

Not *Just* Machine Learning: Ethical Considerations and Machine Learning



Welcome!



Cameron W. Piercy

I am here because I opened my mouth and wrote a bit about human-machine dynamics. I'm a mixed-methods social scientist. I teach "Communication and the Internet," "Relationships and Digital Media," "Social Network Analysis" and "Organizational Comm. Theory."

Tweet complaints to: @cameronpiercy

Huge thank you to Casey Fiesler at CU- Boulder for lots of the ideas (and evidence).

why are black women so



why are black women so angry
why are black women so loud
why are black women so mean
why are black women so attractive
why are black women so lazy
why are black women so annoying
why are black women so confident
why are black women so sassy
why are black women so insecure

ALGORITHMS OF OPPRESSION

HOW SEARCH ENGINES
REINFORCE RACISM

SAFIYA UMOJA NOBLE

NEW YORK TIMES BESTSELLER

WITH A NEW AFTERWORD

WEAPONS OF MATH DESTRUCTION



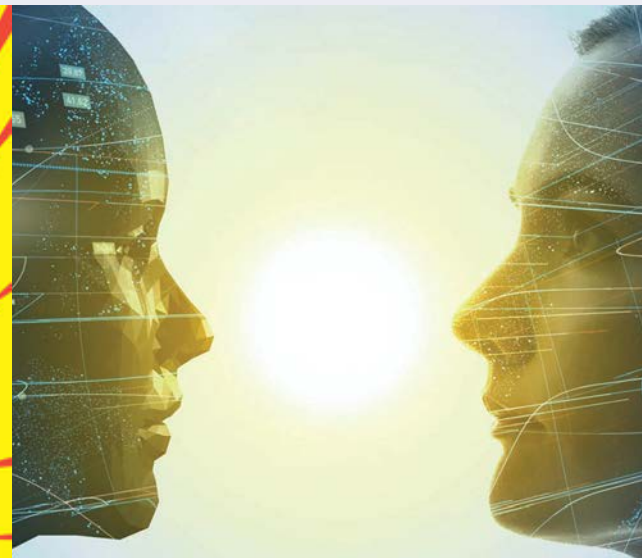
HOW BIG DATA INCREASES INEQUALITY
AND THREATENS DEMOCRACY

CATHY O'NEIL



"This is a manual for the 21st-century citizen,
and it succeeds where other big data accounts
have failed—it is accessible, refreshingly
critical, and feels relevant and urgent."

