



## Key Stage 4 – Computer Says No

### Notes for teachers

#### At a glance

Programmers can program computers to learn to do certain tasks. Although the programmer writes the initial program, as it is fed more data the computer changes the way that it carries out the task in order to improve its ability to perform it. However, **how** it does this is not decided by the programmer but by the computer. Researchers at the University of Oxford are looking at ways to use machine learning to solve more complex problems and to solve them more efficiently.



Students explore the ethics of using computers to make decisions. Is it a good idea to have computers making decisions if we can't know how they are deciding the outcome? Are computers more or less likely to be biased than people? Are there some decisions that should always/never be made by computers?

#### Learning Outcomes

- Students can describe in simple terms what is meant by Machine Learning
- Students can communicate their ideas about the ethics of Machine Learning effectively

#### Each student will need

- Student sheet
- Print out of articles in web links (optional)
- Set of 'Computer Says No' cards to rank (one set per group of 4-6 students)
- Resources for each group of 4-6 students to create a presentation (pens/paper/access to PowerPoint etc)



## Possible Lesson Activities

### 1. Starter activity

- Watch the Oxford Sparks Machine Learning video
- Based on the video, ask students in pairs to come up with three different things that machine learning is already used for or might be used for in the future.

Things mentioned include:

- Facial, text and speech recognition (including photo tagging/predictive text)
  - SPAM filters
  - Online viewing or shopping recommendations
  - Credit card fraud recognition
  - Medical diagnosis
  - Social media
- Check that they understand that it is not the computer programmers who decide how to solve the task but the program itself.

### 2. Main activity: Computer Says No!

- Explain that today they'll be thinking about the advantages and disadvantages of Machine Learning/AI (Artificial Intelligence) and that there are not necessarily any right or wrong answers - it will depend on their own opinion.
- As a class, come up with some ground rules for conducting discussions and making sure that everyone respects other people's opinion.
- Ask students to read the information about machine learning on the student sheets.
- There are also some links to articles in the web links section that may be useful for them to read.
- Split students into groups of 4-6 and hand out the 'Computer Says No!' cards to each group
- Each of the cards has a different industry/situation where AI using decisions based on Machine Learning could be used. Ask the students to imagine that decisions in that industry are made by computers (based on data that people have fed it) rather than directly by people.
- Ask students to rank the cards in order of most to least happy to allow computers to make the decision. Students will need to agree within their groups on the order (if possible). Encourage them to come up with reasons for **why** they have chosen that order.
- Ask one group to come up to the front and hold up their cards so that the class can see the order that they have chosen. Ask if other groups chose the same order. If not, what reasons did they have for putting the cards in a different order?

### 3. Main activity: Creating a presentation

- Ask students to create a short (2-5minute) presentation arguing for or against using machine learning in one of the industries on the cards. The presentation should use persuasive language and give arguments to support their position. Presentations could take the form of an oral presentation, PowerPoint presentation or poster (or a combination of one or more of these).
- Try to encourage groups to pick different sides/industries to other groups so there is some variety. Perhaps get some groups to play 'Devil's Advocate' and promote reasons for or against Machine Learning that they don't necessarily agree with.



## 4. Plenary

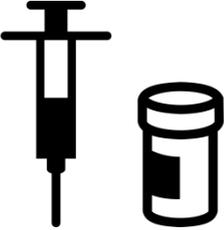
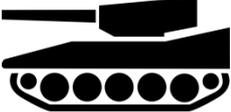
- Ask the groups to deliver their presentation to the rest of the class.
- Ask if anyone has changed their mind as a result of hearing what other groups have said and why. It may be worth pointing out that being willing to change your mind is not a bad thing.

## Weblinks

- Oxford Sparks Machine Learning animation page  
<http://www.oxfordsparks.ox.ac.uk/content/what-machine-learning>
- Article about AI programs making insurance payout decisions :  
<http://www.bbc.co.uk/news/world-asia-38521403>
- Article about bias in AI programs  
<https://www.theguardian.com/technology/2016/dec/19/discrimination-by-algorithm-scientists-devise-test-to-detect-ai-bias>
- Article about the possibility of setting up an AI watchdog.  
<https://www.theguardian.com/technology/2017/jan/27/ai-artificial-intelligence-watchdog-needed-to-prevent-discriminatory-automated-decisions>
- Oxford Sparks Machine Learning Website



Computer says no cards for ranking exercise

<p><b>Medicine</b></p> 	<p><b>Warfare</b></p> 
<p><b>Job Interviews</b></p> 	<p><b>Car Insurance</b></p> 
<p><b>SPAM filters</b></p> 	<p><b>Online advertising</b></p> 
<p><b>Agriculture</b></p> 	<p><b>Policing</b></p> 