of Computer Ethics

- New technology has been introduced that never existed before
- New human actions that were not possible (or economically viable) before

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Differences from Traditional Ethics

- The logical malleability of computers
- *"Just, as the power of a steam engine was the raw resource of the Industrial Revolution so the logic of a computer is a raw resource of the Information Revolution. Because the logic applies everywhere, the potential applications of computer technology appear limitless. The computer is the nearest thing we have to a universal tool. Indeed, the limits of computers are largely the limits of our own creativity"*

James Moor

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Differences from Traditional Ethics

- The computer's impact on society
- *"Computers have been used for years by businesses to expedite routine work, such as calculating payrolls. However, as personal computers become widespread and allow executives to work at home, and as robots do more and more factory work, the emerging question will be 'What is the nature of this work?'"*

James Moor

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Differences from Traditional Ethics

- The invisibility factor
- Computer operations are not transparent to the users in most circumstances
- *"When interest on a bank account is calculated, there is often a fraction of a cent left over after rounding off. This programmer instructed a computer to deposit these fractions of a cent to his own account"*

James Moor

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Similarities

- Some argue that issues with computer ethics are not new or unique
- *"The underlying flexibility of math and logic is greater than that of the computer, but we did not develop logic ethics and mathematics ethics"*

Gotterbarn

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Similarities

- "Revise our definition of certain rights such as privacy in light of the new realities created by the phenomenon of digital disclosure. Although we need to reinterpret what the right to privacy means on the frontiers of cyberspace, it is important to underline that the notion of a right to privacy, a right to control of information about oneself, has not lost its intelligibility"

Spinello

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Benefits for Computer Professional

- Trust
- Security
- Comfort

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Ethical Research

- What is research? “Process of investigation leading to new insights, effectively shared”
- What is research ethics? “Research is conducted to the highest level of ethical standards and in accordance with current legislation and policy requirements”

Research Ethics

- Animals
- The environment and cultural objects
- Human participants

https://xaperezsindin.com/2013/03/28/is-the-only-aim-to-do-the-best-work/

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Purpose of Research Ethics

- To protect
  - The dignity, rights, safety and well-being of research participants
  - The safety and reputation of researchers
  - The reputation of the institutions

University of Kent - Research Integrity: Code of Ethical Practice For Research

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Working with Human Participants

- Any form of data collection from humans
  - Online surveys, interviews, asking friends for their data
  - Are you asking for any sensitive information, e.g. email addresses, Twitter handles?
- Ensure secure storage of such data: Encrypted, locked
- With whom are you sharing the data? Properly anonymised?

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Example: Collecting Data

- You want to evaluate how effective your new Android app is in helping users manage their privacy settings, e.g. location sharing
  - How do you select participants? Inclusion and exclusion criteria
  - Are you going to get written consent from the participants?
  - Have you disclosed everything your participants need to know?
  - Do you need any demographics information, e.g. age, ethnicity?

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Example: Working with Public Data

- You want to use a public dataset to train your machine learning model
  - Previously gathered data by other researchers
  - Usually does not involve sensitive data, i.e. personally identifiable information

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Ethical Software Engineering

- Primary focus of a software engineer: Developing user functionality
- Secondary focus:
  - Documentation
  - Testing
  - Security & privacy
  - …
  - Ethics

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Software Engineering Code of Ethics

- IEEE-CS/ACM joint task force
- Software engineers shall commit themselves to making the analysis, specification, design, development, testing and maintenance of software a beneficial and respected profession
- Commitment to the health, safety and welfare of the public

https://www.computer.org/web/education/code-of-ethics

IEEE/ACM Principles

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Principles - Public

- Approve software only if they have a well-founded belief that it is safe, meets specifications, passes appropriate tests, and does not diminish quality of life, diminish privacy or harm the environment
- Disclose to appropriate persons or authorities any actual or potential danger to the user, the public, or the environment
- Be fair and avoid deception in all statements, particularly public ones, concerning software or related documents, methods and tools

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Principles – Client and Employer

- Not knowingly use software that is obtained or retained either illegally or unethically
- Use the property of a client or employer only in ways properly authorised, and with the client's or employer's knowledge and consent

