

Ethics

Michael Hilton

Administrivia

Due Today: Project 4 checkpoint

Final Project 4 – Tuesday April 11

No class Thursday April 13 – Carnival

Project 5 is live: <https://cmu-313.github.io/projects/P5/>

Let me know if you are concerned about finding an internship, and would be interested in a class over the summer.

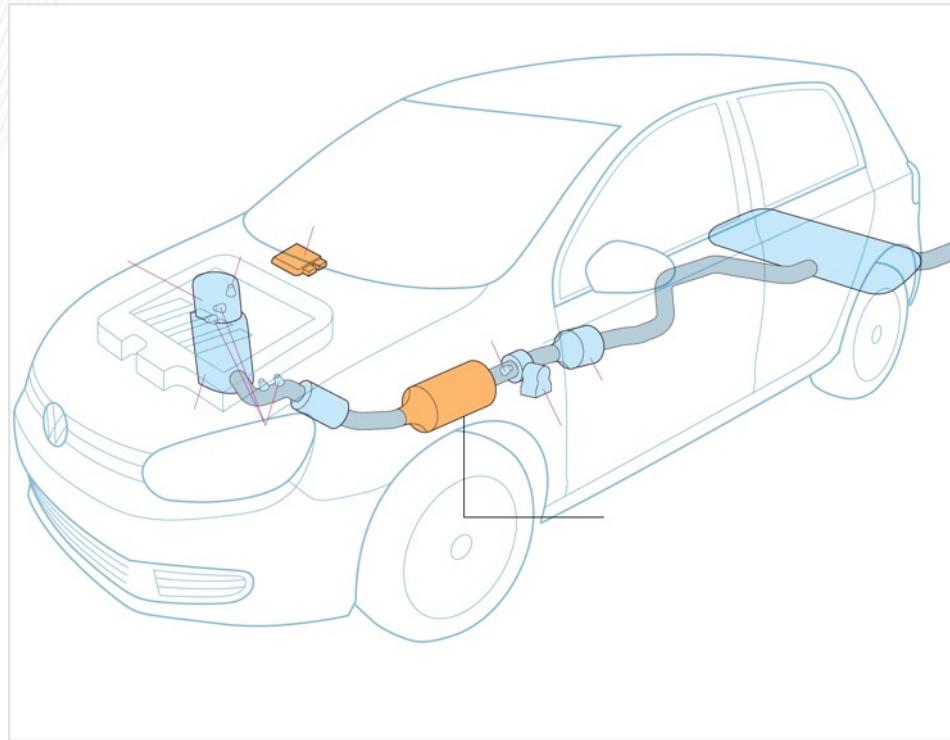
Learning goals

- Awareness of ethical issues in software engineering
- Reflection on decision making
- Questions to ask when evaluating the ethics of software
- Starting points to dig deeper

Ethics

Volkswagen Scandal

VW was caught cheating on emissions for Diesel engines



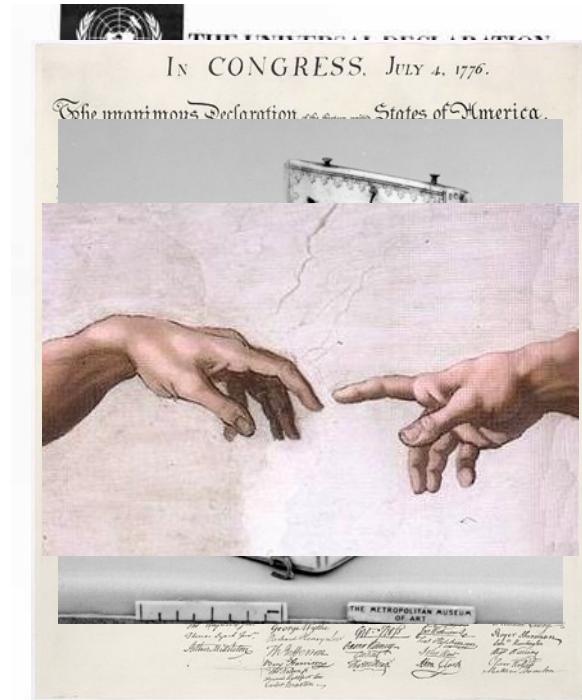
<https://www.nytimes.com/interactive/2015/business/international/vw-diesel-emissions-scandal-explained.html?mtrref=www.google.com&assetType=REGIWALL>

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.

Why Human Flourishing?

- Universal Declaration of Human Rights: “All human beings are born free and equal in dignity and rights.”
- Declaration of Independence: “We hold these truths to be self-evident...”
- Internal Compass
- Faith



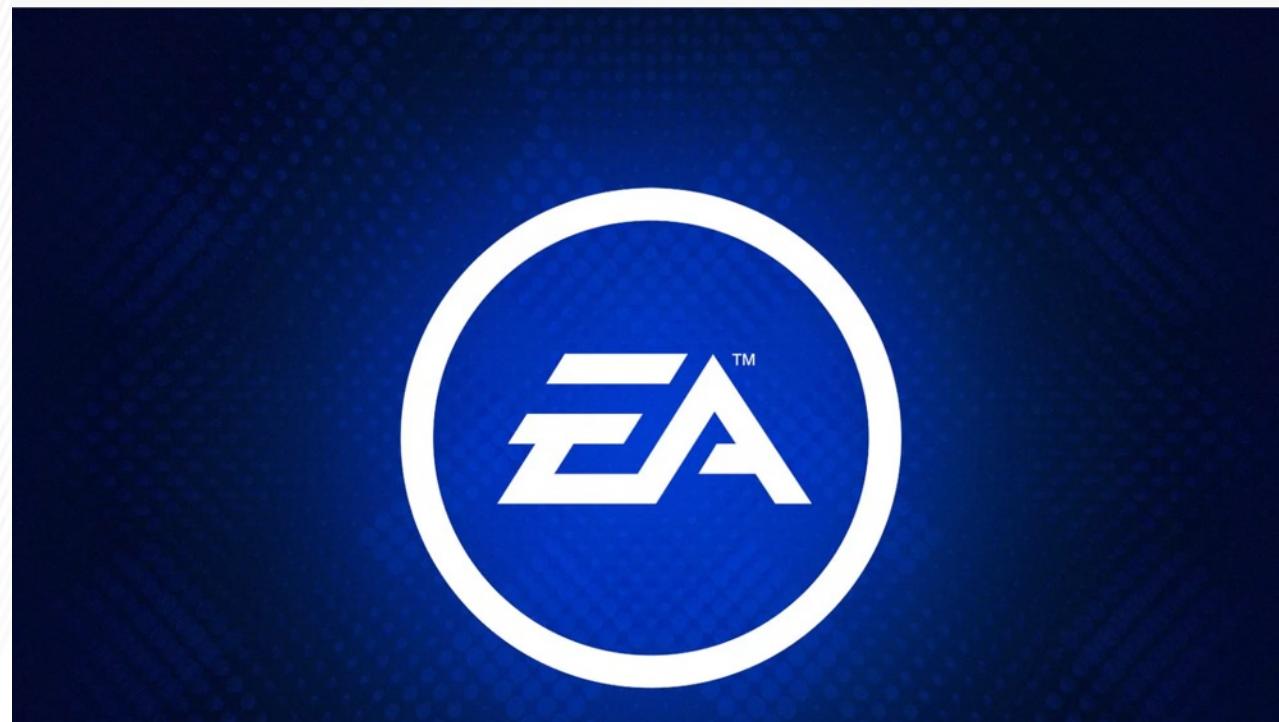
UNITED NATIONS

Activity: **(Un)Ethical situations**

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

‘People like surprises,’ executive tells UK Parliament

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



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

f   SHARE



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

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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



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!

