

Artificial Intelligence

This resource will:

- ▶ introduce you to some popular applications of artificial intelligence, and
- ▶ get you thinking about their related ethical implications.



Visit cemc.uwaterloo.ca/resources/cs-and-society.html for more *CS and Society* resources.
Algorithmic Bias is a natural extension of this resource.



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DIP



Artificial Intelligence (and Jeopardy!)

Ken Jennings and Brad Rutter were Jeopardy-winning machines. Jennings had a winning streak of 74 episodes, and Rutter earned an impressive \$3.25 million.

In 2011, both contestants were defeated by *an actual* Jeopardy-winning machine — a computer named Watson.

How did Watson do it? Was Watson intelligent?

Artificial Intelligence

The theory and development of computer systems able to perform tasks that previously required human intelligence.





DIP



Machine Learning and Training Data

Artificial intelligence systems can gain knowledge in a way similar to how people gain knowledge - learning through trial and error.

Machine Learning

A computer system's ability to automatically learn and improve from experience without being explicitly programmed.

Maching learning requires **training data**. Lots and lots of it.

- ▶ Your smartphone can identify your most recent photo is of Evan because it has studied *hundreds of photos of Evan*.
- ▶ A self-driving car can distinguish a pedestrian from a moose because it has studied *thousands of hours of driving videos from dashboard cameras*.





DIP

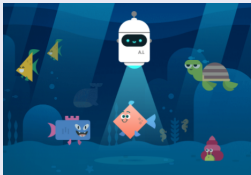


Activity - AI for Oceans

The best way to understand artificial intelligence, machine learning, and training data, is to see it all in action.

In the following activity your task is to help an artificial intelligence system learn the difference between fish and non-fish, by feeding it training data.

AI for Oceans
rebrand.ly/ai-for-oceans



Watch the videos and complete levels 1 through 5 of this activity. As you progress, think about the relationship between the training data and how well the system performs. How could things go wrong?





Self-Driving Cars - Fact or Fiction?

Self-driving cars use artificial intelligence to operate with little, or even no, interaction from a human driver.

When talking about self-driving cars, it can be difficult to determine what is real and what is still the subject of science fiction. Can you determine what is fact from what is false?

Self-Driving Cars
rebrand.ly/kahoot-self-driving-cars





DINE



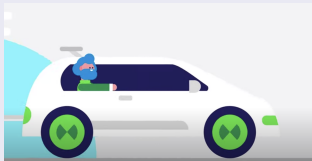
Self-Driving Cars - Pros and Cons

There are many benefits to having self-driving cars. There are also potential drawbacks and serious concerns.

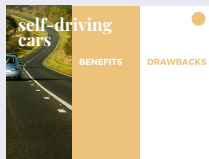
The following video identifies some pros and cons. After watching the video, complete the provided pros and cons list. **In addition, include one pro and one con of your own.**

Pros and Cons of Self-Driving Cars rebrand.ly/pro-con-self-driving-cars

Video →



List →





DINE



Voice Recognition - Training Data

Voice assistants (such as Siri, Google Assistant, Cortana, and Amazon Alexa) use artificial intelligence to identify voices and interpret meaning from speech in order to carry out commands.

In order for voice assistants to be helpful to their human owners, they need to be able to accurately recognize voice.

In other words, voice assistants need to study a lot of sound bites. But whose?

Brainstorm as a class what types of sound bites should be included when training voice assistants. For example, voices from men, voices from children, ...





Voice Recognition - Ethics of Analyzing Speech

What are the consequences of having devices that analyze how we speak?

The following article discusses some important issues we should keep in mind as voice recognition becomes increasingly popular.

After reading the article complete the provided self-reflection.

Ethics of Analyzing Speech
rebrand.ly/ethics-of-analyzing-speech

Article →



Reflection →

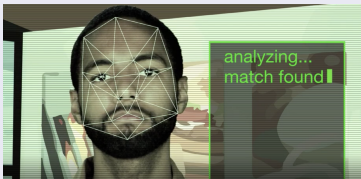




Facial Recognition - Introduction



Facial Recognition
rebrand.ly/pbs-facial-recognition



Facial recognition software uses artificial intelligence in order to identify a person from images of their face. The following video provides a brief introduction.

Did You Know?

If you have ever uploaded your photo in order to participate in an internet quiz, social media challenge, or novelty site, you may have willingly contributed your face to a facial recognition database.





Facial Recognition - Bias



Gender Shades
rebrand.ly/gender-shades



Computer scientist, Joy Buolamwini, discusses how well (or how poorly) facial analysis software performs across different races and genders.

Discuss

What are the dangers of using facial recognition software that is only accurate on certain kinds of faces?

What could be done to reduce facial recognition bias?

This topic is explored further in our Algorithmic Bias resource.





DIGEST



Video - Moral Cars

As self-driving cars speed into reality, it is important to address some ethical implications.

Moral Cars
rebrand.ly/moral-cars



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Reflection



1. When should driverless cars be allowed on public roads? What criteria would you want to be met?
2. How do you feel about being a passenger in a driverless car?
3. How do you feel about sharing the roads with driverless cars?
4. As described in the video, are you a Bentham or a Kant?
5. Iyad Rahwan talked about the Moral Machine website which asks you to choose what a car should do in various hypothetical situations. Try it for yourself at moralmachine.net.

How do you feel about your results?



DIGEST



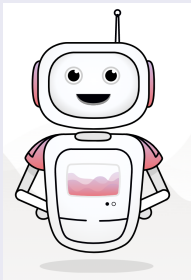


Common Voice

Common Voice is an initiative to help teach machines how real people speak. Its goal is to create a high quality and publicly open dataset.

Common Voice

commonvoice.mozilla.org/en



Consider contributing to the initiative by donating your unique voice, by listening to the voices of others, or both!





Facial Recognition Applications



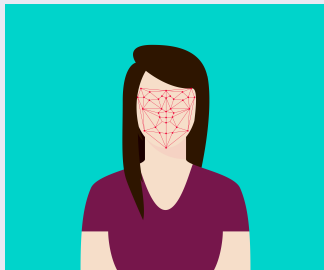
The applications and potential usages of facial recognition software are vast. Does this excite you? Frighten you? Perhaps you fall somewhere in the middle.



Level of Comfort

rebrand.ly/facial-recognition-applications

DIGEST



Use the following activity to sort out how you feel. Arrange the facial recognition applications into three columns — those that make you uncomfortable, those that you are comfortable with, and those you are not sure about.





DESSERT

For more information about artificial intelligence:

A People's Guide to AI (rebrand.ly/peoples-guide-ai)

For more information about self-driving cars:

CNBC (rebrand.ly/driverless-cars)

Washington Post (rebrand.ly/self-driving-cars-vision)

For more information about voice recognition:

Scientific American (rebrand.ly/speech-recognition-bias)

For more information about facial recognition:

10 Year Challenge (rebrand.ly/10-year-challenge-meme)

Gender Shades (gendershades.org)