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Principles - Management

- Attract potential software engineers only by full and accurate description of the conditions of employment
- Not ask a software engineer to do anything inconsistent with the ethical code

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Principles - Self

- Improve their ability to create safe, reliable, and useful quality software at reasonable cost and within a reasonable time
- Improve their ability to produce accurate, informative, and well-written documentation

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Ethical AI

- Ethical issues surrounding intelligent entities
- Typically, associated with robots
  - Robots ethics
  - Robots as weapons
- Machine ethics
  - Algorithms
  - Machine learning bias

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Three Laws of Robotics

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws

Isaac Asimov

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Robot Rights

- People should have moral obligations towards their machines
- Rights such as
  - Right to exist
  - Perform its own mission
  - Equality before the law

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Machine learning

- The promise of providing more objective, data-driven results
- Used in online advertising, credit ratings, criminal sentencing, etc
- A source for perpetuating social inequalities and discrimination

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Bias

- Women are less likely to be shown high-income job ads by Google
- Amazon's same-day delivery service is systematically not available in black neighborhoods

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Case Studies

- How should machines carry our ethical decisions?
- What responsibilities should they have?
- Should they be supervised by human experts in critical situations?

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Autonomous Cars

https://www.nytimes.com/2012/10/28/automobiles/yes-driverless-cars-know-the-way-to-san-jose.html

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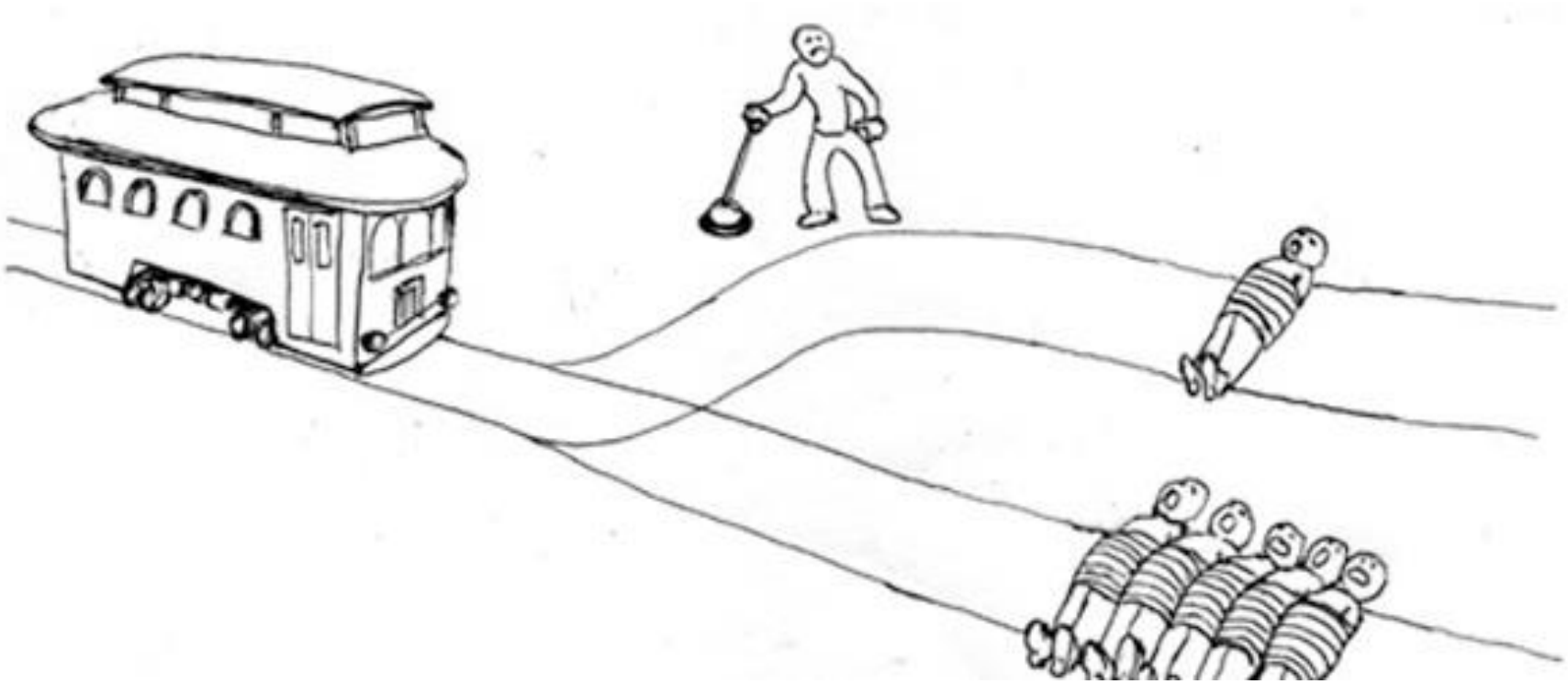
Trolley Problem