324 Retweets 65 Quote Tweets 1,243 Likes

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

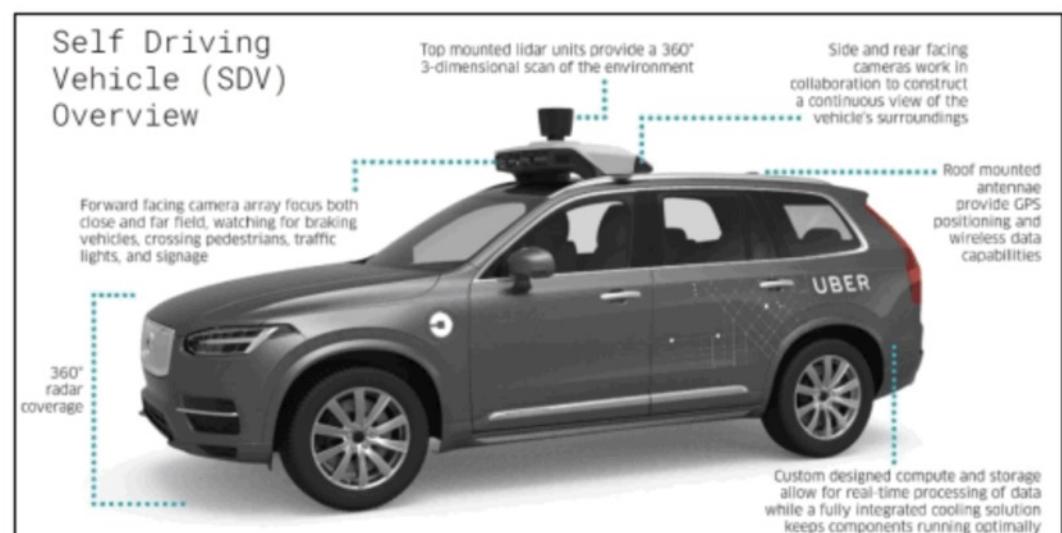
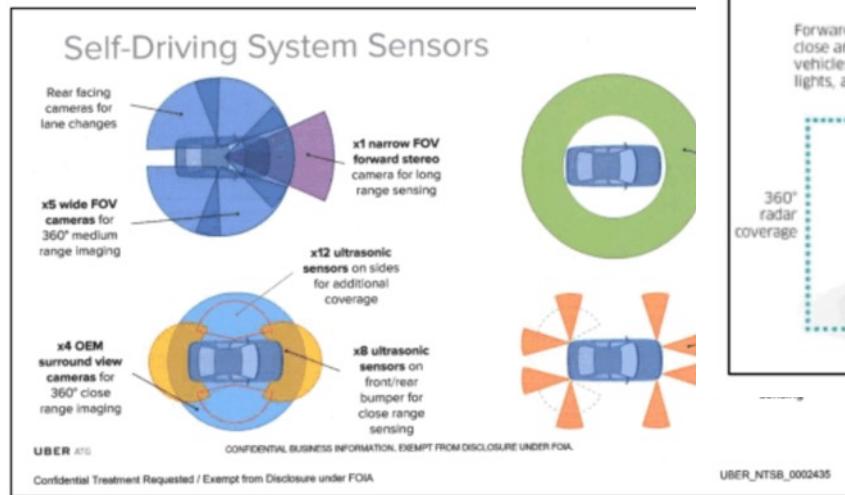
The system had several serious software flaws, the NTSB said.



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

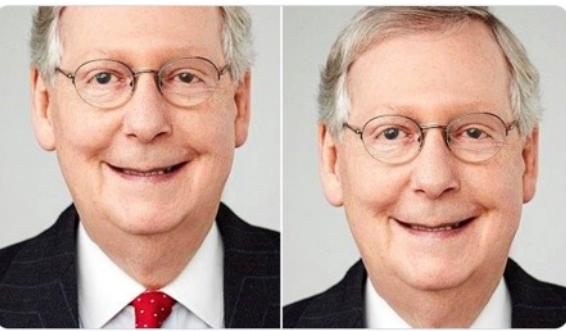
Lahoti, Preethi, Krishna P. Gummadi, and Gerhard Weikum. “iFair: Learning Individually Fair Data Representations for Algorithmic Decision Making.” 2019 IEEE 35th International Conference on Data Engineering (ICDE) (2019)

Twitter cropping photos

 Tony "Abolish (Pol)ICE" Arcieri 🇺🇸
@bascule

Trying a horrible experiment...

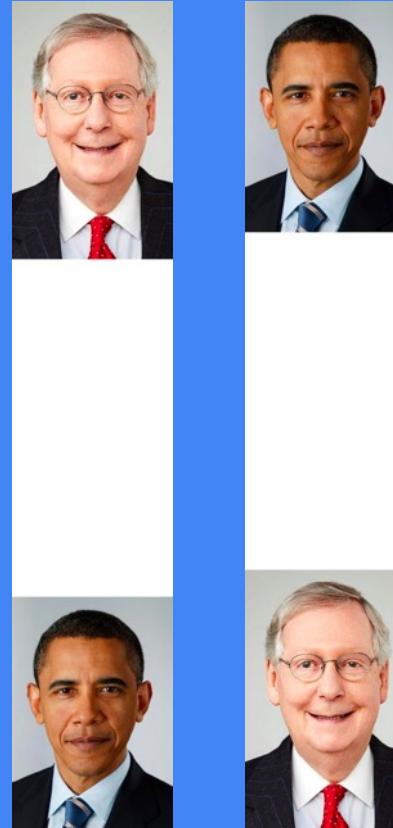
Which will the Twitter algorithm pick: Mitch McConnell or Barack Obama?



