

Data 198 Recap

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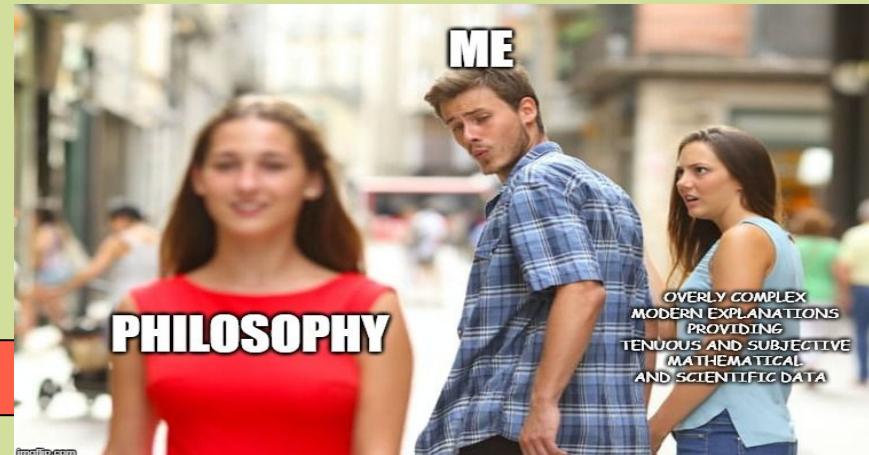


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Summary

How can data be destructive?



Deductive Logic

Simple and Complex Statements

- Earth is a planet.
- Earth is a planet and the United States is a country.

Logical Connectives

| Connective | Name | Logical Function | Used to Express |
|------------|-----------|------------------|------------------------------|
| ~ | Tilde | Negation | Not, it is not the case that |
| & | Ampersand | Conjunction | And, also, moreover, |
| v | Wedge | Disjunction | Or, unless |

Arguments

Evaluating Arguments

- Argument: A list of statements, with one conclusion and premises.
 - Conclusion: The statement being argued for.
 - Premise: A statement in support of a conclusion.

Validity:

- Valid: It's impossible for the conclusion to be false if the premises are true.
- Invalid: It's possible for the conclusion to be false if the premises are true.

Soundness:

- Valid argument + all true premises

Sound Arguments

All humans are mortal.
Socrates is human.
Thus, Socrates is mortal.

All chickens are rats.
Socrates is a chicken.
Thus, Socrates is a rat.

All humans are rats.
Socrates is a human.
Thus, Socrates is a rat.

Everyone loves a lover.
I love chocolate.
Thus, you love Socrates.

Inductive Argument

- An argument is Inductively strong if and only if it is **improbable** that its **conclusion is false** given that its **premises are true**, and it is not deductively valid.
- Inductive strength depends on **how improbable** it is that the conclusion is false given that the premises are true.

Example:

- Premise: The sun has risen every morning throughout history.
- Conclusion: Therefore, the sun will rise tomorrow.

Hume's Argument

Hume's Argument:

1. We are rationally justified in accepting the Principle of the Uniformity of Nature *only* if there is an argument for it that has premises known to be true and is either (i) deductively valid or (ii) inductively strong.
2. There is no such argument.

3. Thus, we are not rationally justified in accepting the Principle.

Enumerative Induction

Enumerative Induction

- Type of inductive reasoning in which general conclusions are drawn from specific observations.

Should we accept it??

Raven's Problem!

- **Hypothetico-Deductivism:** Hypotheses are confirmed when their logical consequences turn out to be true.
1. Assume that "All Fs are G." = "All non-Gs are non-F."
 2. So "any non-black things that is a non-raven" confirms the generalization "All non-black things are non-ravens."
 3. So, "any non-black non-raven" confirms "All ravens are black."
 4. So, for example, my blue shirt confirms "ALL RAVENS ARE BLACK."

[!!!]

Goodman's New Riddle of Induction

GRUE:

An object is GRUE if and only if

Either 1. It was first observed before the year 2050 and is green

OR 2. It was not first observed before 2050 and is blue



Green Induction:

- All observed emeralds have been GREEN.
- So, all emeralds are GREEN.