https://imgur.com/gallery/pKEMa

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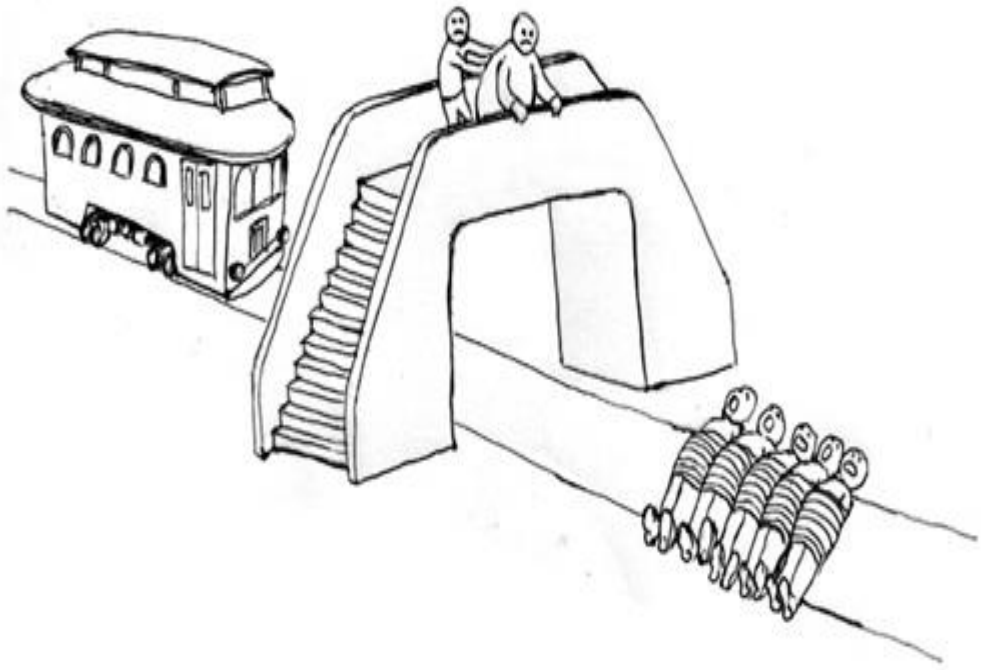
Variations

- <u>The fat man:</u> As before, a trolley is hurtling down a track towards five people. You are on a bridge under which it will pass, and you can stop it by putting something very heavy in front of it. As it happens, there is a very fat man next to you. Your only way to stop the trolley is to push him over the bridge and onto the track, killing him to save five.