—FINANCIAL TIMES

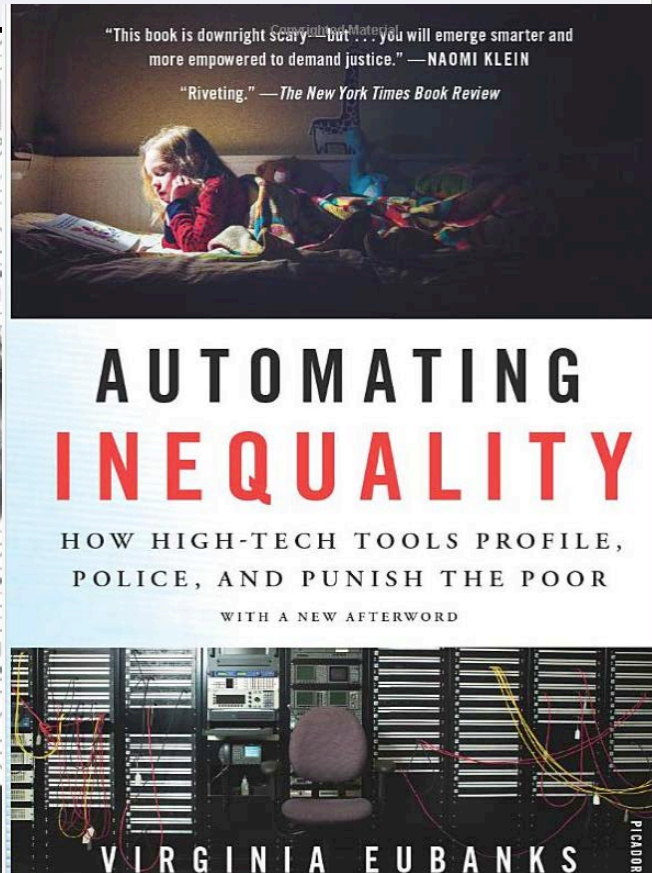
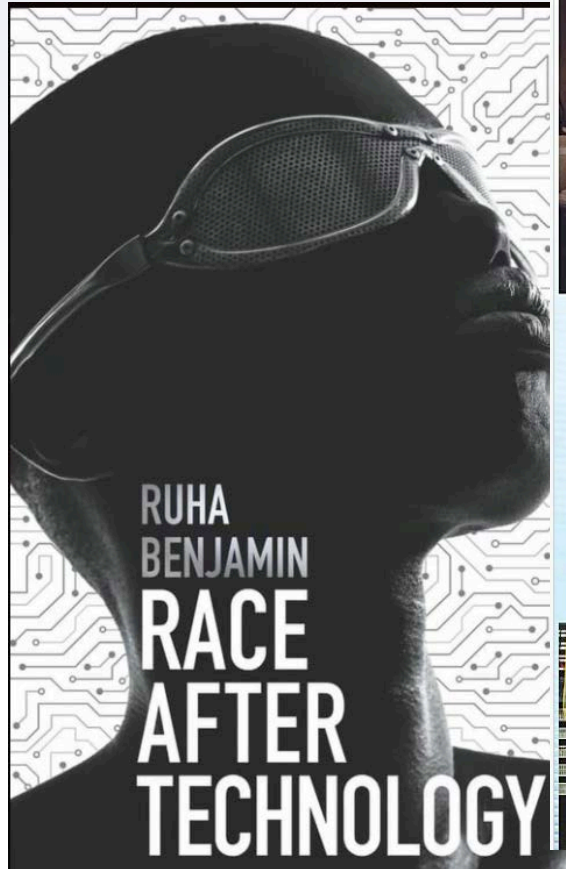


HUMAN- MACHINE *Communication*

Rethinking Communication,
Technology, and Ourselves

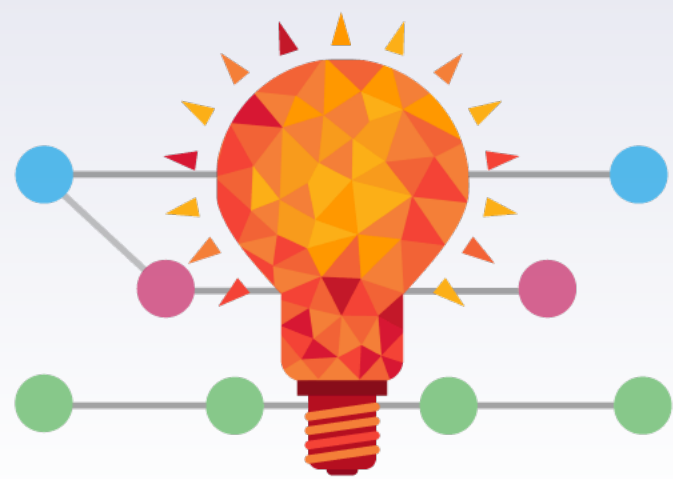
Edited by **Andrea L. Guzman**

Additional Important Texts



Our plan

- ▶ The exigencies: What is machine learning?
- ▶ The foundational role of data in ML
- ▶ The importance of agency in ML processes
- ▶ Putting ethics in ML



Assumptions



- ▶ **Ethics is everyone's responsibility.**
- ▶ **There is no perfect data.** All data holds assumptions (like this list).
- ▶ **Researchers must take responsibility for their process** (as gun owners should their weapons).
- ▶ **Philosophical issues are not ameliorated by complex models**—indeed, they are exacerbated.



What is Machine Learning?

Go to [Kahoot.it](https://kahoot.it)

The exigencies

Scandals

“Software engineers continue to treat safety and ethics as specialties, rather than the foundations of all design.”