The GREEN Induction is strong.

The GRUE Induction is weak.

GRUE Induction:

- All observed emeralds have been GRUE. (because they were observed before 2050 and were green)
- So, all emeralds should be GRUE. (meaning after 2050, they would appear blue if first observed then)

Unit 2

Ethics



Where should we start with ethics?

- Ethics is the branch of philosophy that examines what is right and wrong in human behavior.

Areas of Moral Philosophy

- Value Theory: explores what is valuable, desirable, or good in life
 - What makes a life goes well?
- Normative Ethics: Seeks to establish principles and theories about how people ought to behave
 - What are our moral duties?
- Metaethics: investigation to the nature of morality
 - What is the status of ethics?

Morality



How do we determine ethical standards?

Defining Morality

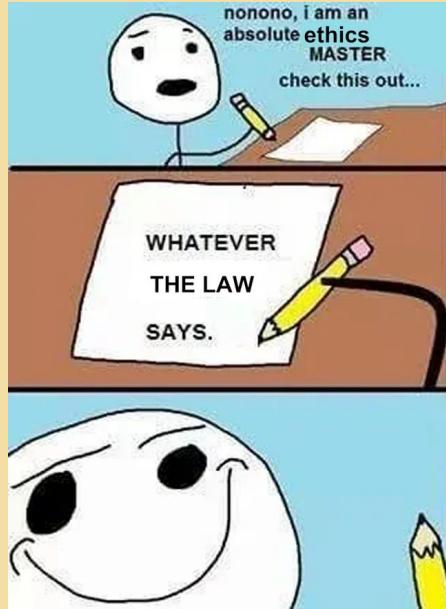
- Focused on the good life, our duties to others, the nature of good and bad character traits, among other things
 - Not defined by law, etiquette, self-interest, tradition, convention

Moral Philosophy?

- Assess the plausibility of competing moral theories by using rational arguments

Unit 2

Harm and Benefit



What is a harm and benefit?

- Harm: negatively affects or diminishes some persons' chances of having a good life or living well
- Benefit: positively affects or improves ""

What ethically significant harms and benefits can you encounter in data analytics?

Ethics and Data Analytics



Ethically significant harms/benefits in data analytics

- Benefits
 - Human Understanding
 - Efficiency
 - Predictive accuracy and personalization
- Harms
 - Fairness and Justice: bias
 - Privacy and security: anonymizing datasets
 - Transparency and Autonomy: Access to information

Ethical Objectivism



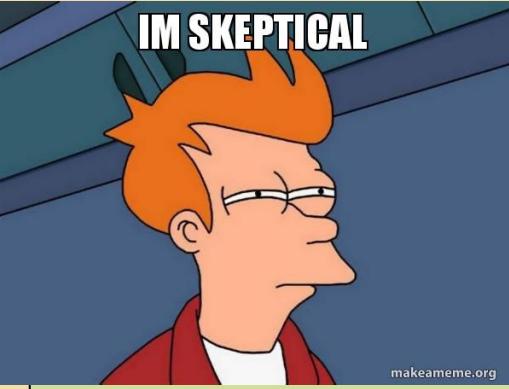
Ethical Objectivism

- The view that some moral standards are objectively correct and that some moral claims are objectively true.

Objectivity

- Moral standards are objective if they apply to everyone, even if people don't believe that they do, even if people are indifferent to them, and even if obeying them fails to satisfy anyone's desires.

Are there any objectively true moral claims?



IM SKEPTICAL

Moral Skepticism

Moral Skepticism:

the denial of ethical objectivism

- Moral Nihilism: the view that there are no moral truths at all
- Ethical Relativism: the view that there are some moral truths but that they are relative to each person or society

Situation: Ethan steals expensive medicine to save his dying child.