6:05 PM · Sep 19, 2020 · Twitter Web App

64.7K Retweets 16.3K Quote Tweets 198.6K Likes

Reply Retweet Like Share

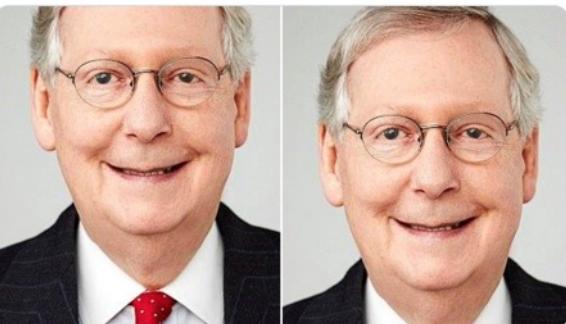


Twitter cropping photos

Tony "Abolish (Pol)ICE" Arcieri 🇺🇸
@bascule

Trying a horrible experiment...

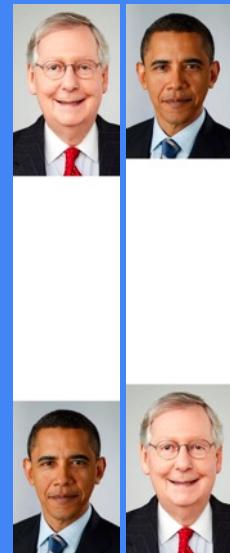
Which will the Twitter algorithm pick: Mitch McConnell or Barack Obama?



6:05 PM · Sep 19, 2020 · Twitter Web App

64.7K Retweets 16.3K Quote Tweets 198.6K Likes

Like Retweet Heart Share



TheArtGun COMMS OPEN
@TheArtGun

Replies to @bascule

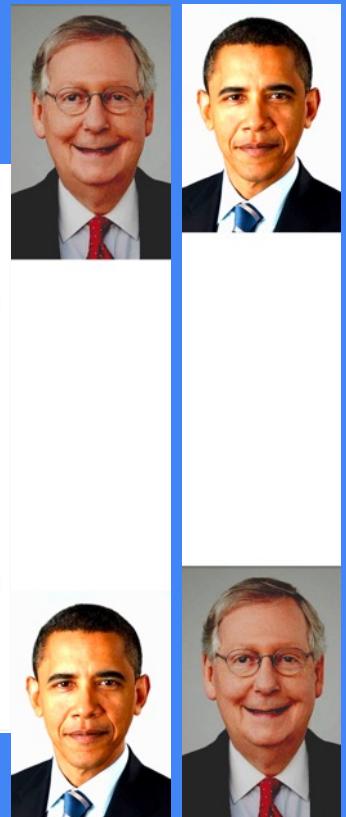
What if we adjust the contrast



10:36 PM · Sep 19, 2020 · Twitter Web App

35 Retweets 5 Quote Tweets 102 Likes

Like Retweet Heart Share



Open Source Maintainers

dominictarr commented 7 days ago

Owner ...

dominictarr commented 7 days ago

Owner ...

limonte commented 7 days ago • edited ▾

...
dominictarr commented 6 days ago

Owner ...

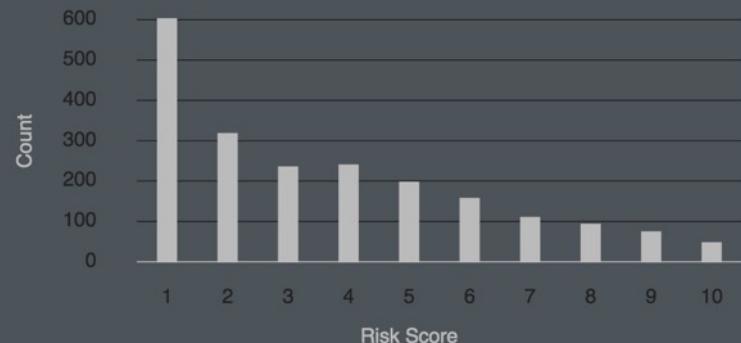
XhmikosR commented 6 days ago

...
jaydenseric commented 6 days ago

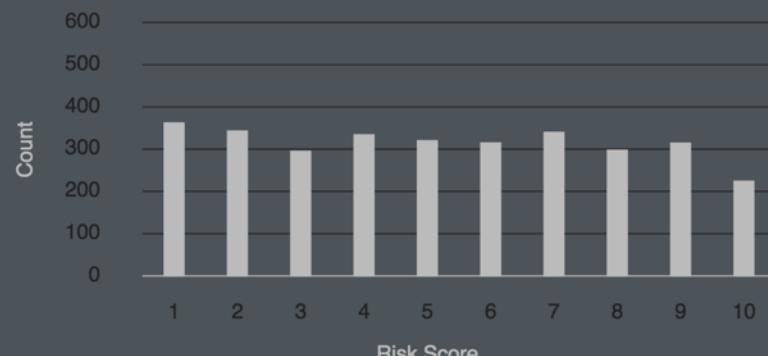
...
There is a huge difference between not maintaining a repo/package, vs giving it away to a hacker (which actually takes more effort than doing nothing), then denying all responsibility to fix it when it affects millions of innocent people.

884 162 7 16 18

White Defendants' Risk Scores



Black Defendants' Risk Scores



These charts show that scores for white defendants were skewed toward lower-risk categories. Scores for black defendants were not. (Source: ProPublica analysis of data from Broward County, Fla.)

Prediction Fails Differently for Black Defendants

	WHITE	AFRICAN AMERICAN
Labeled Higher Risk, But Didn't Re-Offend	23.5%	44.9%
Labeled Lower Risk, Yet Did Re-Offend	47.7%	28.0%

Algorithmic Bias

Algorithms affect:

Where we go to school

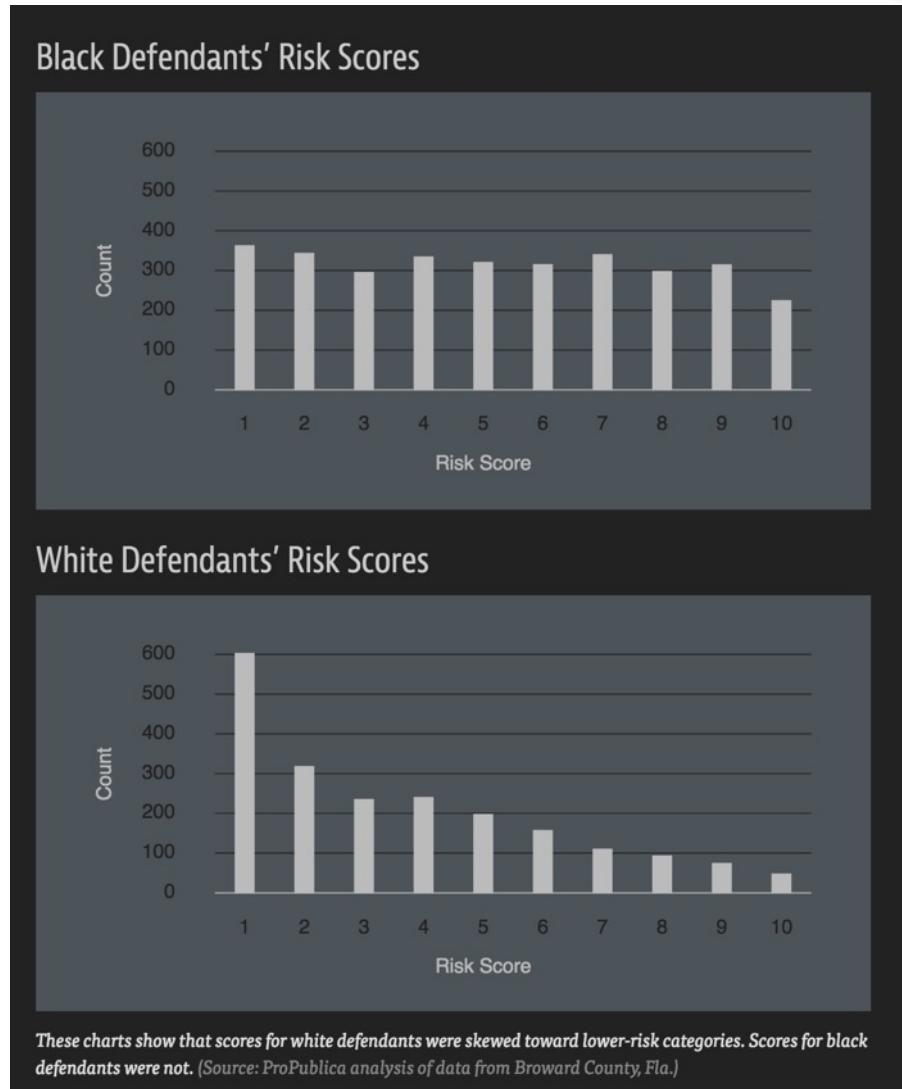
Access to money

Access to health care

Receiving parole

Possibility of Bail

Risk Scores



Therac-25

Bug (race-condition) in software lead to at least 6 deaths

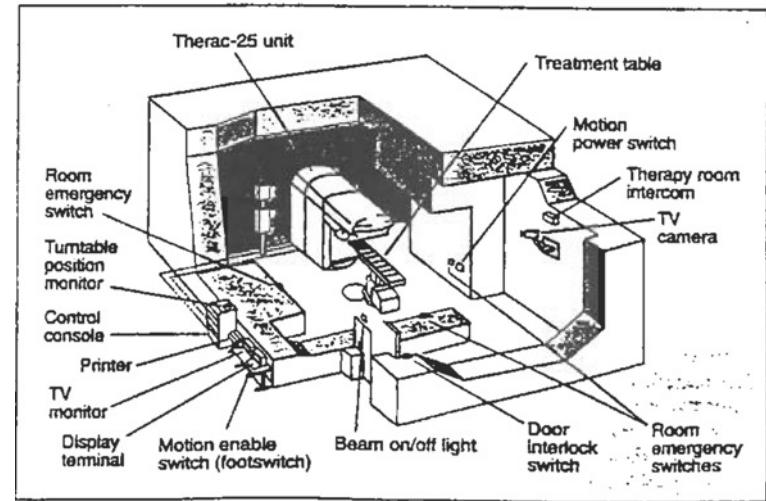
Traced to:

Lack of reporting bugs

Lack of proper due diligence

Engineers were overconfident, removed hardware locks

Race condition of 8 seconds could lead to problems



PATIENT NAME:	John	TREATMENT MODE:	FIX	BEAM TYPE:	E	ENERGY (KeV):	10
				ACTUAL	PRESCRIBED		
UNIT RATE/MINUTE	0.00000	0.00000					
MONITOR UNITS	200.00000	200.00000					
TIME (MIN)	0.27000	0.27000					
GANTRY ROTATION (DEG)	0.00000	0.00000					VERIFIED
COLLIMATOR ROTATION (DEG)	359.20000	359.20000					VERIFIED
COLLIMATOR X (CM)	14.20000	14.20000					VERIFIED
COLLIMATOR Y (CM)	27.20000	27.20000					VERIFIED
WEDGE NUMBER	1.00000	1.00000					VERIFIED
ACCESSORY NUMBER	0.00000	0.00000					VERIFIED
DATE: 2012-04-16		SYSTEM: BEAM READY		OP.MODE: TREAT		AUTO	
TIME: 11:48:58		TREAT: TREAT PAUSE		X-RAY			
OPR ID: 033-tfs3p		REASON: OPERATOR		COMMAND: █			

The New York Times

Make a contribution

Subscribe Find BUSINESS DAY

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.



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

US edition ▾

n

it ethics

READ

to fool AI with magic

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?

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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's **quality** impact the **humanity** of others?

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

Humane Design Guide

<http://humanetech.com>

Humane Design Guide (Alpha Version)

Use this worksheet to identify opportunities for Humane Technology.				What are Human Sensitivities?
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.	<ul style="list-style-type: none">Artificial scarcityUrgency signallingConstant monitoringOptimizing for screentime	Design engenders calm, balance, safety, pauses and supports circadian rhythms.	<input type="radio"/> High <input type="radio"/> Low
Attention How and where we focus our attention.	Attention is physiologically drawn, overwhelmed or fragmented.	<ul style="list-style-type: none">Constant context switchingMany undifferentiated choicesFearful informationNo stopping cues (e.g. infinite scroll)Unnecessary movement	Enabled to bring more focus and mindfulness.	<input type="radio"/> <input type="radio"/>
Sensemaking How we integrate what we sense with what we know.	Information is fear-based, out of context, confusing, or manipulative.	<ul style="list-style-type: none">Facts out of contextOver-personalized filtersEquating virality with credibilityDeceptive authority (ads vs. content)	Enabled to consider, learn, express and feel grounded.	<input type="radio"/> <input type="radio"/>
Decisionmaking How we align our actions with our intentions.	Intentions and agency are not solicited nor supported.	<ul style="list-style-type: none">Avatars to convey authorityStalking ads and messagesPush content modelsServing preference over intent	Enabled to gain agency, purpose, and mobilization of intent.	<input type="radio"/> <input type="radio"/>
Social Reasoning How we understand and navigate our personal relationships.	Status, relationships or self-image are manipulated.	<ul style="list-style-type: none">Quantified social statusViral sharingImplied obligationEnabling impersonation	Enabled to connect more safely and authentically with others.	<input type="radio"/> <input type="radio"/>
Group Dynamics How we navigate larger groups, status, and shared understanding.	Excluded, divided or mobilized through fear.	<ul style="list-style-type: none">Suppressing views and nuanceEnabling ad hominem or hate speechEnabling viral outrageLack of agreed-upon norms	Enabled to develop a sense of belonging and cooperation.	<input type="radio"/> <input type="radio"/>

[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.	<ul style="list-style-type: none">• Constant context switching• Many undifferentiated choices• Fearful information• No stopping cues (e.g. infinite scroll)• Unnecessary movement	Enabled to bring more focus and mindfulness.	

