Carnegie Mellon University Qatar

Ethics

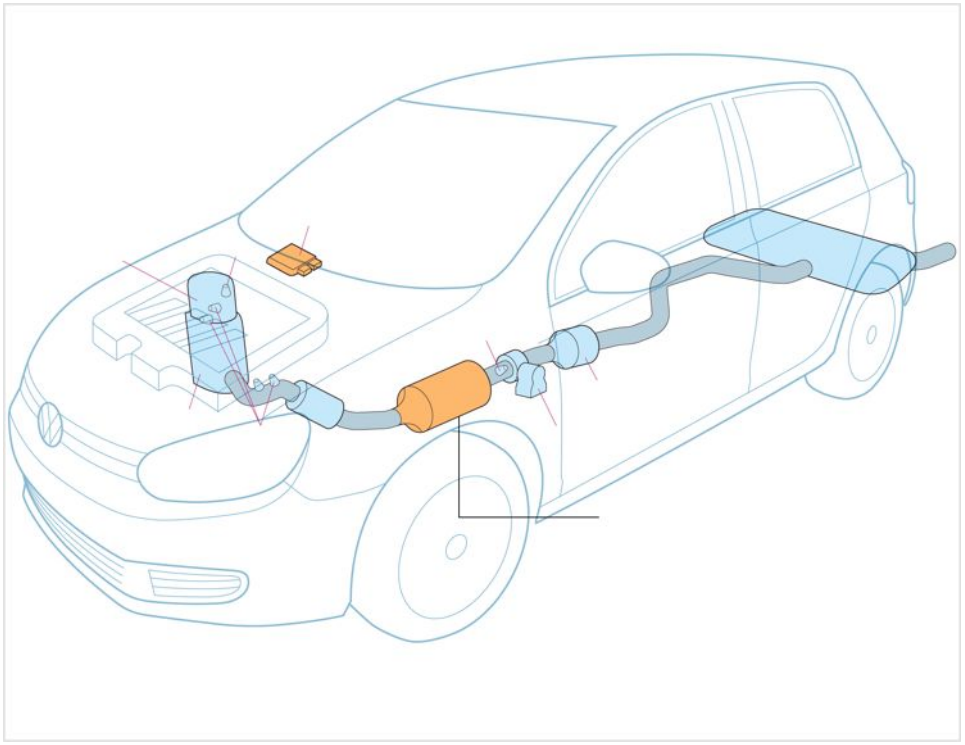
17-313, Foundations of Software Engineering, Fall 2023

(partially based on the slides of 17-445 by Christian Kästner)

S3D
Software and Societal Systems Department

Volkswagen Scandal

VW was caught cheating on emissions for Diesel engines



https://www.nytimes.com/interactive/2015/business/international/vw-diesel-emissions-scandal-explained.html?mtrref=www.google.com&assetType=REGIWALL

S3D

What is Human Flourishing?

According to Harvard's Human flourishing program: Human flourishing is composed of five central domains: **happiness and life satisfaction, mental and physical health, meaning and purpose, character and virtue, and close social relationships.**

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Why Human Flourishing?

- Universal Declaration of Human Rights: “All huma
  free and equal in dignity and rights.”
- US Declaration of Independence: “We hold these
  self-evident…”
- Internal Compass

Activity:
(Un)Ethical situations

EA calls its loot boxes ‘surprise mechanics,’ says they’re used ethically

80

‘People like surprises,’ executive tells UK Parliament

By Ana Diaz | @AnaLikesPikachu | Jun 21, 2019, 9:10am EDT

SHARE

Domino's Would Rather Go to the Supreme Court Than Make Its Website Accessible to the Blind

Rather than developing technology to support users with disabilities, the pizza chain is taking its fight to the top

by Brenna Houck | @EaterDetroit | Jul 25, 2019, 6:00pm EDT

SHARE

Some airlines may be using algorithms to split up families during flights

Your random airplane seat assignment might not be random at all.

By Aditi Shrikant | aditi@vox.com | Nov 27, 2018, 6:10pm EST

SHARE

Passengers boarding a Boeing aircraft of the low cost airline carrier Ryanair in Thessaloniki Macedonia Airport, Greece. | Nicolas Economou/NurPhoto/Getty Images

TC

Login

Startups
Apps
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Audio
Extra Crunch
Newsletters
Events
Advertise

—

Crunchbase
More

Search

Facebook privacy
Transportation
Enterprise
Def Con 2019

Lime halts scooter service in Switzerland after possible software glitch throws users off mid-ride

Ingrid Lunden @ingridlunden / 9:51 am EST • January 12, 2019

Comment

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Currently, the AI portrait generator has been trained mostly on portraits of people of European ethnicity. We're planning to expand our dataset and fix this in the future. At the time of conceptualizing this AI, authors were not certain it would turn out to work at all. This is close to state of the art in AI at the moment.

Sorry for the bias in the meanwhile. Have fun!

11:23 AM · Mar 8, 2021 · Twitter Web App

324 Retweets **65** Quote Tweets **1,243** Likes

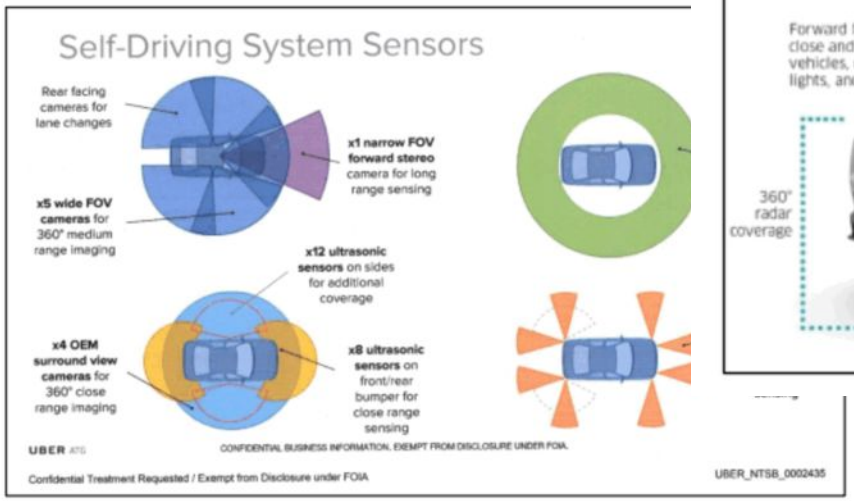
Uber self-driving car involved in fatal crash couldn't detect jaywalkers