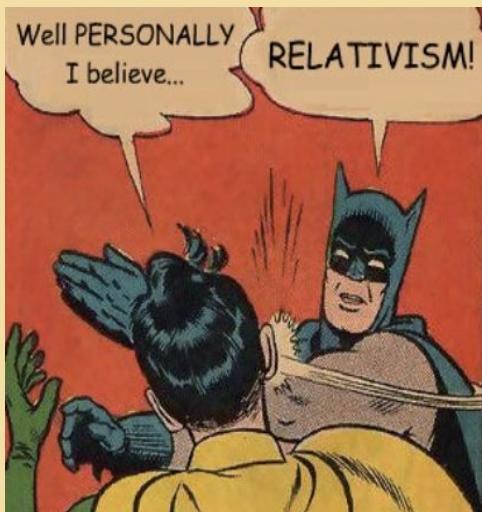
Moral Nihilism: Morality is an illusion—there is no real right or wrong. Ethan's action is neither good nor bad; it simply happens.

Ethical Subjectivism: Morality is based on personal beliefs. If Ethan believes stealing is justified, then it is right for him. If Dr. Lewis believes stealing is wrong, then it is wrong for him.

Key Difference:

Moral nihilism rejects morality entirely, while ethical subjectivism sees morality as personal and relative.

Two forms of Ethical Relativism



Ethical Subjectivism

Morality is based on **individual beliefs and feelings**. What is right or wrong depends on **personal opinion**, meaning different people can have different moral truths.

- Ex) If one person believes lying is wrong and another believes it is acceptable, both are “right” in their own perspectives.

An act is morally acceptable just because...

- I approve of it or my commitments allow it.

An action is morally wrong just because...

- I disapprove of it or my commitments forbid it.

Two forms of Ethical Relativism

If you claim that morality is subjective, then your moral condemnation carries no weight



Cultural Subjectivism

Morality is determined by **cultural norms and traditions**. What is right or wrong depends on the **society** one belongs to, not personal beliefs.

- Example: If one culture allows arranged marriages and another forbids them, both practices are morally correct within their respective societies.

An act is morally acceptable just because...

it is allowed by the ideals of **the society** in which it is performed

An action is morally wrong just because...

it is forbidden by the ideal of **the society** in which it is performed.

Implications of Ethical Relativism

Ethical relativism challenges moral objectivity but raises serious problems. If morality is always relative, moral progress, debate, and universal human rights become difficult to justify.

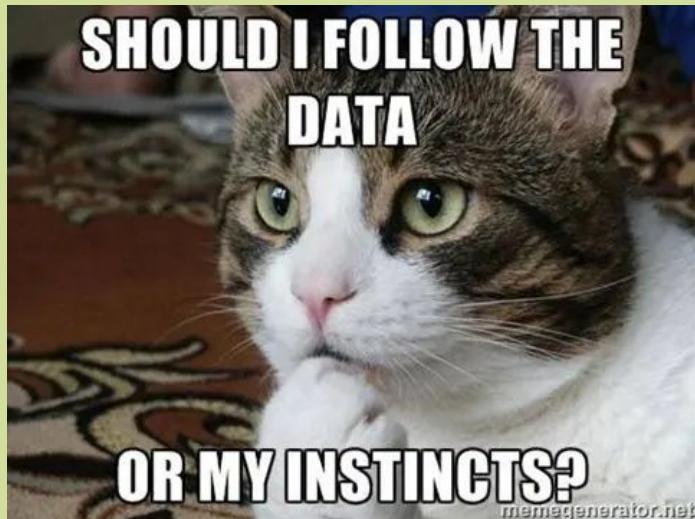
1. Moral Progress Becomes Impossible
2. No One's Moral Views Can Be Wrong
3. Moral Questioning Becomes Meaningless
4. Nothing is Intrinsically Valuable
5. All Moral Views Are Equally Valid
6. Contradictions Arise



What were some ethical concerns you encountered while working on the mini project?



Unit 3: Normative Ethics & Data Science



What makes something objectively morally right or wrong?

- Should people be motivated solely by self-interest?
- Should we aim primarily to maximize happiness?
- What is **fairness**? Why might it matter?
- What is **autonomy**? Why might it matter?
- What is **respect**? Why might it matter?

Egoism

Psychological Egoism states:

- All human actions aim at avoiding some personal loss or gaining some personal benefit.
- All actions aim to promote (perceived) self-interest.