–Yonatan Zunger in the *Boston Globe*

Complex models

- ▶ The **Black Box problem** (how do complex model reach conclusions).
- ▶ **Data imperfections**
- ▶ Missing values
- ▶ Life/death decisions

Proximal/distal tradeoffs

- ▶ **Technical debts**-implied costs of better product vs. future bug fixes.
- ▶ **Ethical debts**- implied costs of not considering social/ethical implications

Complex technologies introduce complex problems

- ▶ The Internet facilitates more complex training data sets than we thought possible (e.g. Captcha an addresses, NLP, mapping the sky)
- ▶ Training models on biased data yields biased results (Noble, 2018).
- ▶ “So, fairness isn’t calculated into WMDs [weapons of math destruction]. And the result is massive, industrial production of *unfairness*” (O’Neil, 2017, p. 95).

A close-up photograph of a woman's face, focusing on her eyes and nose. She has a neutral expression and is looking directly at the camera. The background is dark. A white search bar is overlaid at the bottom of the image, containing the text 'women shouldn't|'. Below the search bar, a list of search suggestions is displayed. A blue search button with a magnifying glass icon is located to the right of the search bar.

Actual Display of Search Results

women shouldn't|




women shouldn't have rights

women shouldn't vote

women shouldn't work


women shouldn't box


What is the problem?


Google   


Q All Images Videos News Shopping More Settings Tools Collections SafeSearch


female college harvard teaching lab molecular cover student cell chemistry brian faculty