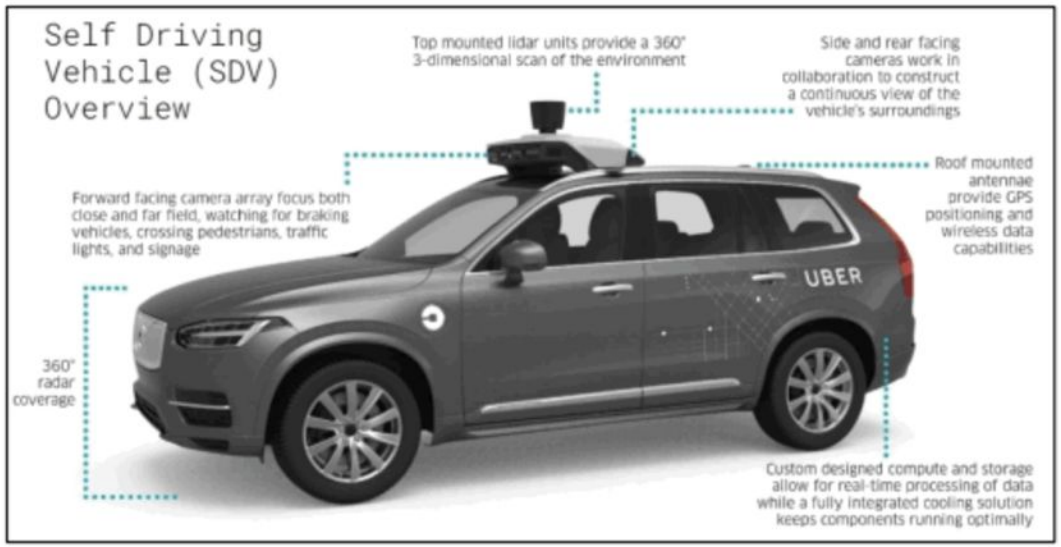
The system had several serious software flaws, the NTSB said.

Steve Dent, @stevetdent
11.06.19 in Transportation

25
Comments

1131
Shares





xing.com search for "Brand Strategist"

Search query	Work experience	Education experience	Profile views	Candidate	Xing ranking
Brand Strategist	146	57	12992	male	1
Brand Strategist	327	0	4715	female	2
Brand Strategist	502	74	6978	male	3
Brand Strategist	444	56	1504	female	4
Brand Strategist	139	25	63	male	5
Brand Strategist	110	65	3479	female	6
Brand Strategist	12	73	846	male	7
Brand Strategist	99	41	3019	male	8
Brand Strategist	42	51	1359	female	9
Brand Strategist	220	102	17186	female	10

Lahoti, Preethi, Krishna P. Gummadi, and Gerhard Weikum. "iFair: Learning Individually Fair Data Representations for Algorithmic Decision Making." 2019 IEEE 35th International Conference on Data Engineering (ICDE) (2019

Twitter cropping photos

https://blog.twitter.com/engineering/en_us/topics/insights/2021/sharing-learnings-about-our-image-cropping-algorithm

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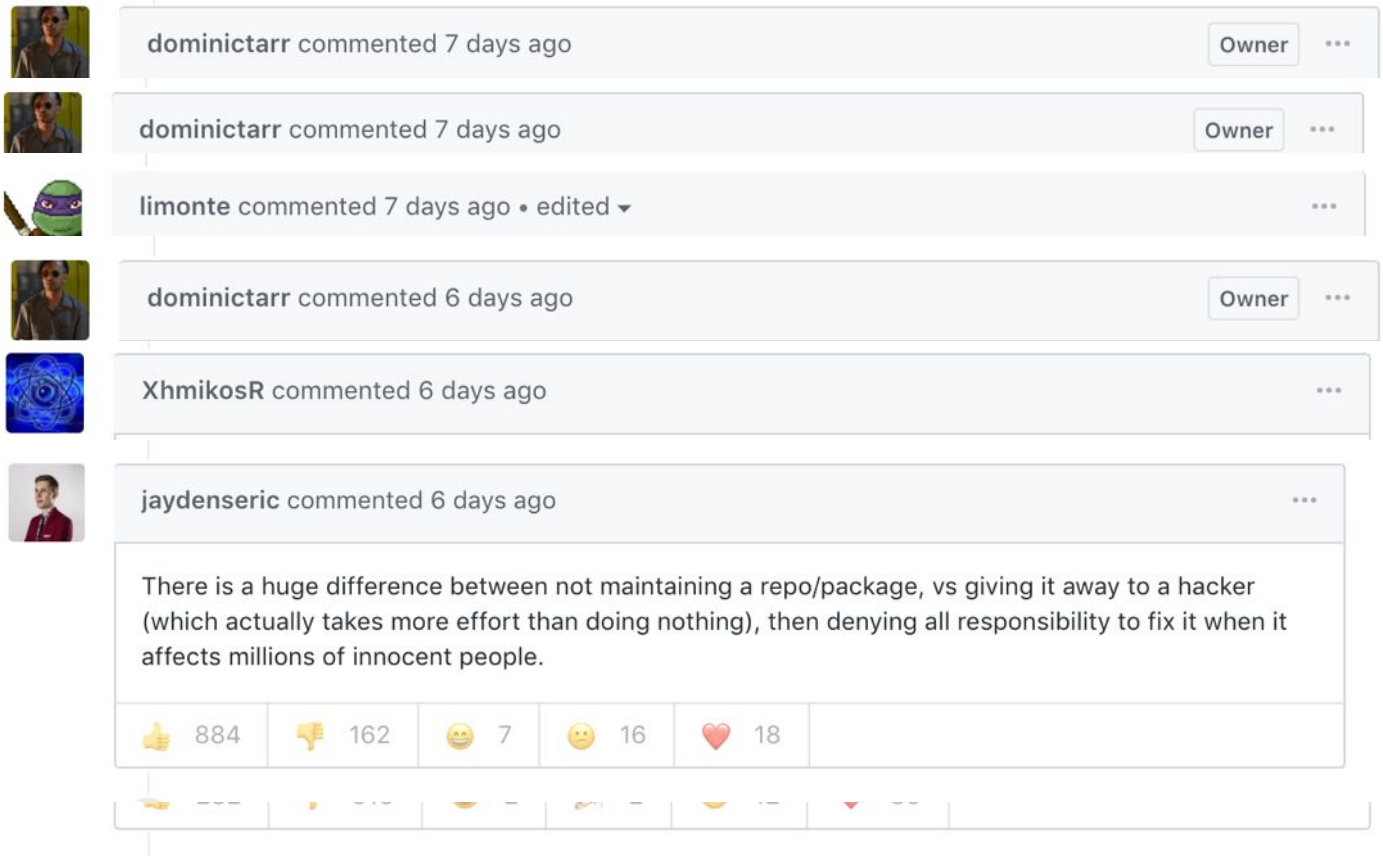
Twitter cropping photos