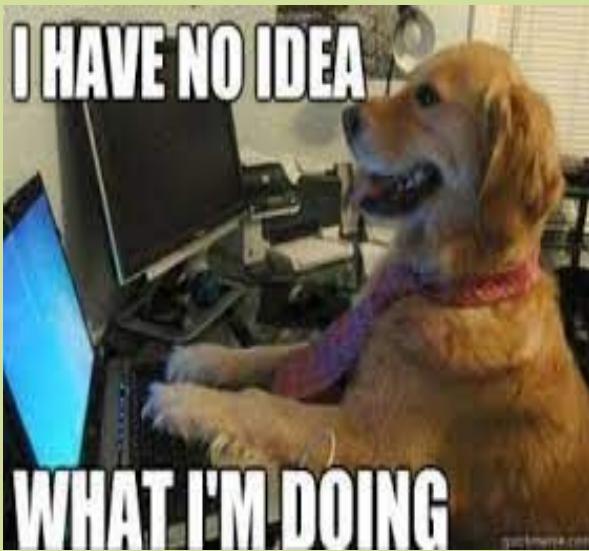
Think of an action you performed today.

What was your aim?

Ethical Egoism states:

- Actions are morally right just because they best promote one's self-interest.
- Actions are morally wrong just because they fail to promote one's self-interest.

Which Egoism is this?



Key Argument:

1. The right thing to do is whatever benefits you the most.
2. Helping others is only good if it also helps you in some way.
3. So, we should always act in our own self-interest because that's what morality is about.

Consequentialism, Utilitarianism, Utility

Consequentialism

- Morally right just because they maximize the amount of goodness in the world.

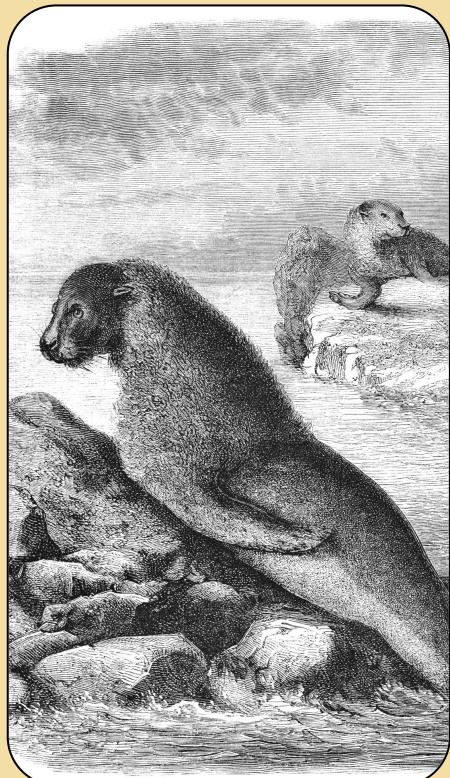
Act Utilitarianism

- Most prominent version of consequentialism.
- According to act utilitarianism, there is one ultimate moral standard: the *principle of utility*.

The Principle of Utility

- An action is morally required just because it does more to improve overall well-being than any other action you could have done in the circumstances.

Normative Ethics & Data Science



Honesty, Fairness, Happiness

- In a class of 6 students
- During an in-class test
- Should Anna cheat on the test to improve her grade?

Normative Ethics & Data Science

Option 1: Anna Cheats

- Anna secretly cheats during the test.
- Anna receives an A: +20 units of pleasure.
- Other students are unaware and receive their grades normally:
 - 2 students get A's: +10 units of pleasure each.
 - 2 students get B's: +5 units of pleasure each.
 - 1 student gets a C: 0 units of pleasure.
- Total Pleasure: $1 \times 20 + 2 \times 10 + 2 \times 5 + 1 \times 0 = 50$

She can't catch you cheating if you don't cheat



Normative Ethics and Data Science

Option 2: Anna Doesn't Cheat

- All students work honestly.
- Each student receives a grade based on their own work:
2 students get A's: +10 units of pleasure each.
2 students get B's: +5 units of pleasure each.
2 students, including Anna, get C's: 0 units of pleasure each.
- Total Pleasure: $2 \times 10 + 2 \times 5 + 2 \times 0 = 30$



Normative Ethics & Data Science



MATH DESTRUCTION



HOW BIG DATA INCREASES INEQUALITY

The Cheater

Which option is morally better?