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 Jones¹



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 move 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.

¹Abby 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

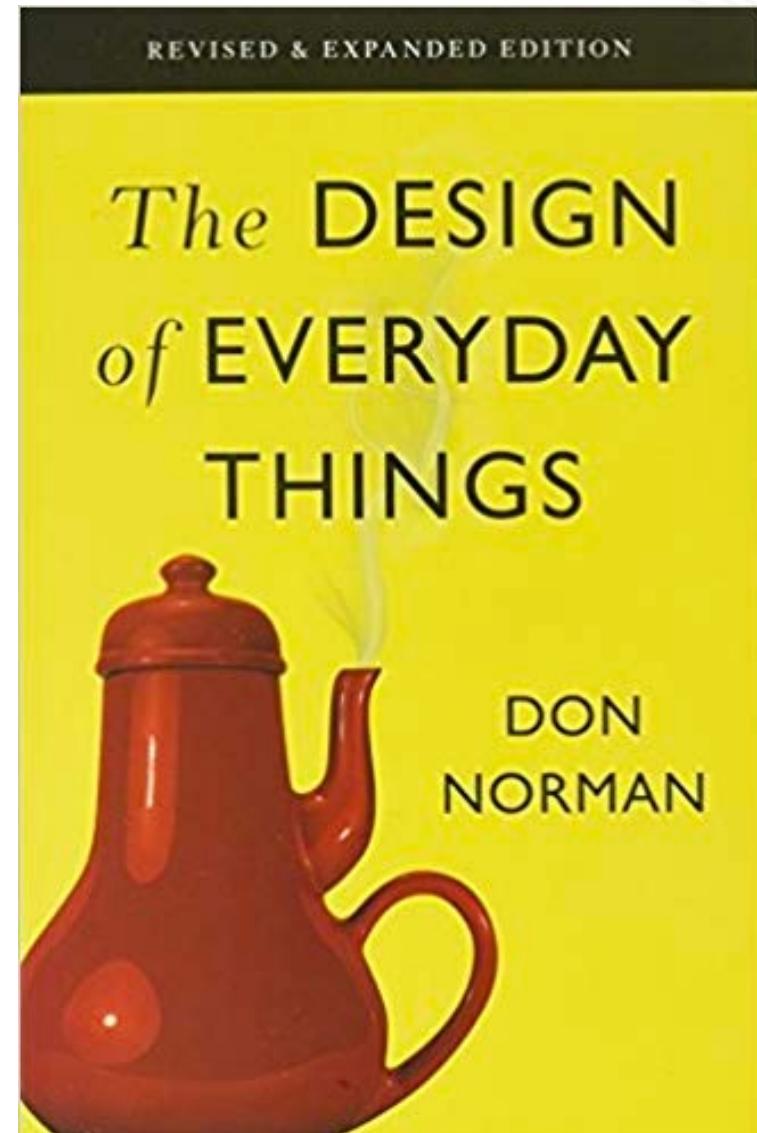
<https://gendermag.org>

<ul style="list-style-type: none">• 1. Pick a persona. eg: Abby• 2. Pick a use case/scenario in your tool, eg:<ul style="list-style-type: none">– in Book Store Navigator app...– “Find science fiction books” 	<ul style="list-style-type: none">• 3a-b. Pick a Subgoal for that scenario. eg: <p>Subgoal #1: “See bookstore map”.</p> <p>Q: Will Abby have formed this sub-goal...? • Yes/no/maybe. Why? Consider Abby's Motivations...</p> 
<ul style="list-style-type: none">• 3c-d. Pick an Action for that subgoal. <p>Action #1: “Tap ‘Browse Off’”:</p> <p>– Q1. Will Abby know what to do? • Yes/no/maybe. Why? Consider Abby's, ... Tinkering</p> <p>→ First answer Q1. After answering it, then perform the action.</p> 	<p>– 3e. Q2. If she performs the action, producing</p>  <p>will Abby see progress toward the subgoal? • Yes/no/maybe. Why? Consider Abby's Self-Efficacy & ...</p>

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 C



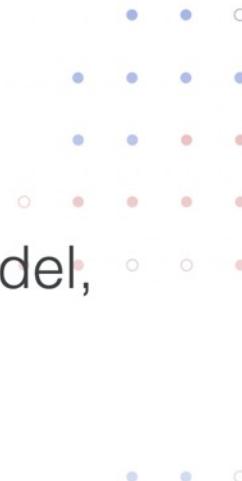
**2. Does my
software amplify
positive or
negative behavior
for users and
society at large?**

What if...

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

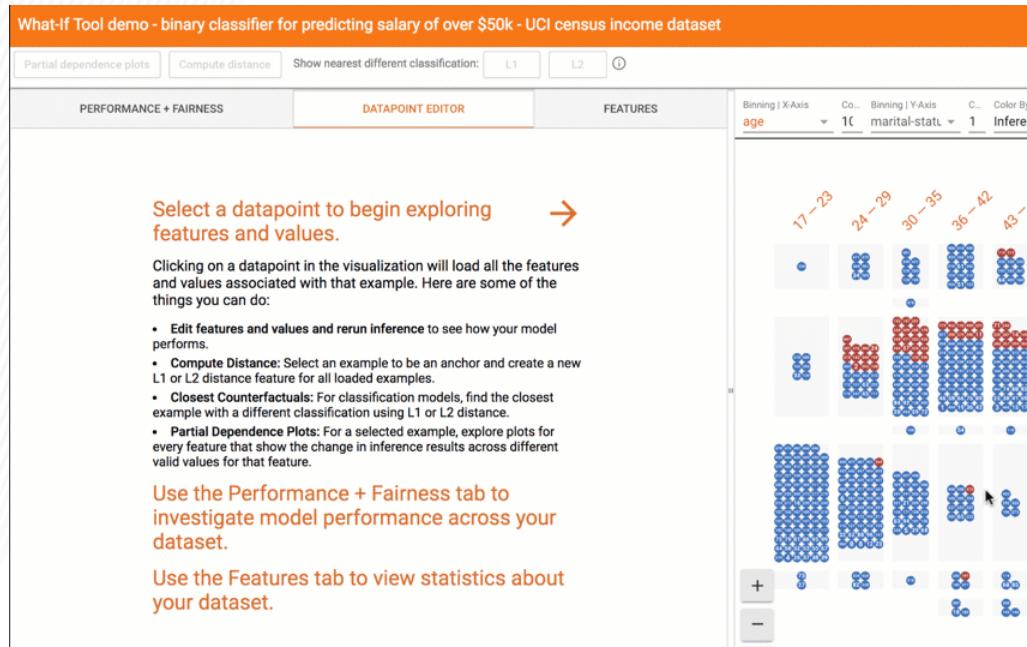
What If...

you could inspect a machine learning model,
with minimal coding required?