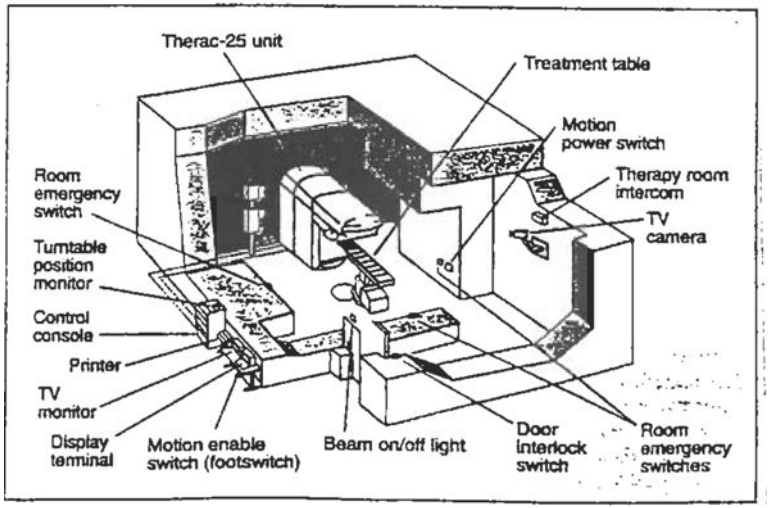
Twitter cropping photos

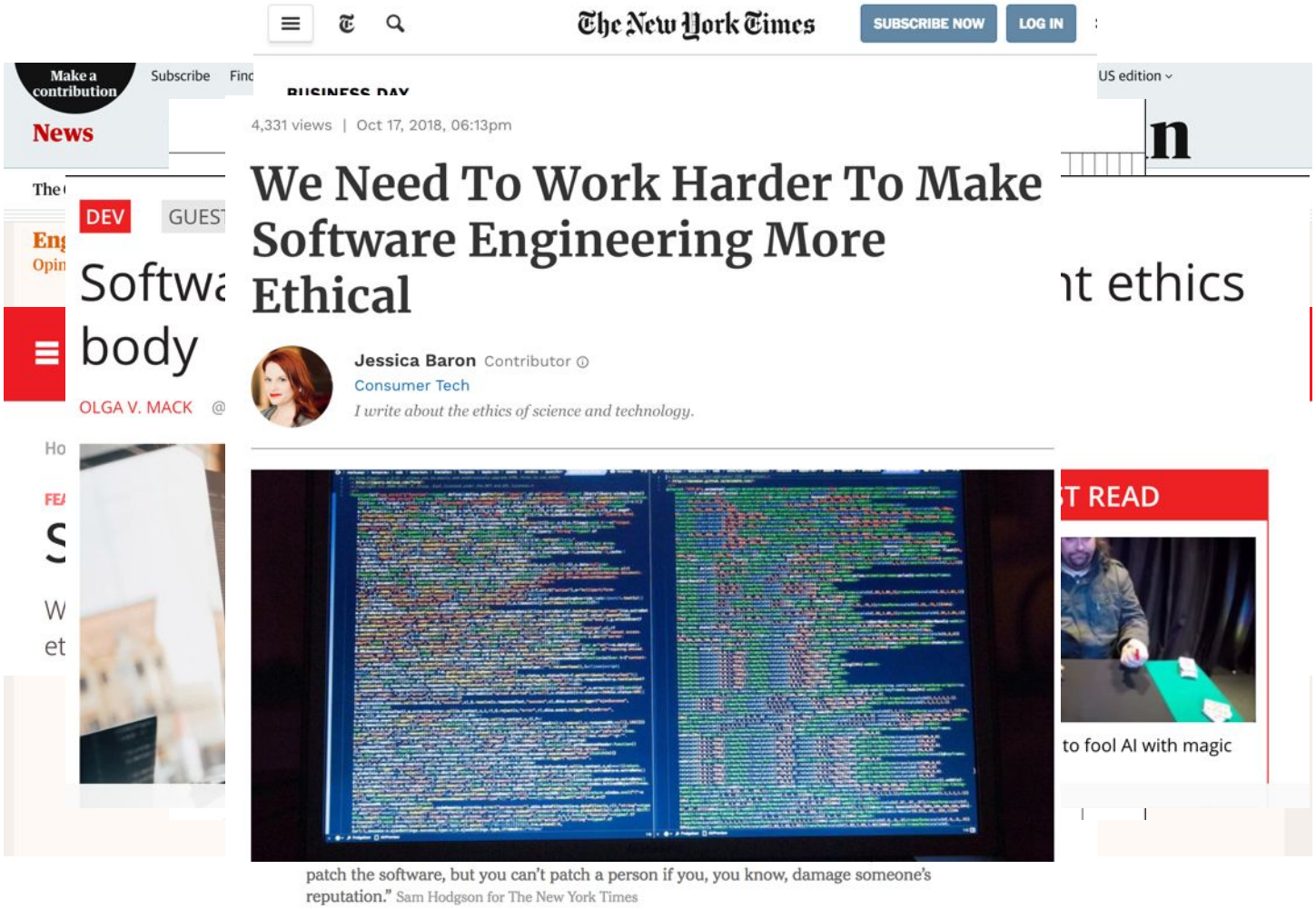
Open Source Maintainers



Therac-25

Bug (race-condition) in software lead to at least 6 deaths
Traced to:
Lack of reporting bugs
Lack of proper due diligence
Engineers were overconfident, removed hardware locks
Race condition of 8 seconds could lead to problems

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4,331 views | Oct 17, 2018, 06:13pm
We Need To Work Harder To Make Software Engineering More Ethical
Jessica Baron Contributor
Consumer Tech
I write about the ethics of science and technology.
DEV
OLGA V. MACK
T READ
to fool AI with magic
patch the software, but you can't patch a person if you, you know, damage someone's reputation." Sam Hodgson for The New York Times

Code of Ethics

As an ACM member I will ....
Contribute to society and human well-being.
Avoid harm to others.
Be honest and trustworthy.
Be fair and take action not to discriminate.
Honor property rights including copyrights and patent.
Give proper credit for intellectual property.
Respect the privacy of others.
Honor confidentiality.

Code of Ethics

Research shows that the code of ethics does not appear to affect the decisions made by software developers.

Does ACM's Code of Ethics Change Ethical Decision Making in Software Development?

Andrew McNamara
North Carolina State University
Raleigh, North Carolina, USA
ajmcnama@ncsu.edu

Justin Smith
North Carolina State University
Raleigh, North Carolina, USA
jssmit11@ncsu.edu

Emerson Murphy-Hill
North Carolina State University
Raleigh, North Carolina, USA
emerson@csc.ncsu.edu

ABSTRACT

Ethical decisions in software development can substantially impact end-users, organizations, and our environment, as is evidenced by recent ethics scandals in the news. Organizations, like the ACM, publish codes of ethics to guide software-related ethical decisions. In fact, the ACM has recently demonstrated renewed interest in its code of ethics and made updates for the first time since 1992. To better understand how the ACM code of ethics changes software-

The first example is the Uber versus Waymo dispute [26], in which a software engineer at Waymo took self-driving car code to his home. Shortly thereafter, the engineer left Waymo to work for a competing company with a self-driving car business, Uber. When Waymo realized that their own code had been taken by their former employee, Waymo sued Uber. Even though the code was not apparently used for Uber's competitive advantage, the two companies settled the lawsuit for $245 million dollars.

Challenge:

How do we apply ethics to a field (Software Engineering) that is changes so often?