Active Learning in Science Education ...
teachingcenter.wustl.edu



Biology Department | Pomona College in ...
pomona.edu

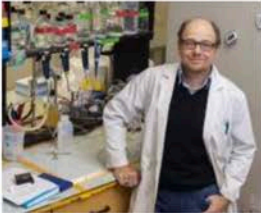

Biology Department | Pomona College in ...
pomona.edu



Lycoming College biology professor ...
lycoming.edu



Biology Professor Searches for a Be...
themichigantimes.com


Biology professor answers students sex ...
thechannels.org


Biology professor researches parasites ...
purdueexponent.org


Waterloo Biology Professor recogniz...
uwaterloo.ca

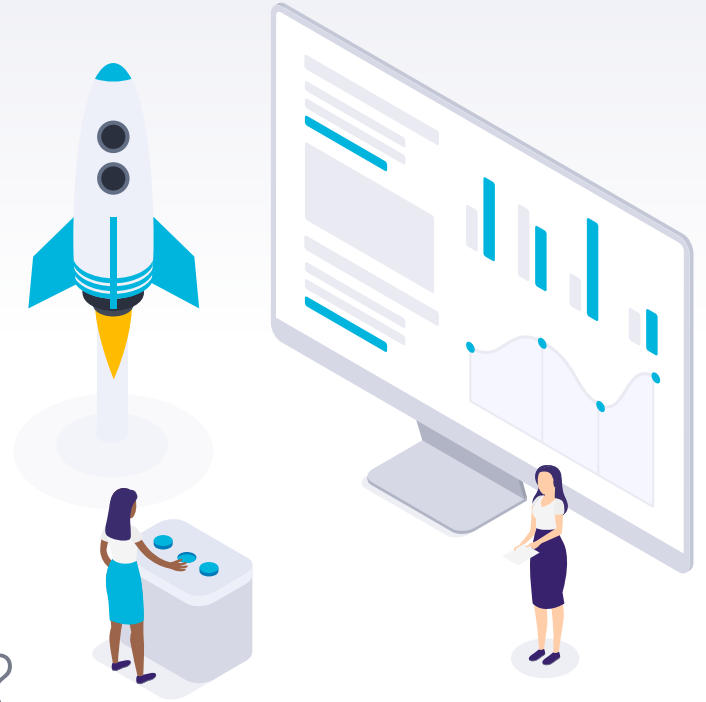

Biology professor researches mealworms ...
ung.edu


Biology professor earns NSF grant to ...
wp.stolaf.edu

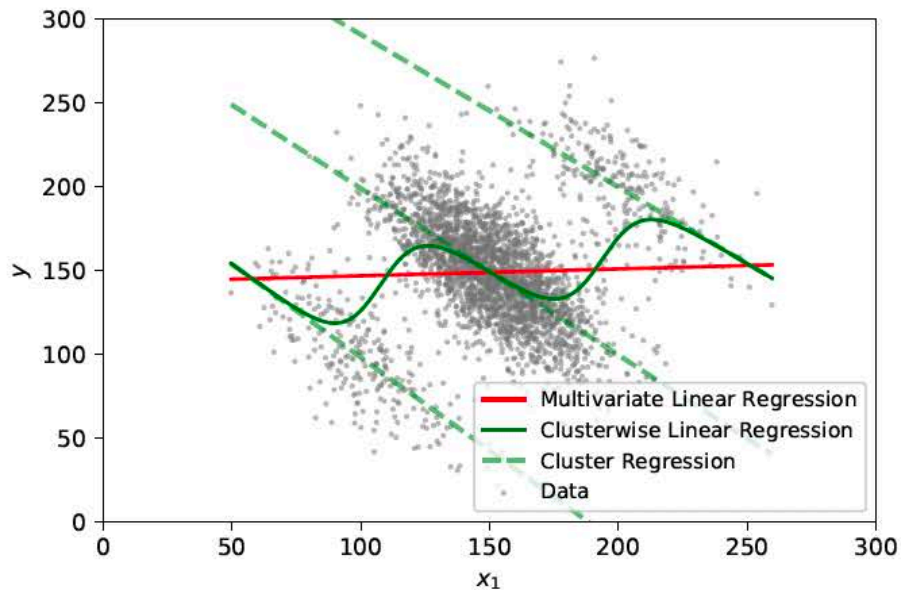
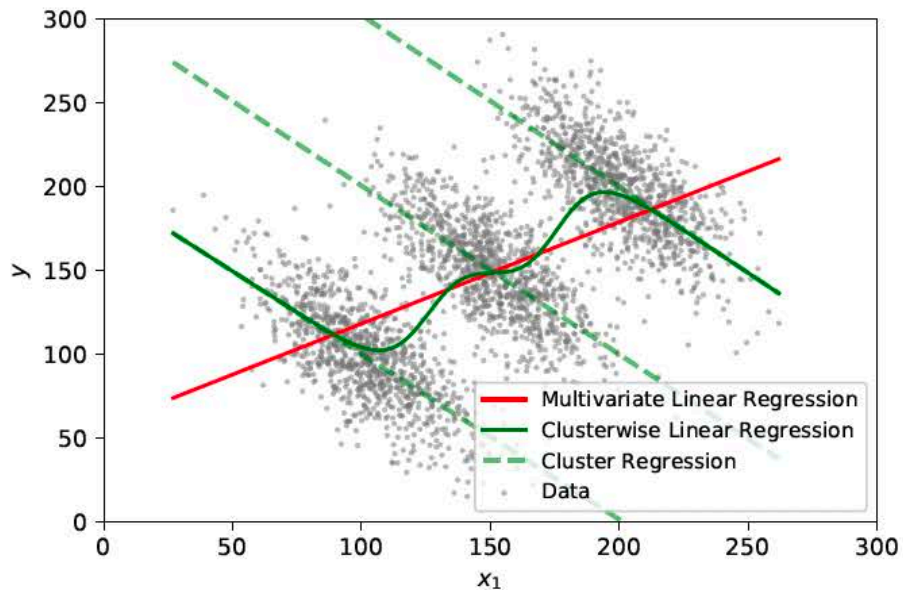
2

Data is foundational to ML

What data **fuels your** ML models?
How do **you** select data for **your models**?



What is your model (not) attending to?





The overwhelming majority of Americans (82%) believe that robots and/or AI should be carefully managed.

-Zhang & Dafoe (2019)



“ The inclination is to *replace people* with data trails, turning them into more effective shoppers, voters, or workers to optimize some objective (O’Neil, 2017, p. 48).



▶ The model is only as good as the data and assumptions

“Horseshit”

O’Neil, 2017, p. 41



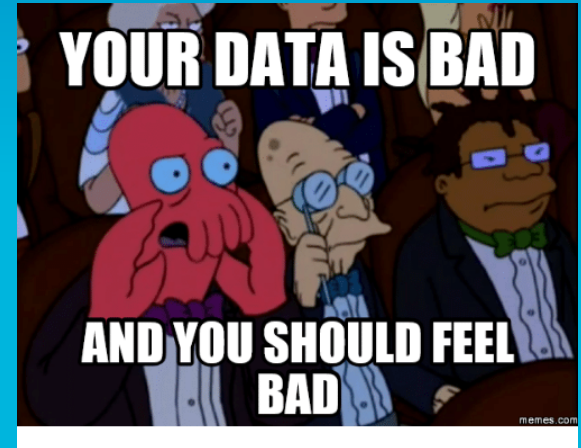
**More of
the same**



**Indecipherable
outcomes and
models**



The folks building WMDs routinely lack data for the behaviors [or other outcomes] they're most interested in. So they substitute stand-in data, or proxies (O'Neil, 2017, p. 17).