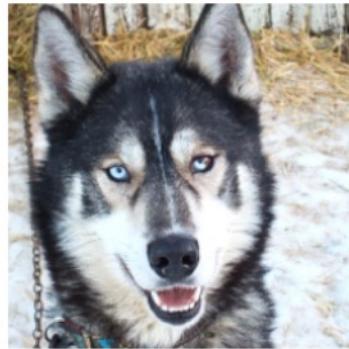


What if...

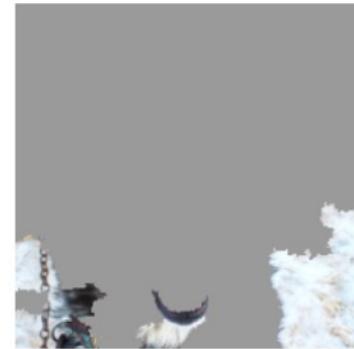
<https://pair-code.github.io/what-if-tool/>



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.

	Before	After
Trusted the bad model	10 out of 27	3 out of 27
Snow as a potential feature	12 out of 27	25 out of 27

Local Interpretable Model-Agnostic Explanations LIME)

<https://github.com/marcotcr/lime>

Prediction probabilities

atheism	0.58
christian	0.42

atheism

Posting
0.15
Host
0.14
NNTP
0.11
edu
0.04
have
0.01
There
0.01

christian

Text with highlighted words

From: johnchad@triton.unm.edu (jchadwic)

Subject: Another request for Darwin Fish

Organization: University of New Mexico, Albuquerque

Lines: 11

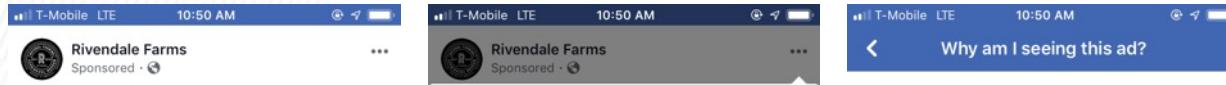
NNTP-Posting-Host: triton.unm.edu

Hello Gang,

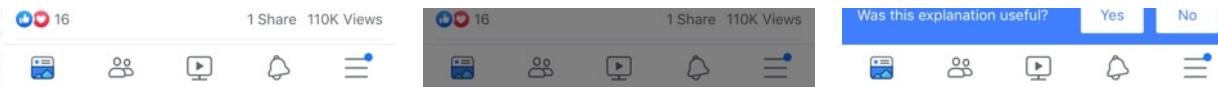
There have been some notes recently asking where to obtain the DARWIN fish.

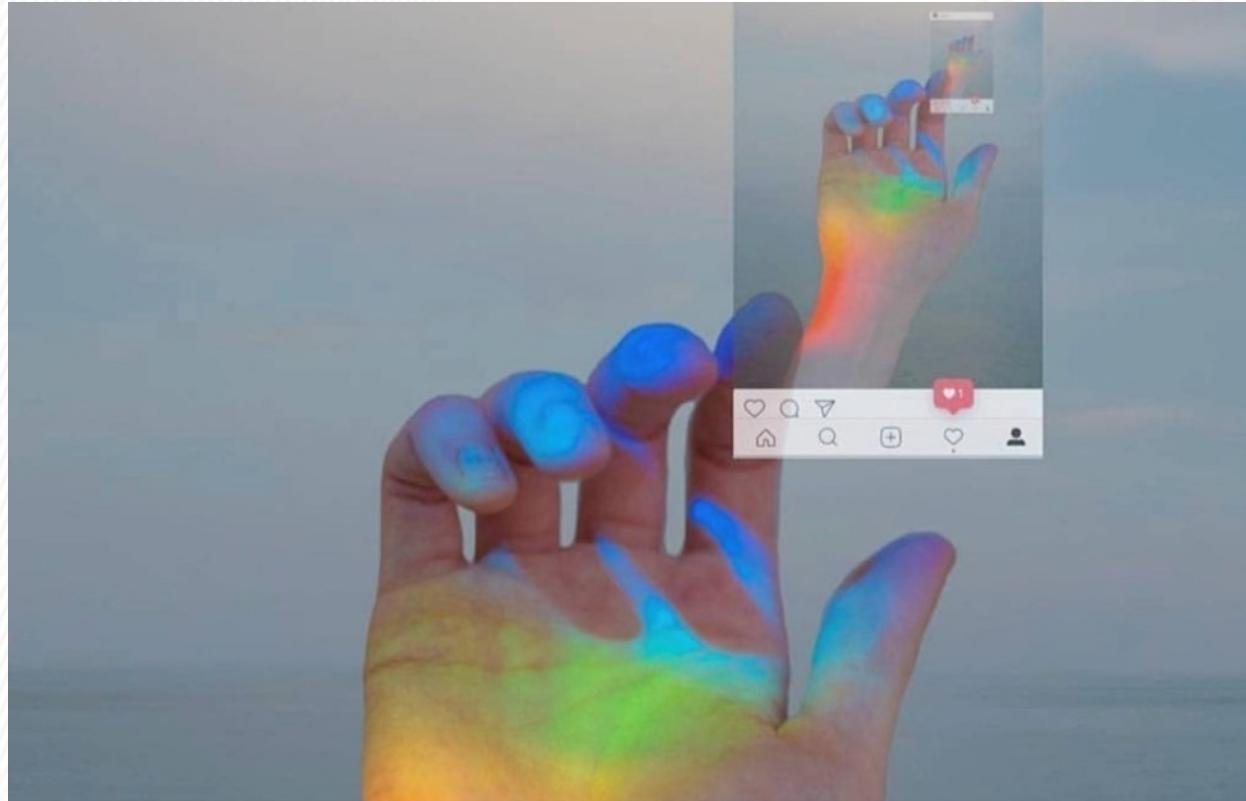
This is the same question I have and I have not seen an answer on the net. If anyone has a contact please post on the net or email me.

Explain “why” to customers



There may be other reasons you're seeing this ad, including that Rivendale Farms wants to reach **people ages 22 to 64 who live or were recently near Pittsburgh, Pennsylvania**. This is information based on your Facebook profile and where you've connected to the internet.





@dovneon

What Instagram removing likes may mean for influencers and our self-esteem

SCIENCE & TECH - FEATURE

The decision could have a positive impact on the way people use the platform, but harm those trying to use it professionally

Anil Dash on how to prevent abuse

http://anildash.com/2011/07/20/if_your_websites_full_of_assholes_its_your_fault-2/

You should have real humans dedicated to monitoring and responding to your community.

You should have community policies about what is and isn't acceptable behavior.

Your site should have accountable identities.

You should have the technology to easily identify and stop bad behaviors.

You should make a budget that supports having a good community, or you should find another line of work.