Remember the Dominos case? The ADA law was written before the first website (1990)

To handle this uncertainty about the future, let's focus on three questions we can ask to remind ourselves to focus on promoting human flourishing.

Three questions to promote human flourishing

1. Does my software respect the humanity of the users?
2. Does my software amplify positive behavior, or negative behavior for users and society at large?
3. Will my software development practices impact the humanity of others?

S3D

1. Does my software respect the humanity of the users?

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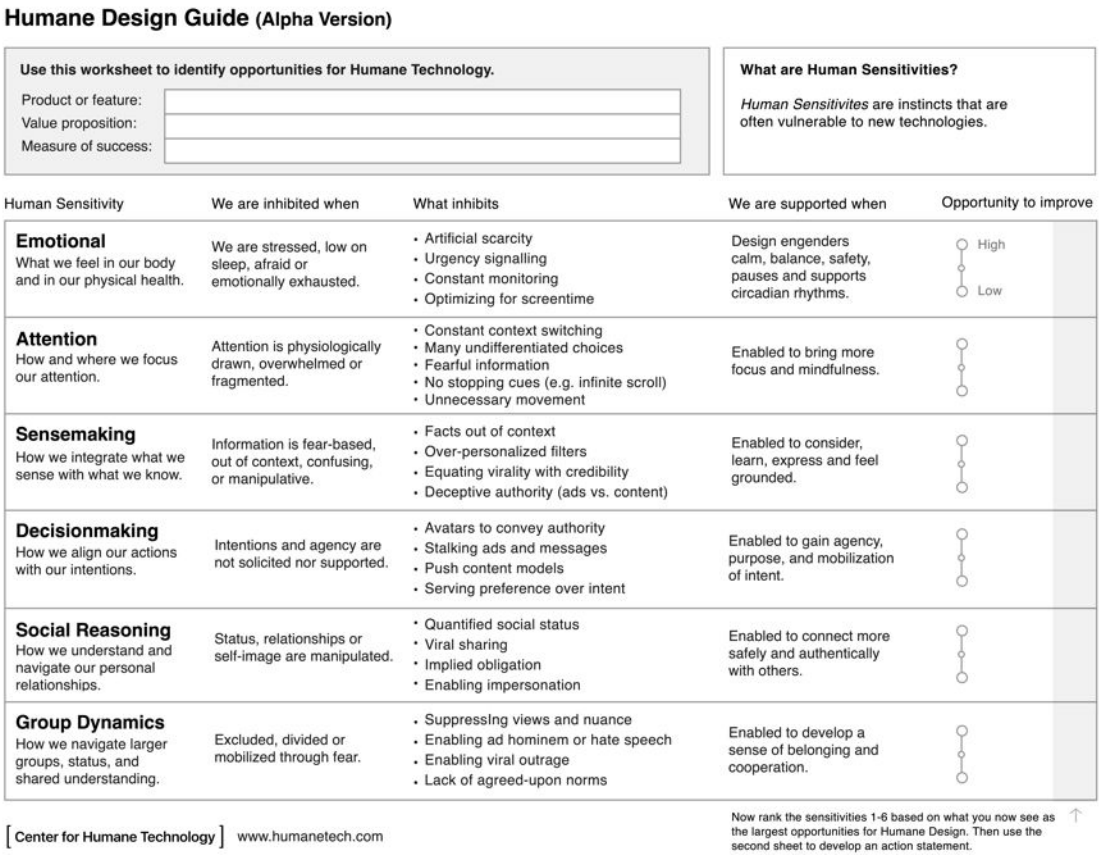
Humane Design Guide

http://humanetech.com



Humane Design Guide (Alpha Version)

Use this worksheet to identify opportunities for Humane Technology.

Product or feature:
Value proposition:
Measure of success:

What are Human Sensitivities?

Human Sensitivites are instincts that are often vulnerable to new technologies.

Human Sensitivity	We are inhibited when	What inhibits	We are supported when	Opportunity to improve
Emotional What we feel in our body and in our physical health.	We are stressed, low on sleep, afraid or emotionally exhausted.	• Artificial scarcity • Urgency signalling • Constant monitoring • Optimizing for screentime	Design engenders calm, balance, safety, pauses and supports circadian rhythms.	High / Low
Attention How and where we focus our attention.	Attention is physiologically drawn, overwhelmed or fragmented.	• Constant context switching • Many undifferentiated choices • Fearful information • No stopping cues (e.g. infinite scroll) • Unnecessary movement	Enabled to bring more focus and mindfulness.	
Sensemaking How we integrate what we sense with what we know.	Information is fear-based, out of context, confusing, or manipulative.	• Facts out of context • Over-personalized filters • Equating virality with credibility • Deceptive authority (ads vs. content)	Enabled to consider, learn, express and feel grounded.	
Decisionmaking How we align our actions with our intentions.	Intentions and agency are not solicited nor supported.	• Avatars to convey authority • Stalking ads and messages • Push content models • Serving preference over intent	Enabled to gain agency, purpose, and mobilization of intent.	
Social Reasoning How we understand and navigate our personal relationships.	Status, relationships or self-image are manipulated.	• Quantified social status • Viral sharing • Implied obligation • Enabling impersonation	Enabled to connect more safely and authentically with others.	
Group Dynamics How we navigate larger groups, status, and shared understanding.	Excluded, divided or mobilized through fear.	• Suppressing views and nuance • Enabling ad hominem or hate speech • Enabling viral outrage • Lack of agreed-upon norms	Enabled to develop a sense of belonging and cooperation.	

[Center for Humane Technology] www.humanetech.com

Now rank the sensitivities 1-6 based on what you now see as the largest opportunities for Humane Design. Then use the second sheet to develop an action statement.

Humane Design Guide

http://humanetech.com

Provides a template for considering a piece of software, and asking questions to help us arrive at a “humane design”
Consider 6 human sensitivities: **Emotional, Attention, Sense making, Decision making, Social Reasoning, and Group Dynamics**

Human Sensitivity	We are inhibited when	What inhibits	We are supported when	Opportunity to improve
Attention How and where we focus our attention.	Attention is physiologically drawn, overwhelmed or fragmented.	• Constant context switching • Many undifferentiated choices • Fearful information • No stopping cues (e.g. infinite scroll) • Unnecessary movement	Enabled to bring more focus and mindfulness.	

Identify Opportunities to improve

Humane Design Guide

http://humanetech.com

After analysis step, develop plan of action:

1. In what ways does your product/feature currently engage Human Sensitivities?
2. How might your product/feature support or elevate human sensitivities?
3. Action Statement

GenderMag

https://gendermag.org

Abby Jones[1]

You can edit anything in blue print

- 28 years old
- Employed as an Accountant
- Lives in Cardiff, Wales

Abby has always liked music. When she is on her way to work in the morning, she listens to music that spans a wide variety of styles. But when she arrives at work, she turns it off, and begins her day by scanning all her emails first to get an overall picture before answering any of them. (This extra pass takes time but seems worth it.) Some nights she exercises or stretches, and sometimes she likes to play computer puzzle games like Sudoku

Background and skills

Abby works as an accountant. She is comfortable with the technologies she uses regularly, but she just moved to this employer 1 week ago, and their software systems are new to her.