- ▶ How are systematic biases translated into technological practice in your field?

Who has access to technological resources?

Who affects the design of technological tools?

3

Agency



- ▶ *Agency* describes a set of assumptions held by social theorists* about the source and story of social reality. (Piercy et al., 2020).

**Though our audience was social scientists doing post hoc analysis, our point applies well to anyone using complex machine learning.*

The importance of *agency*

- ▶ In computer-mediated communication we do not:
 - ▶ Blame technology (e.g. “Facebook is making us lonelier”).
 - ▶ Assume that machines operate independent of humans
- ▶ We do:
 - ▶ Assume that **systems link-and-amplify** beyond a single creator
 - ▶ Acknowledge that tools do not always perform as intended



Agency Matters

Upstream assumptions about agency affect *downstream* decision making (Piercy et al., 2020).



Case Study: 2016 Presidential Election and Twitter Bots

- ▶ Twitter identified **50,258 automated Russian accounts**
- ▶ Which produced: **1.4 million user interactions** (follows, likes, retweets), **2.12 million election-related Tweets**, and **454.7 million impressions** (views).
- ▶ Because bots are capable of **collecting, using, and disseminating information** on platforms such as Twitter, they serve as an ideal case for the intellectual task of parsing the meaning and location of social agency.

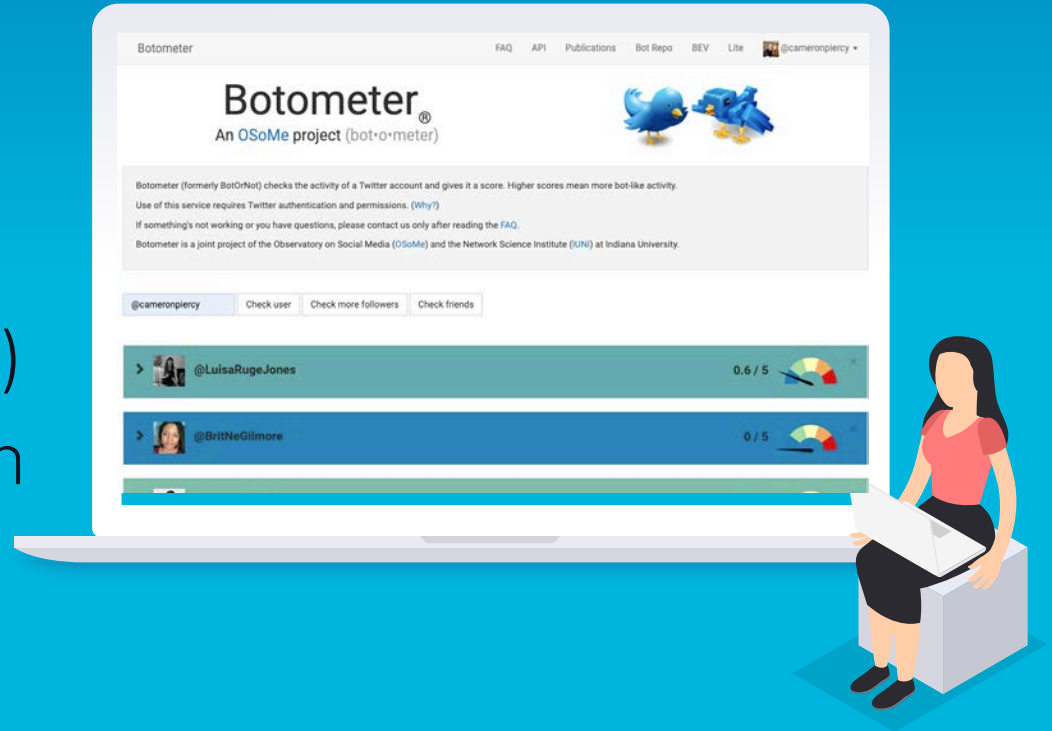
4 A's of Agency



- ▶ **Assumptions** – What counts as ‘agency’?
- ▶ **Analytical attention**– Where should we focus attention? (programmers, bots, users)
- ▶ **Appeal** – Facilitates ‘blame’ (or accountability) vs. relational emergence
- ▶ **Attribution** – people and objects in concert OR people making objects do things