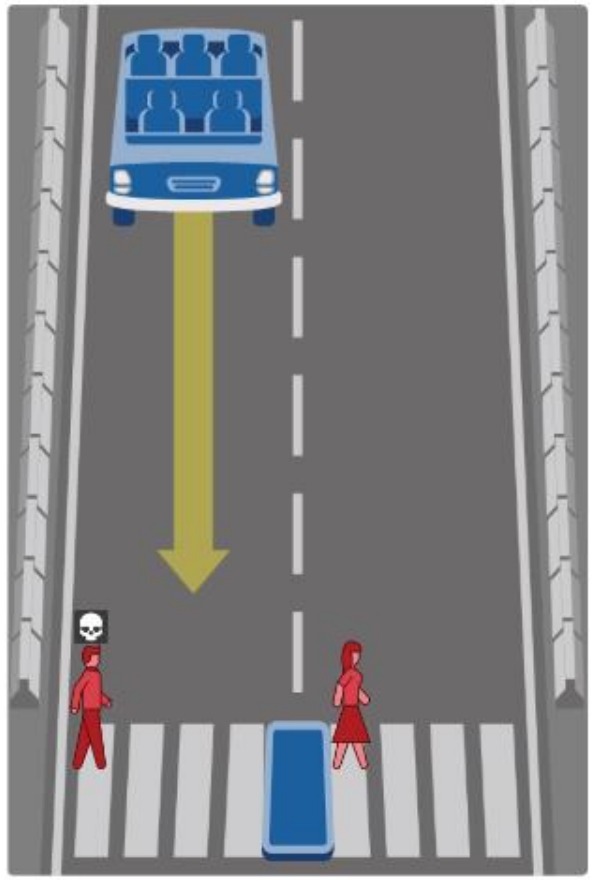


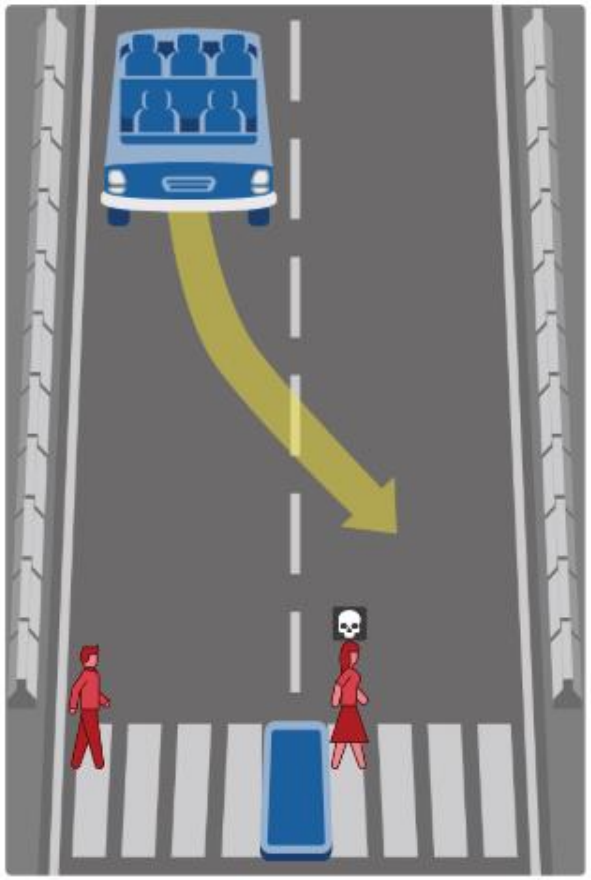
https://imgur.com/gallery/pKEMa

Self-driving Car Choices

- Whom to crash into?
- Kill the driver?
- Injuries over fatalities?
  - How would the car compute which injury is worse?
  - Is it ok to harm an animal to save humans?
- Would be easier if there is an eject button for the driver!