Abby says she's a "numbers person", but she has never taken any computer programming or IT systems classes. She likes Math and knows how to think with numbers She writes and edits spreadsheet formulas in her work.

In her free time, she also enjoys working with numbers and logic. She especially likes working out puzzles and puzzle games, either on paper or on the computer

Motivations and Attitudes

- ***Motivations***: Abby uses technologies to accomplish her tasks. She learns new technologies if and when she needs to, but prefers to use methods she is already familiar and comfortable with, to keep her focus on the tasks she cares about.
- ***Computer Self-Efficacy***: Abby has low confidence about doing unfamiliar computing tasks. If problems arise with her technology, she often blames herself for these problems. This affects whether and how she will persevere with a task if technology problems have arisen.
- ***Attitude toward Risk:*** Abby's life is a little complicated and she rarely has spare time. So she is risk averse about using unfamiliar technologies that might need her to spend extra time on them, even if the new features might be relevant. She instead performs tasks using familiar features, because they're more predictable about what she will get from them and how much time they will take.

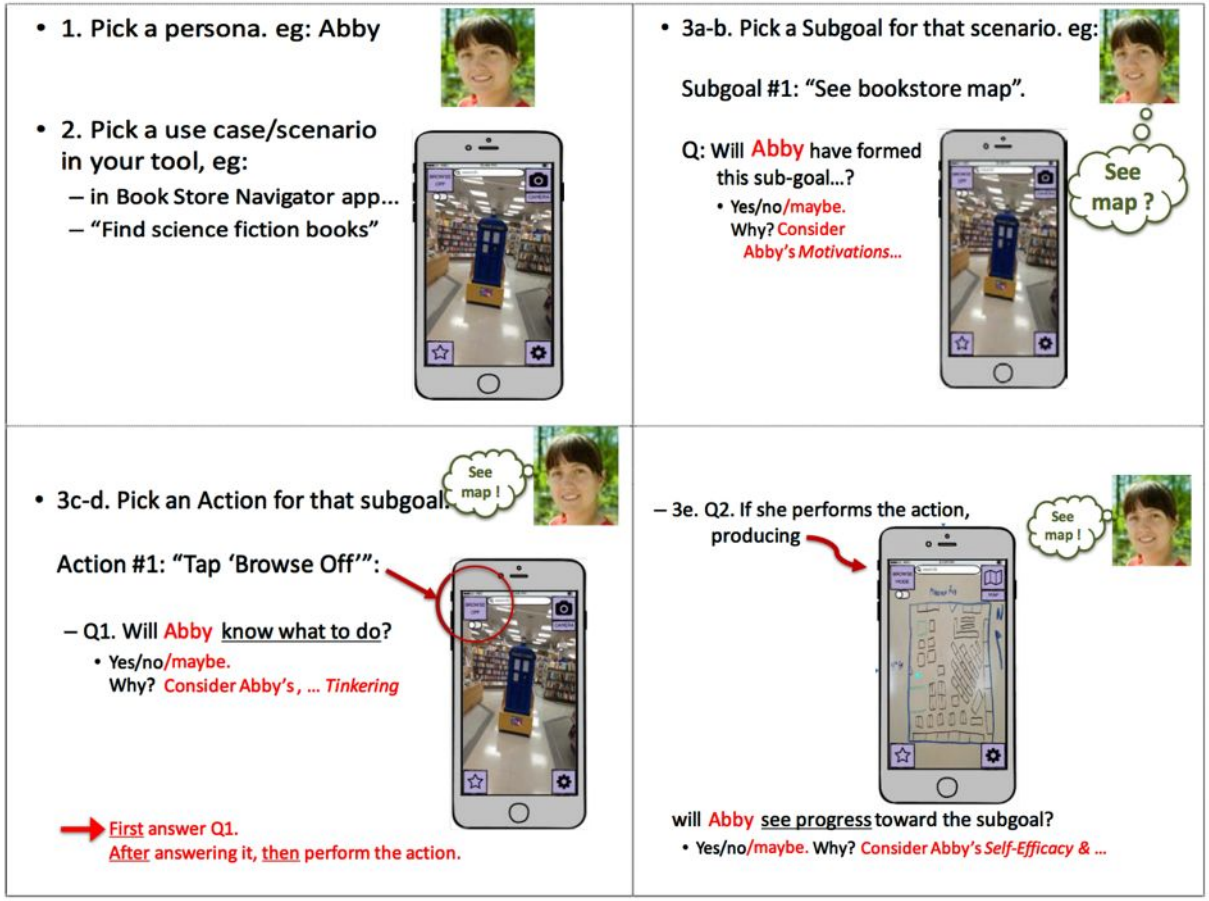
How Abby Works with Information and Learns:

- ***Information Processing Style:*** Abby tends towards a *comprehensive information processing style* when she needs to more information. So, instead of acting upon the first option that seems promising, she gathers information comprehensively to try to form a complete understanding of the problem before trying to solve it. Thus, her style is "burst-y"; first she reads a lot, then she acts on it in a batch of activity.
- ***Learning: by Process vs. by Tinkering***: When learning new technology, Abby leans toward process-oriented learning, e.g., tutorials, step-by-step processes, wizards, online how-to videos, etc, She doesn't particularly like learning by tinkering with software (i.e., just trying out new features or commands to see what they do), but when she does tinker, it has positive effects on her understanding of the software.

[1]Abby represents users with motivations/attitudes and information/learning styles similar to hers. For data on females and males similar to and different from Abby, see http://eusesconsortium.org/gender/gender.php