	<u>Structurational Agency and Human Attribution</u>	<u>Montréal School Agency and Relational Emergence</u>
Assumptions	Agency is enacted when a person could at any time “have acted differently” (Giddens, 1984, p. 9).	Agency is “the capacity to make a difference, [and] is not restricted to a human property.” A plenum of agencies (human and non-human) work in concert (Cooren, 2006).
Analytical attention	Focus on human activities, including how materials and technologies enable and constrain human action.	Proposes an inseparable process whereby actants create the framework for future action.
Appeal	Creates a division between volitional acts and those which affect us but do not have volition.	Broadens the scope of agency to allow any technology, text, site, object, or body to serve as an agent/actant.
Application	Searching to attribute outcomes to human (communication) activities at earlier points.	Describing present reality as emerging from a web of relationships.

Some accounts classified as bots by Botometer (formerly BotOrNot) and reported in Bessi & Ferrara (2016) allude this classification in a follow up (Piercy et al., 2020).





**Not the conclusion of the paper.
Very much the conclusion of this talk.
@cameronpiercy*



...is human...

4

Putting Ethics in ML

Table 1. ML Courses with and without Ethics

School	Total ML related Courses	Ethics-Specific Courses	Technical Courses w/ Ethics	Courses without Ethics
A	9	1	4	4
B	8	0	0	8
C	6	0	0	6
D	5	0	0	5
E	8	0	0	8
F	8	0	0	8
G	8	0	0	8
H	9	0	0	9
I	8	0	0	8
J	8	0	0	8
K	8	0	0	8
L	8	0	0	8
M	8	0	0	8
N	8	0	0	8
O	8	0	0	8
P	8	0	0	8
Q	8	0	0	8
R	5	0	0	5
S	6	0	0	6
T	8	0	0	8
Total (# Courses)	186	14	22	150
Total (# Institutions)	20	8	13	20

Overall, we observed no explicit mention of content related to ethics in the vast majority of the courses we analyzed (150 of the total 186 courses identified) (Saltz et al., 2019, p. 32.5)

7.5% courses on ethics

Not bad, 40% of 20 leading programs had a course

12.7% mention ethics

59% of institutions have some mention

100% of ML deals with ethics



Some problems

- ▶ Technology users (and researchers) don't envision the future well (or accurately).
- ▶ Established routines dominate human behavior
- ▶ Technology **links-and-amplifies (both bias and benefit)**, like every process in a system

What else should we consider?

- ▶ **Progress (often) reinforces dominant ideologies/hegemonic frameworks**
 - ▶ No matter how (UN)Just
 - ▶ What's up with $p < .05$?
- ▶ **Science is NOT proprietary**
- ▶ **ML development is often symbiotic**
- ▶ Tech, especially predictive tech, is becoming more ubiquitous (e.g., Northpointe sentencing software) so we must consider how **systems link-and-amplify action.**



Are you thinking about the possible
UNINTENDED CONSEQUENCES of
your work?

For individuals

Privacy violations

Decisional outcomes

For communities

Bias

Discrimination

Systematic issues

For science

Public trust

Unintended uses

**This slide is all Casey Fiesler
@cfiesler*

How are you creating diversity in your lab?

Increased diversity in team-activities leads to **substantial improvements** in performance (Horwitz & Horwitz, 2007).

How do **you** diversify **membership**?

How do **you** diversify **ideas**?

What do **you** do to **check your assumptions**?



Resources

- ▶ <https://rb.gy/enfjbj> (Casey Fiesler's list of ethics courses/syllabi)
- ▶ <https://responsiblecs.org>
- ▶ <https://internetruleslab.com>
- ▶ "If you work in tech and you're not thinking about ethics, you're bad at your job." @CFiesler

THANKS!