Possible Scenarios - 1





MIT Moral Machine Experiment - http://moralmachine.mit.edu/

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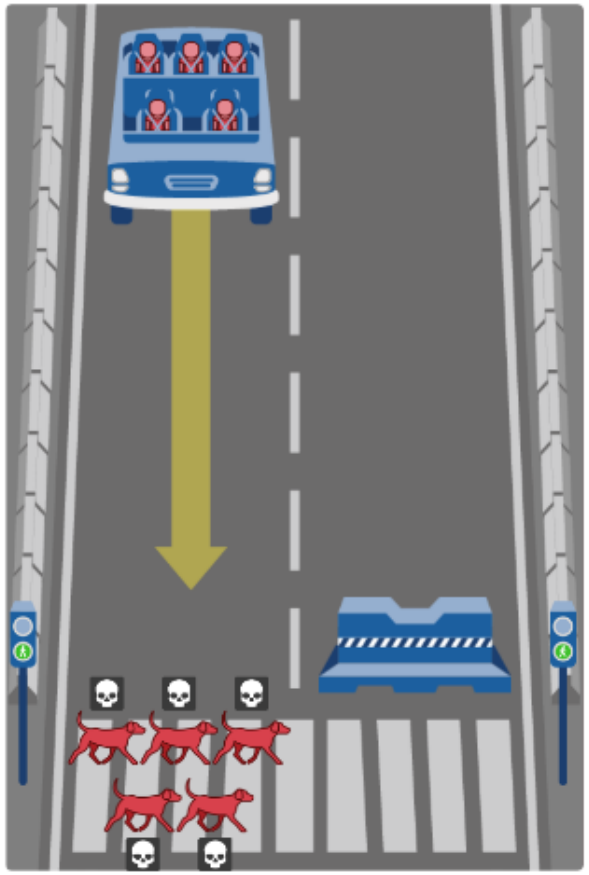
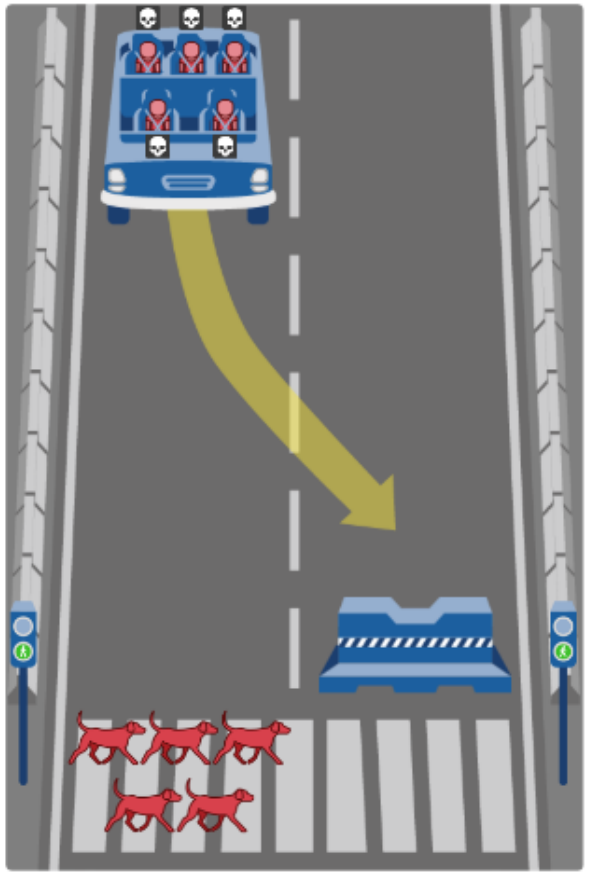
Possible Scenarios - 2





MIT Moral Machine Experiment - http://moralmachine.mit.edu/

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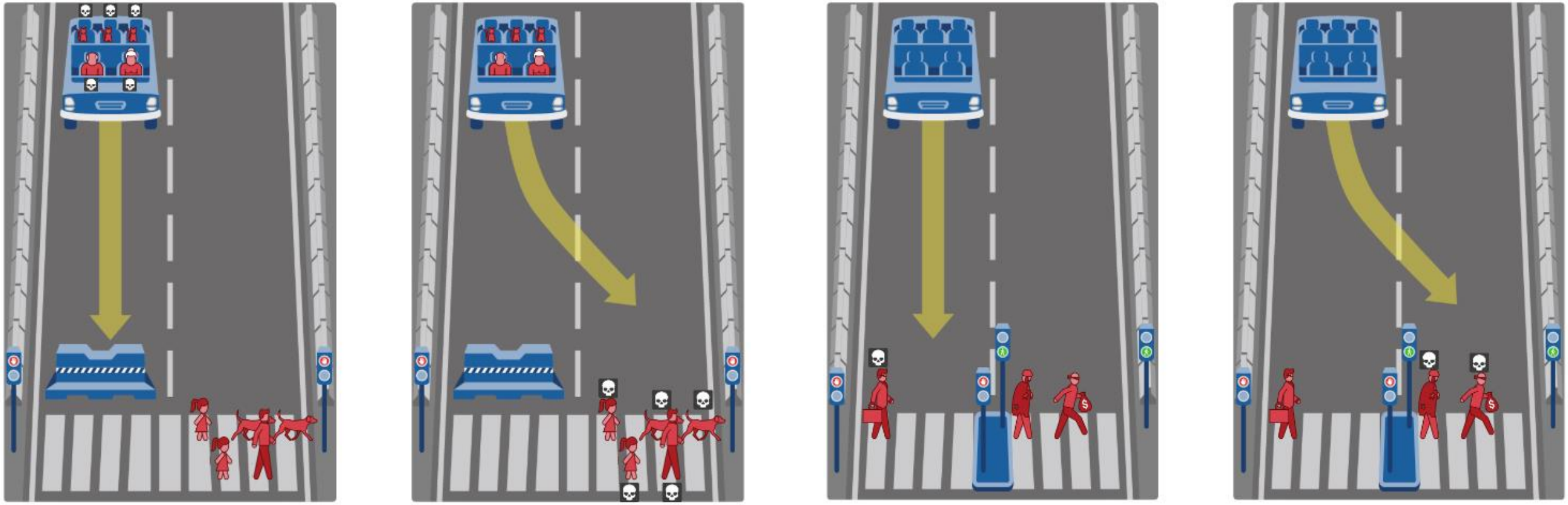
Possible Scenarios - 3