GenderMag

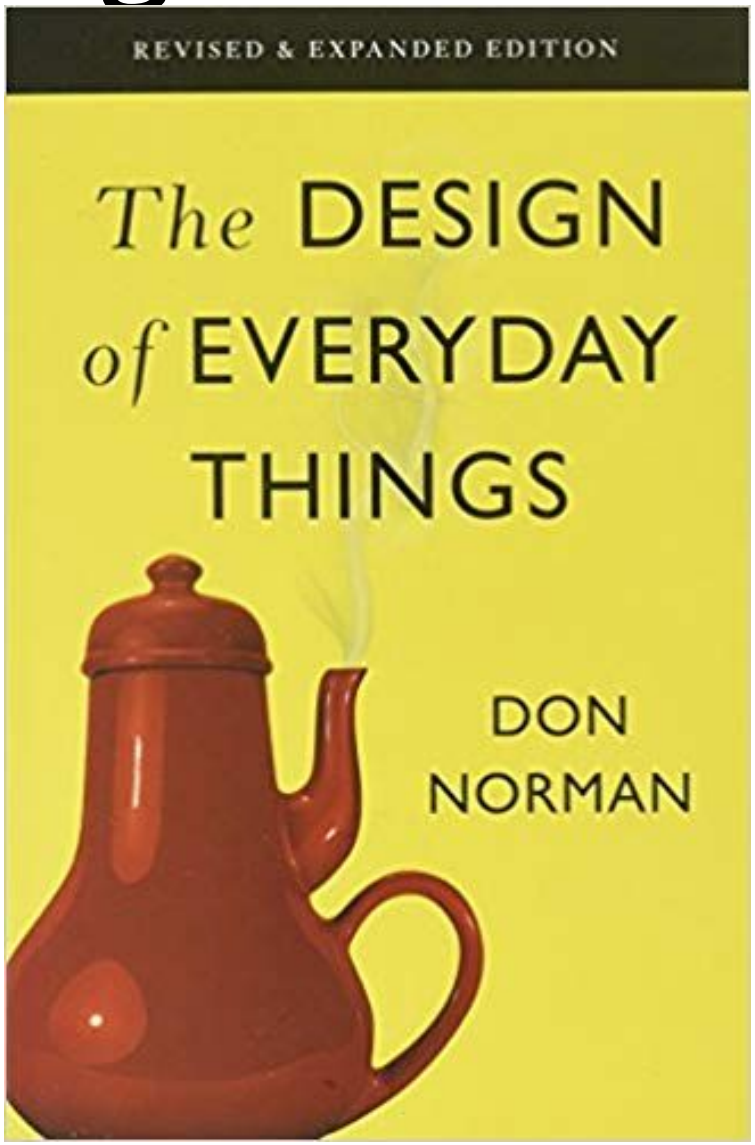
https://gendermag.org



User Centered Design

User-centered design tries to optimize the product around how users can, want, or need to use the product, rather than forcing the users to change their behavior to accommodate the product.

-Wikipedia



Agile

User Centered Design

Agile custo

2. Does my software amplify positive or negative behavior for users and society at large?

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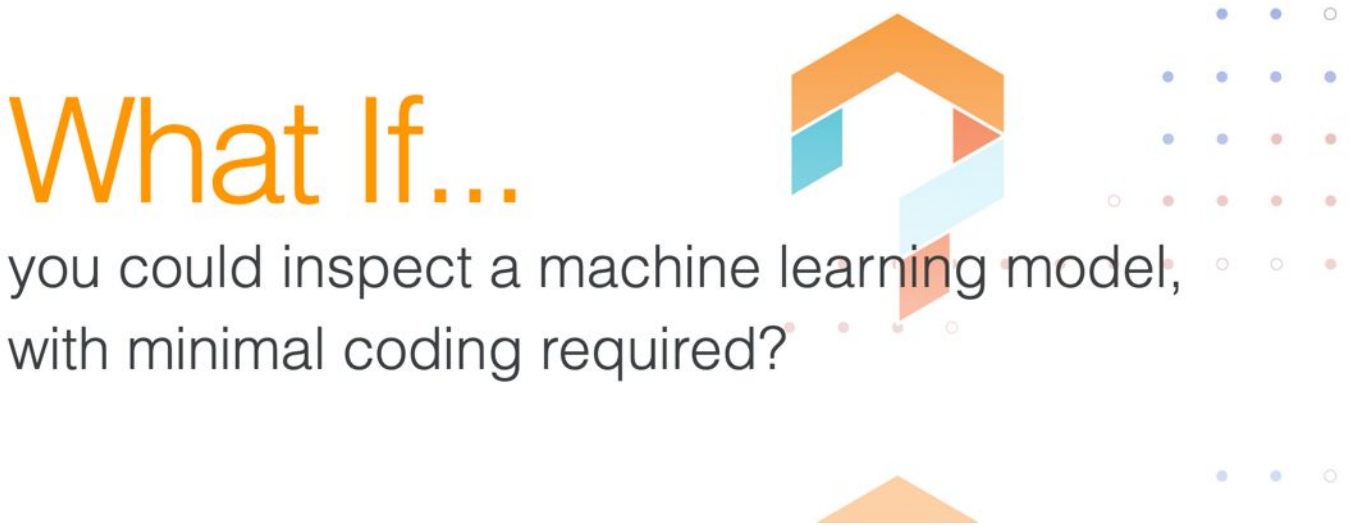
What if...

https://pair-code.github.io/what-if-tool/



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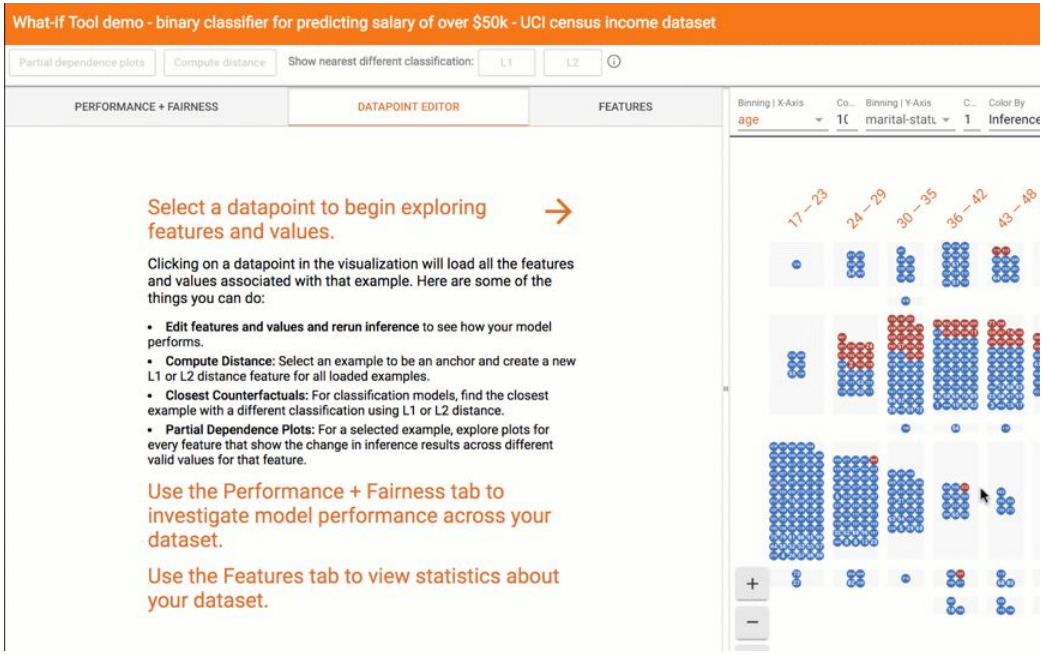
What if...