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



tests passing codecov 97% pypi v0.2.2 conda-forge v0.2.2

| 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) [wiktionary](#)

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

AI Incident Database

The screenshot shows the homepage of the AI Incident Database (AIID) at incidentdatabase.ai. The page features a dark header with a large blue 'AI' logo and the text 'INCIDENT DATABASE'. Below the header, there are two main buttons: 'Discover' and 'Submit'. The main content area is titled 'Welcome to the AIID' and includes sections for 'Why "AI Incidents"?', 'What is an Incident?', and 'Current and Future Users'. A sidebar on the left lists various links such as 'Welcome to the AIID', 'Database Roadmap', 'Researcher Guide', 'Data Summaries', 'Database Apps' (with sub-links for 'Discover App', 'Incident Report Submission', and 'Your App Here'), 'About Us', 'Contact and Follow', and 'Partnership on AI Home'. A sidebar on the right lists 'CONTENTS' including 'Why "AI Incidents"?', 'What is an Incident?', 'Current and Future Users', and 'When Should You Report an Incident?'. The footer contains a small number '4' above a '5'.

Welcome to the AIID

Why "AI Incidents"?

Intelligent systems are currently prone to unforeseen and often dangerous failures when they are deployed to the real world. Much like the transportation sector before it (e.g., [FAA](#) and [FARS](#)) and more recently [computer systems](#), intelligent systems require a repository of problems experienced in the real world so that future researchers and developers may mitigate or avoid repeated bad outcomes.

What is an Incident?

The initial set of more than 1,000 incident reports have been intentionally broad in nature. Current examples include,

4
5

**3. Will my
software's
quality impact
the humanity
of others?**

Quality has long been considered

Quality attributes [\[edit \]](#)

Notable quality attributes include:

- accessibility
- accountability
- accuracy
- adaptability
- administrability
- affordability
- agility [Toll] (see Common Subsets below)
- auditability
- autonomy [Erl]
- availability
- compatibility
- composable [Erl]
- configurability
- correctness
- credibility
- customizability
- debugability
- degradability
- determinability
- demonstrability
- dependability
- deployability
- discoverability [Erl]
- distributability
- durability
- effectiveness
- efficiency
- evolvability
- extensibility
- failure transparency
- fault-tolerance
- fidelity
- flexibility
- inspectability
- installability
- integrity
- interchangeability
- interoperability [Erl]
- learnability
- localizability
- maintainability
- manageable
- mobility
- modifiability
- modularity
- observability
- operability
- orthogonality
- portability
- precision
- predictability
- process capabilities
- producibility
- provability
- recoverability
- relevance
- reliability
- repeatability
- reproducibility
- resilience
- responsiveness
- reusability [Erl]
- robustness
- safety
- scalability
- seamlessness
- self-sustainability
- serviceability (a.k.a. supportability)
- securability
- simplicity
- stability
- standards compliance
- survivability
- sustainability
- tailorable
- testability
- timeliness
- traceability
- transparency
- ubiquity
- understandability
- upgradability
- vulnerability
- usability

Engineering ethics.

Ethics applies and is formalized in many professional fields: medical, legal, business, and engineering.

The first codes of engineering ethics were formally adopted by American engineering societies in 1912-1914. In 1946 the National Society of Professional Engineers (NSPE) adopted their first formal Canons of Ethics.

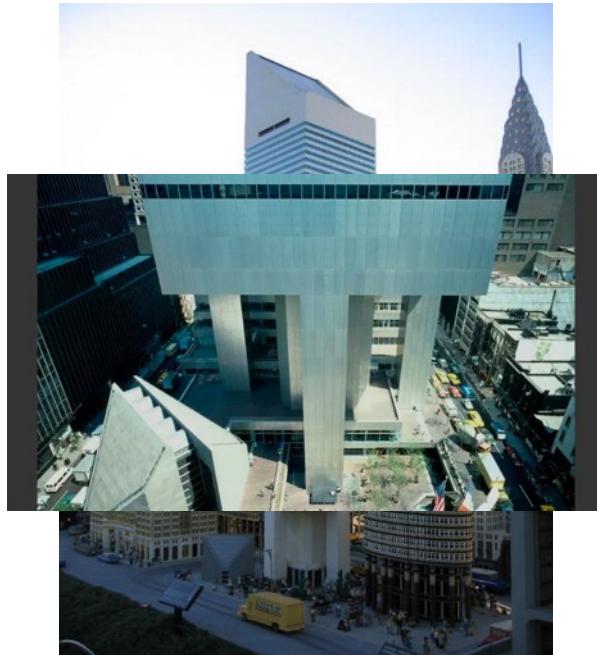
"hold paramount safety, health and welfare of the public"

Citigroup Center, Designed by Structural engineer William LeMessurier

Followed calculations required by building codes

Civil Engineering student Diane Hartley realized there was a problem

Tests showed that winds needed to bring it down would happen every 55 years



Professional Ethics

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

First three “professions”