MIT Moral Machine Experiment - http://moralmachine.mit.edu/

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What People Think

- Surveys about ethical behaviour of driverless cars:
  - Should follow utilitarian approach
  - But, would not buy such cars!

Apple vs FBI Case

- Should Apple assist in unlocking the iPhone of a terrorist?
- Phone was set to eliminate all its data after ten failed password attempts
- Create new software to unlock phones
- Is that going to create privacy issues for other Apple users?
- Could the phone itself make that decision?

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Amazon's BIG Data

- Collect data regarding the sales of bedding products from other retailers
- Customise production based on the colours
  - Reduce costs
  - Sell luxury bedding for reasonable prices
- Utilitarianism
  - Good for the customers as a whole
  - How about those other retailers?

https://www.amazon.com/

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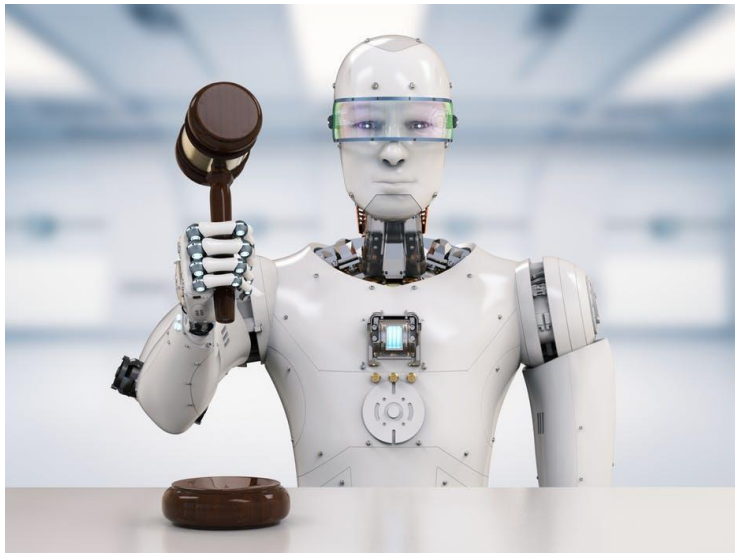
Racial Discrimination

- Garbage in, garbage out
  - Feed data reflecting our prejudices and machines mimic them
  - Though the goal of using machines was to eliminate human bias in the first place
- COMPAS algorithm used in US courts to guide sentencing
  - Forecast who would re-offend
  - Proprietary algorithm: Not open to scrutiny



http://theconversation.com/why-using-ai-to-sentence-criminals-is-a-dangerous-idea-77734

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Conclusions

- In this lecture, we have
  - Seen definitions of ethics and the process of ethical research
  - Described differences between traditional ethics and computer ethics
  - Reviewed research ethics process at Kent
  - Reviewed use cases from software development and AI about ethical decisions

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Additional Material

- https://www.computer.org/web/education/code-of-ethics
- Nick Bostrom and Eliezer Yudkowsky. "The Ethics of Artificial Intelligence". The Cambridge Handbook of Artificial Intelligence, 2014
- TED talks on ethical AI & machine learning bias:
  - https://www.ted.com/talks/iyad_rahwan_what_moral_decisions_should_driverless_cars_make
  - https://www.ted.com/talks/zeynep_tufekci_machine_intelligence_makes_human_morals_more_important