https://pair-code.github.io/what-if-tool/

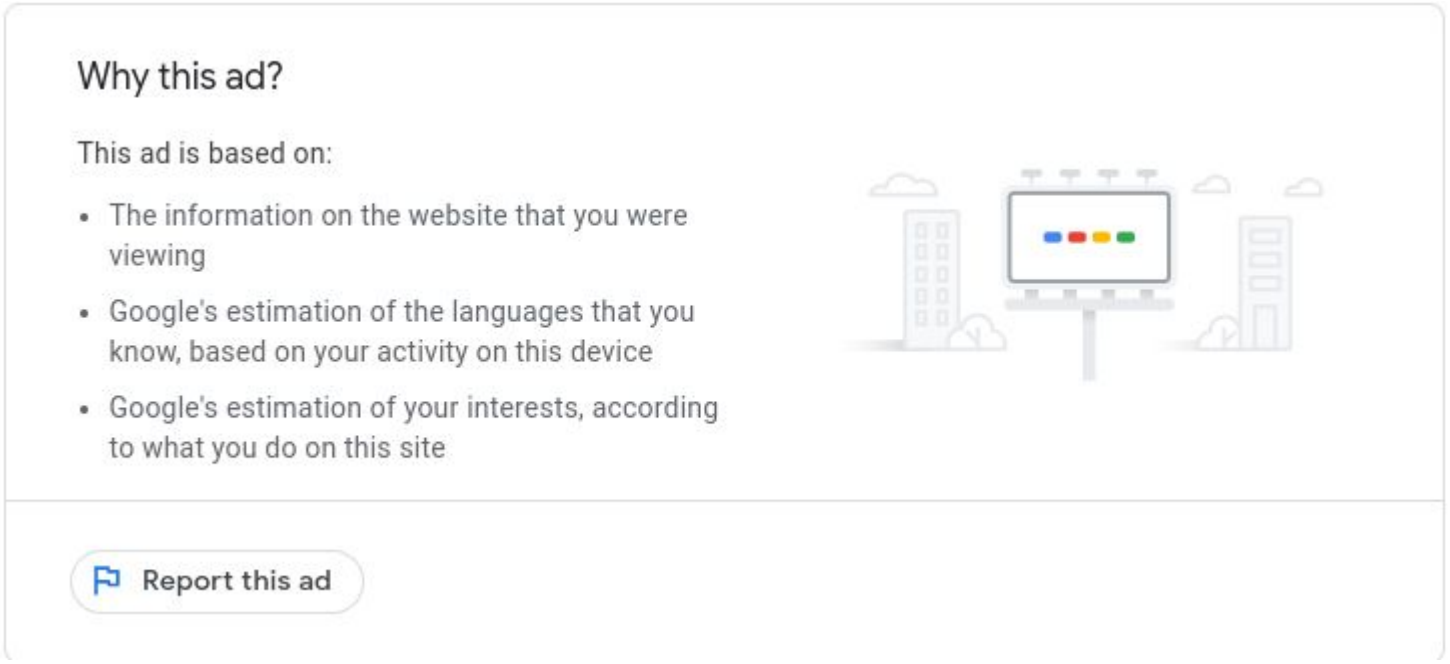


Dog vs Wolf

(a) Husky classified as wolf (b) Explanation

Figure 11: Raw data and explanation of a bad model's prediction in the "Husky vs Wolf" task.

Explain “why” to customers



Deon https://github.com/drivendataorg/deon

> Read more about `deon` on the project homepage

An ethics checklist for data scientists

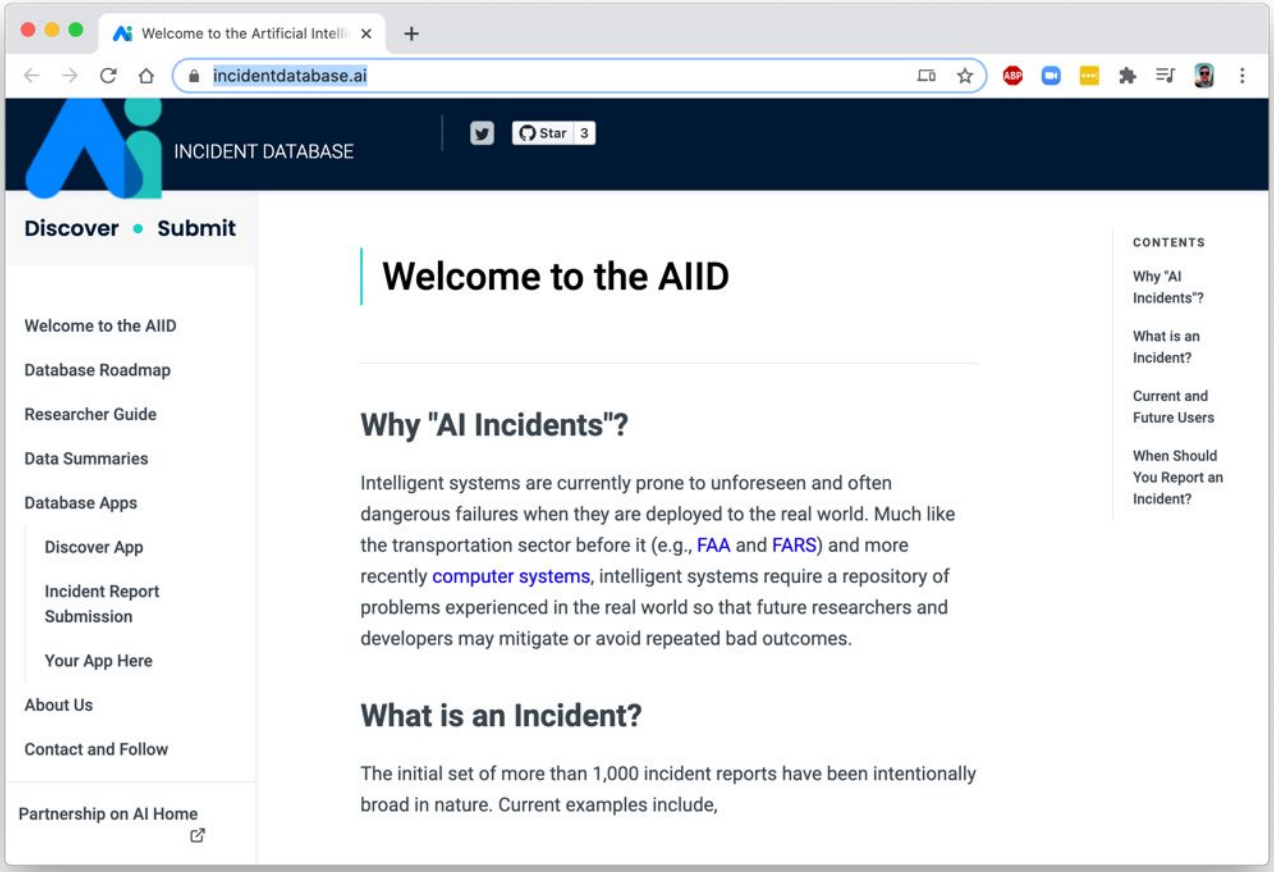
`deon` is a command line tool that allows you to easily add an ethics checklist to your data science projects. We support creating a new, standalone checklist file or appending a checklist to an existing analysis in many common formats.

δέον • (déon) [n.] (*Ancient Greek*) wikitionary

> Duty; that which is binding, needful, right, proper.