- Divinity,

- Law

- Medicine

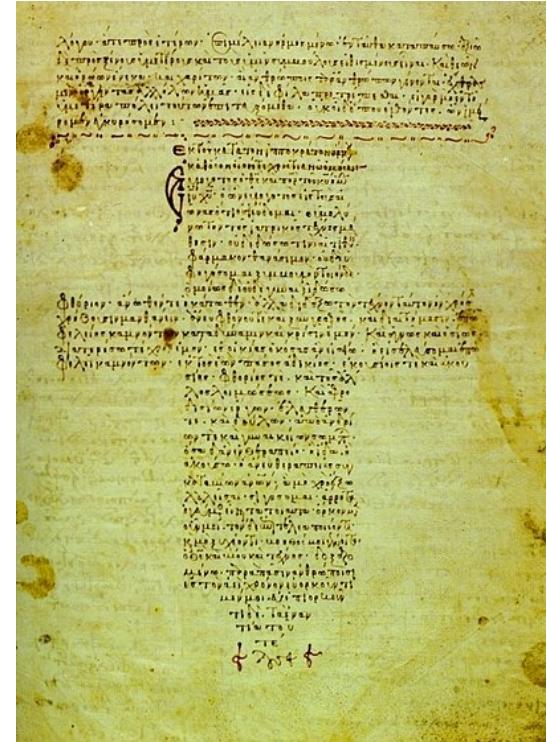


Medicine - Intrinsic

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

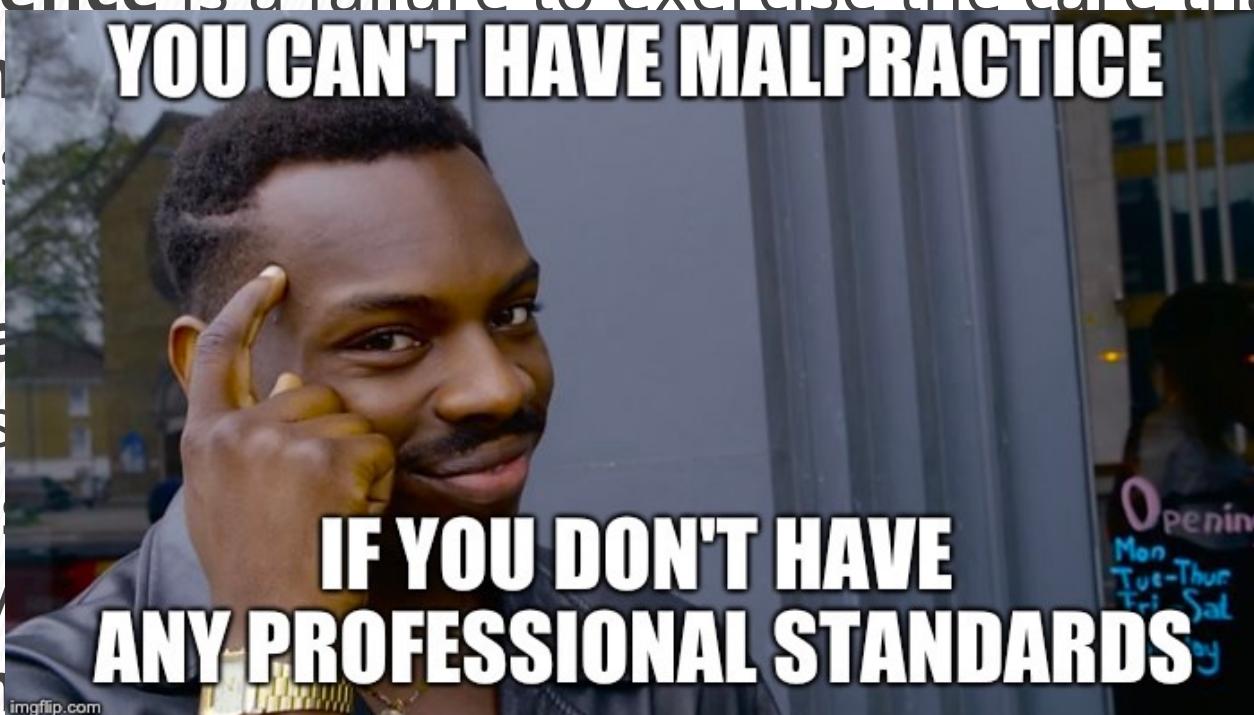
And cause damages to a client

Malpractice vs. Negligence

Negligence is a failure to exercise the care that a reasonable person like

circumstances would require.

Malpractice is a "professional" negligence by a licensed professional who fails to provide the standards of care required by the governing body, causing harm to the plaintiff.



DISCUSSION: What should we do going forward?

Bioengineering Ethics:

- Respect for Autonomy
- Beneficence
- Nonmaleficence
- Justice

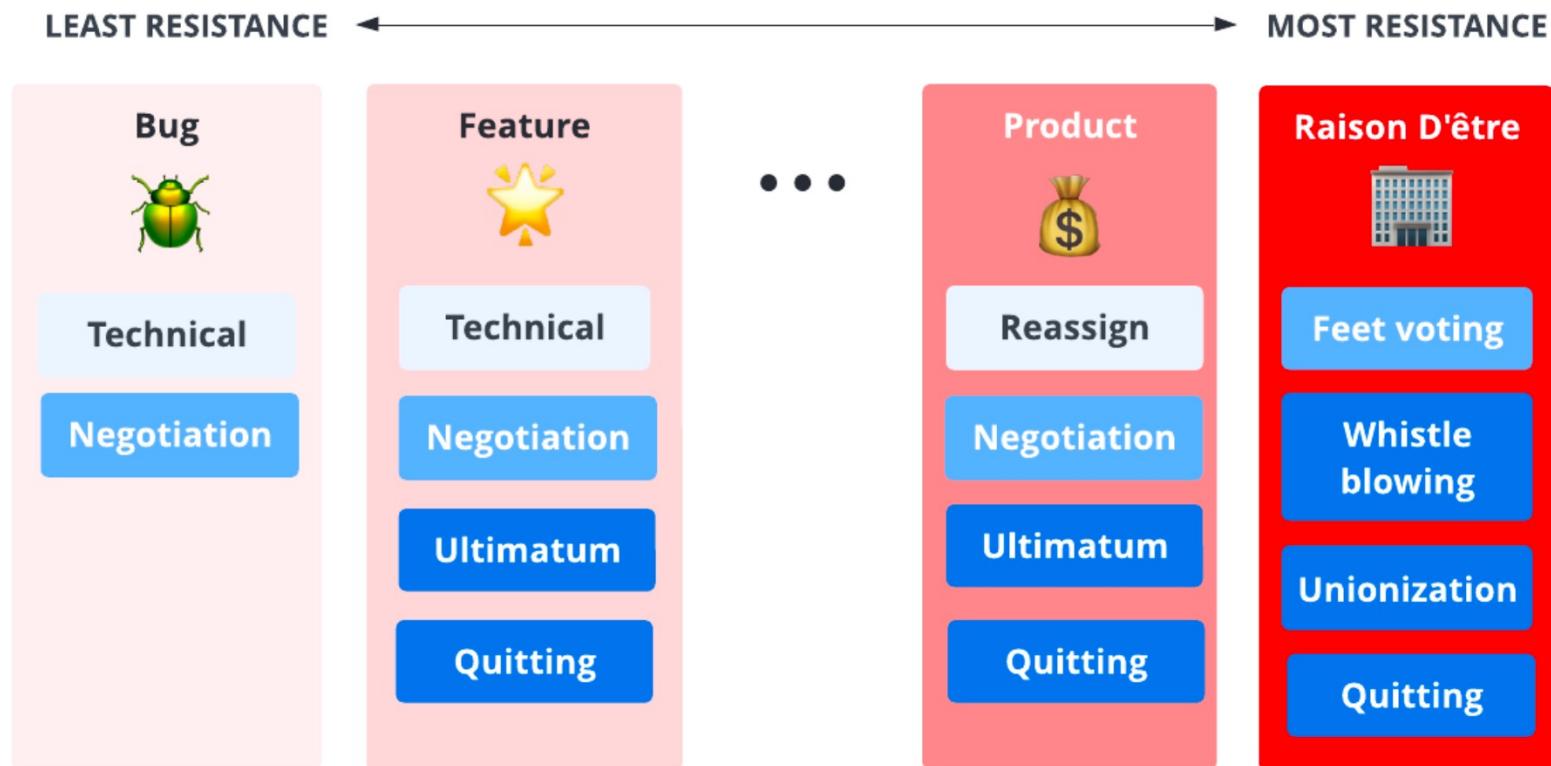
Professional Engineers

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



By ----PCStuff 03:47, 31 July 2006 (UTC), CC BY-SA 2.5,
<https://commons.wikimedia.org/w/index.php?curid=10340855>

Different scope of concerns addressed differently



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?

These questions are the **start** of the
conversation, but as technology
evolves, we must be **vigilant** to ensure
we are 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's **quality** impact the **humanity** of others?