Let's Talk

You can find me at:

- ▶ @cameronpiercy
- ▶ cpiercy@ku.edu



Credits

Special thanks to all the people who made and released these awesome resources for free:

- ▶ Presentation template by [SlidesCarnival](#)
- ▶ Illustrations by [Sergei Tikhonov](#)
- ▶ Photographs by [Unsplash](#)

► Presentation design

This presentation uses the following typographies:

- ▶ Titles: Raleway
- ▶ Body copy: Barlow

Download for free at:

<https://www.fontsquirrel.com/fonts/raleway>

<https://www.fontsquirrel.com/fonts/barlow>

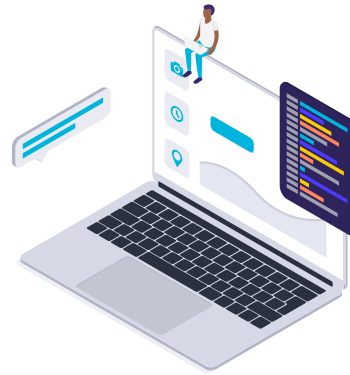
You don't need to keep this slide in your presentation. It's only here to serve you as a design guide if you need to create new slides or download the fonts to edit the presentation in PowerPoint®

Extra resources

Illustrations created by [Sergei Tikhonov](#).

Free illustrations published under the MIT License. You can use them for personal and commercial projects, without the need to include attribution.

[See license](#).



Extra resources

Illustrations created by [Sergei Tikhonov](#).

Free illustrations published under the MIT License. You can use them for personal and commercial projects, without the need to include attribution.

[See license](#).





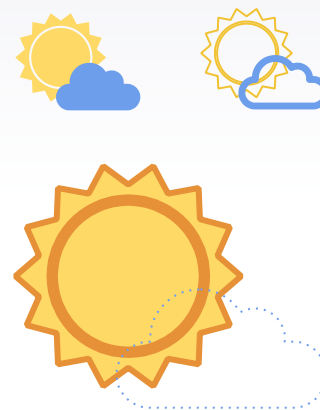
SlidesCarnival icons are editable shapes.

This means that you can:

- ▶ Resize them without losing quality.
- ▶ Change fill color and opacity.
- ▶ Change line color, width and style.

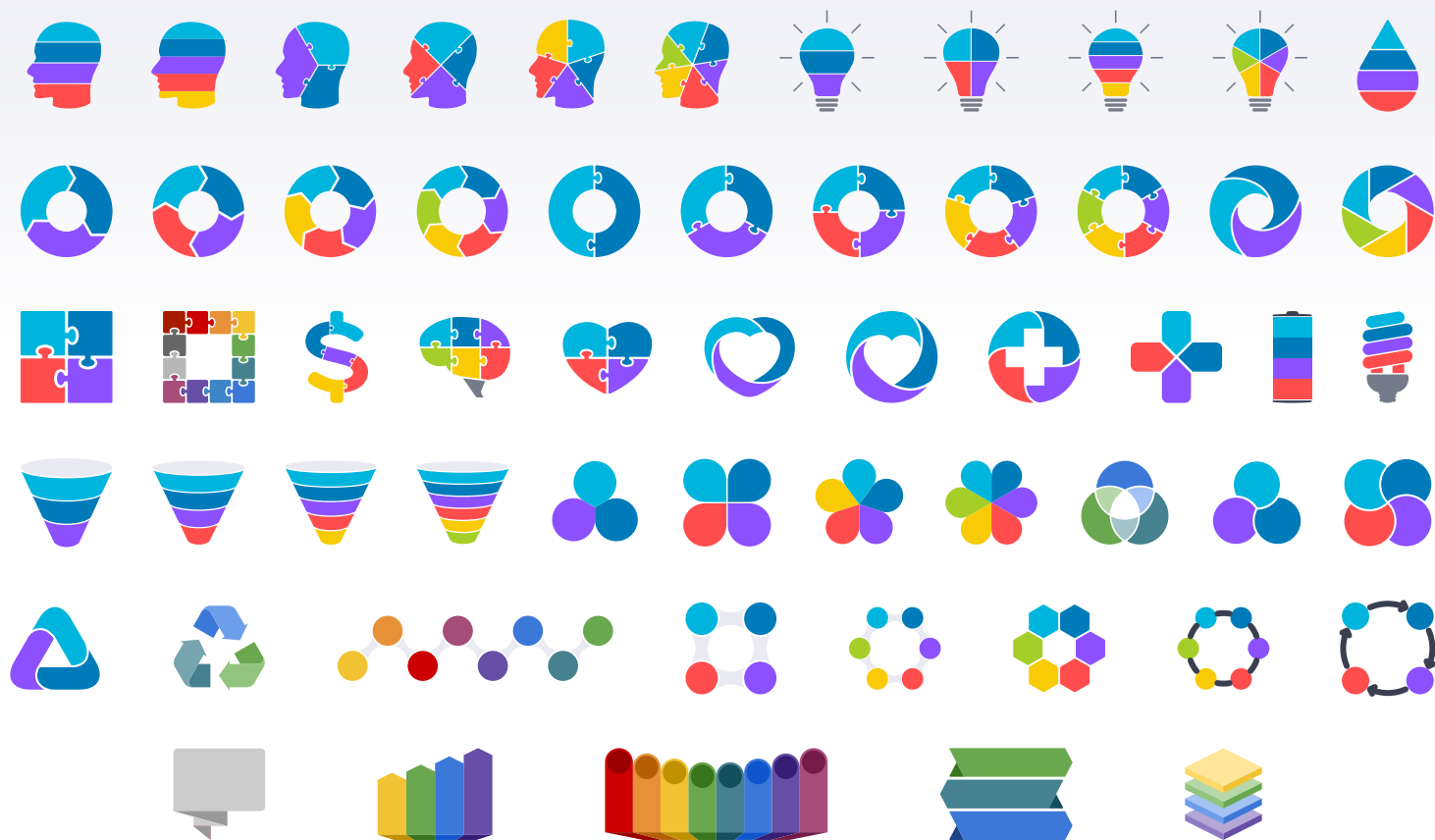
Isn't that nice? :)