S3D

AI Incident Database



3. Will my software development practices impact the humanity of others?

S3D

Professional Ethics

Professional ethics encompass the personal, and corporate standards of behavior expected by professionals.

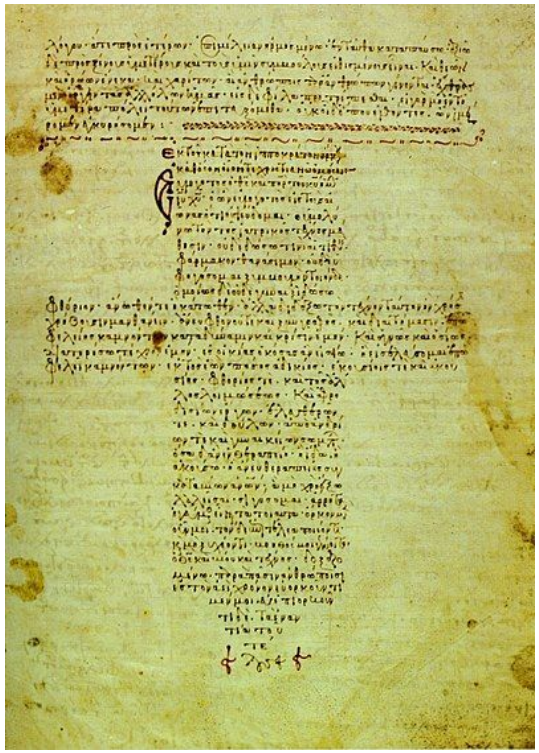
First “professions”

-Law

-Medicine

Medicine - Intrinsic

Hippocratic Oath
~450BC
“Do no Harm”



Law -Extrinsic

Bar regulates behavior

Oath to follow rules

Malpractice

Legal Malpractice

Not every mistake is legal malpractice. For malpractice to exist:

Attorney must handle a case inappropriately

due to negligence or with intent to harm

And cause damages to a client

Malpractice vs. Negligence

Negligence is a failure to exercise the care that a **reasonably prudent person** would exercise in like circumstances.

Malpractice is a type of negligence; it is often called "professional negligence". It occurs when a **licensed professional** (like a doctor, lawyer or accountant) fails to provide services as per the **standards set by the governing body** ("standard of care"), subsequently causing harm to the plaintiff.

Professional Engineers

What {is / could be} the role of **professional engineers** in software?

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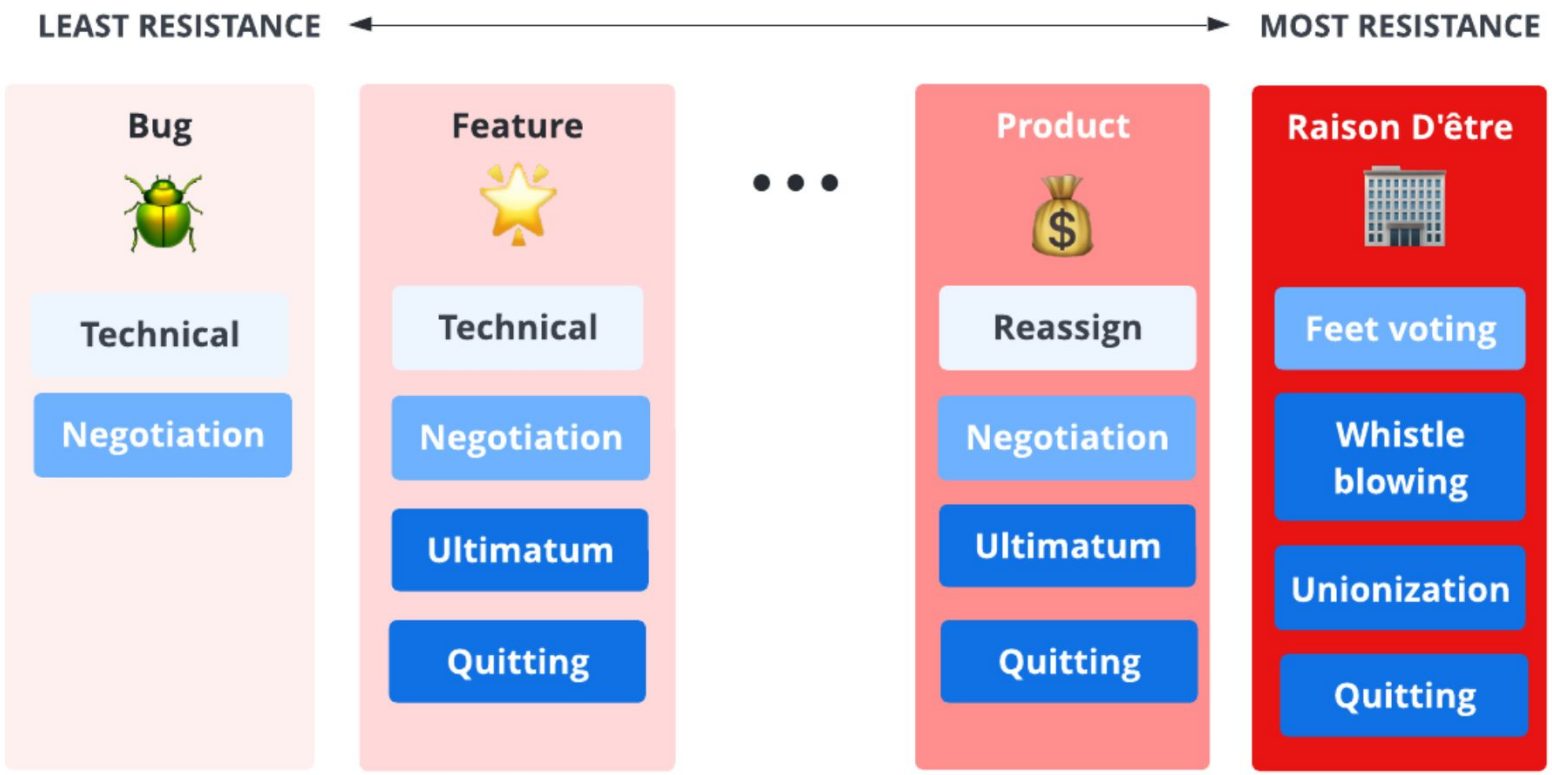
These questions are the start of the conversation, but as technology evolves, we must be vigilant to ensure we are promoting human flourishing

Bioengineering Ethics:

- Respect for Autonomy
- Beneficence
- Nonmaleficence
- Justice

Different scope of concerns addressed differentlv



S3D

Will software quality impact human flourishing?

Most traditional emphasis of “engineering ethics”
What can we learn from other professions?
Should software have ”Professional Engineers”?
How do we define “safety critical systems”?
How much testing is enough? How can we convince others to do that much testing?

S3D

Three questions to promote human flourishing

1. Does my software respect the humanity of the users?
2. Does my software amplify positive behavior, or negative behavior for users and society at large?
3. Will my software's quality impact the humanity of others?

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