Option 1: Maximizes total pleasure but involves unfair and dishonest behavior.

Option 2: Results in lower total pleasure but maintains fairness and honesty among all students.

Normative Ethics & Data Science

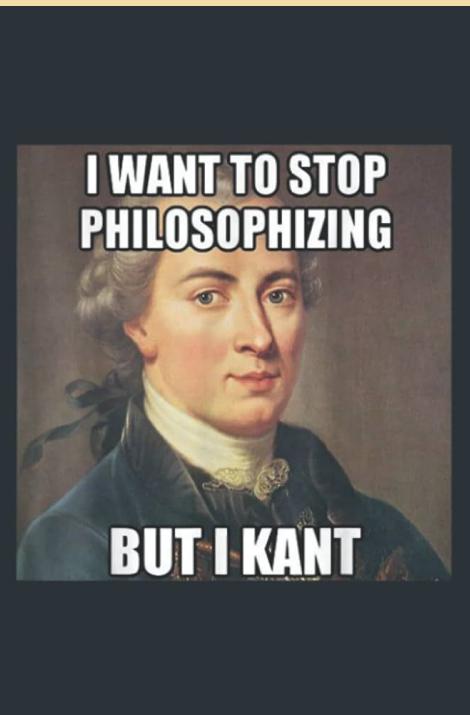
Two fairness tests

1. What if everyone did that?
2. How would you like it if someone did that to you?

Both raise the issue of fairness, but neither provides a foolproof test of the morality of actions.



Normative Ethics & Data Science



Kant's Principle of Universalizability

Kant believed that consistency and fairness are at the heart of morality.

According to Kant:

An action is morally acceptable if and only if its maxim is universalizable.

Normative Ethics & Data Science

Morality and Rationality

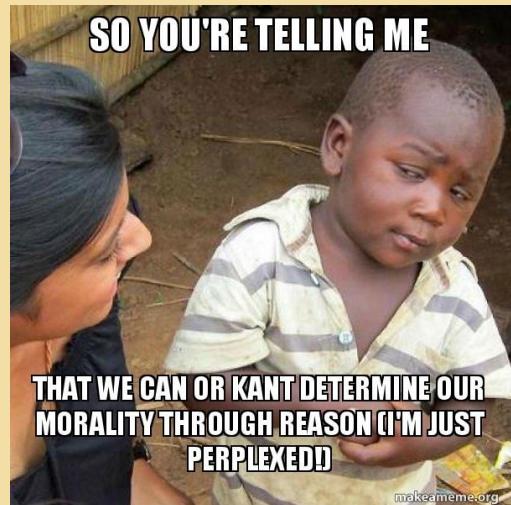
Kant claimed that morality consists of categorical imperatives.

Hypothetical and Categorical Imperatives

Imperative: a command of reason.

Hypothetical imperatives tell us what to do in order to get what we want.

Categorical imperatives are requirements of reason that apply to everyone, regardless of their desires.



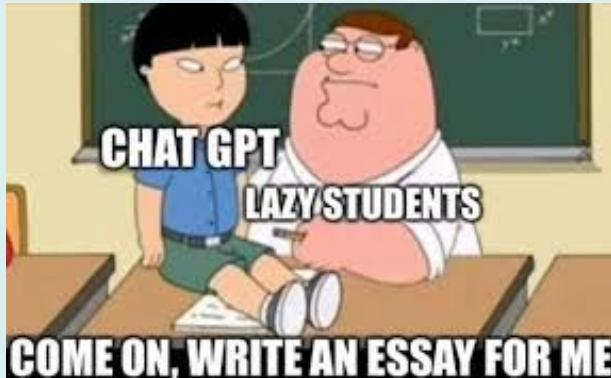
Normative Ethics & Data Science



The Principle of Humanity

Always treat a human being (yourself included) as an end, and never as a mere means.

Is using ChatGPT ethical?



Kahoot!

When it's kahoot day





THANK YOU