Examples:



Find more icons at slidescarnival.com/extra-free-resources-icons-and-maps

Diagrams and infographics



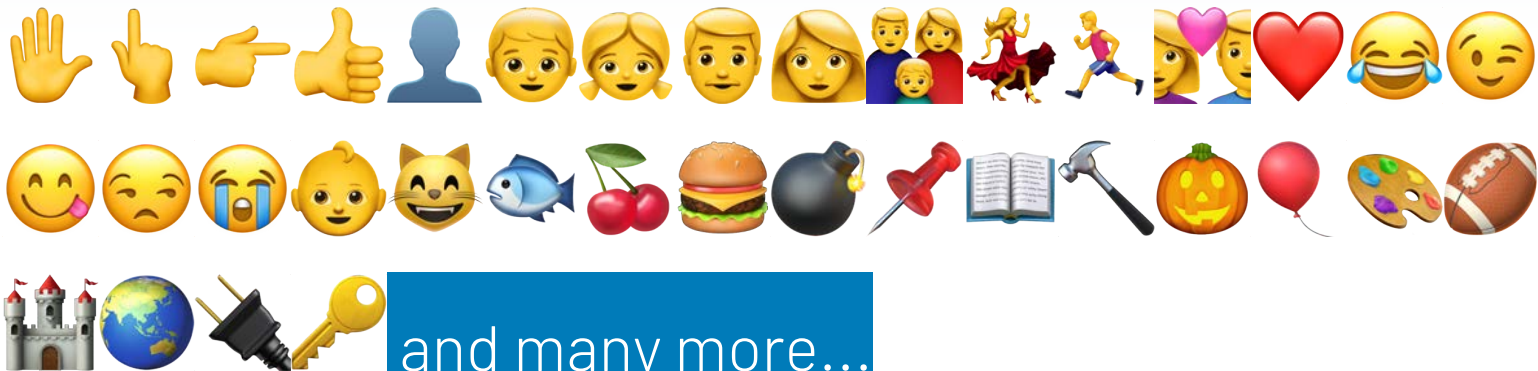


You can also use any emoji as an icon!

And of course it resizes without losing quality.

How? Follow Google instructions

<https://twitter.com/googledocs/status/730087240156643328>





Free templates for all your presentation needs



For PowerPoint and
Google Slides



100% free for personal
or commercial use



Ready to use,
professional and
customizable



Blow your audience
away with attractive
visuals