An Hour of Code… with Artificial Intelligence!

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The University of Adelaide

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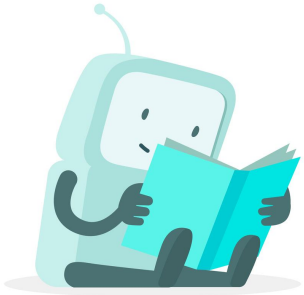
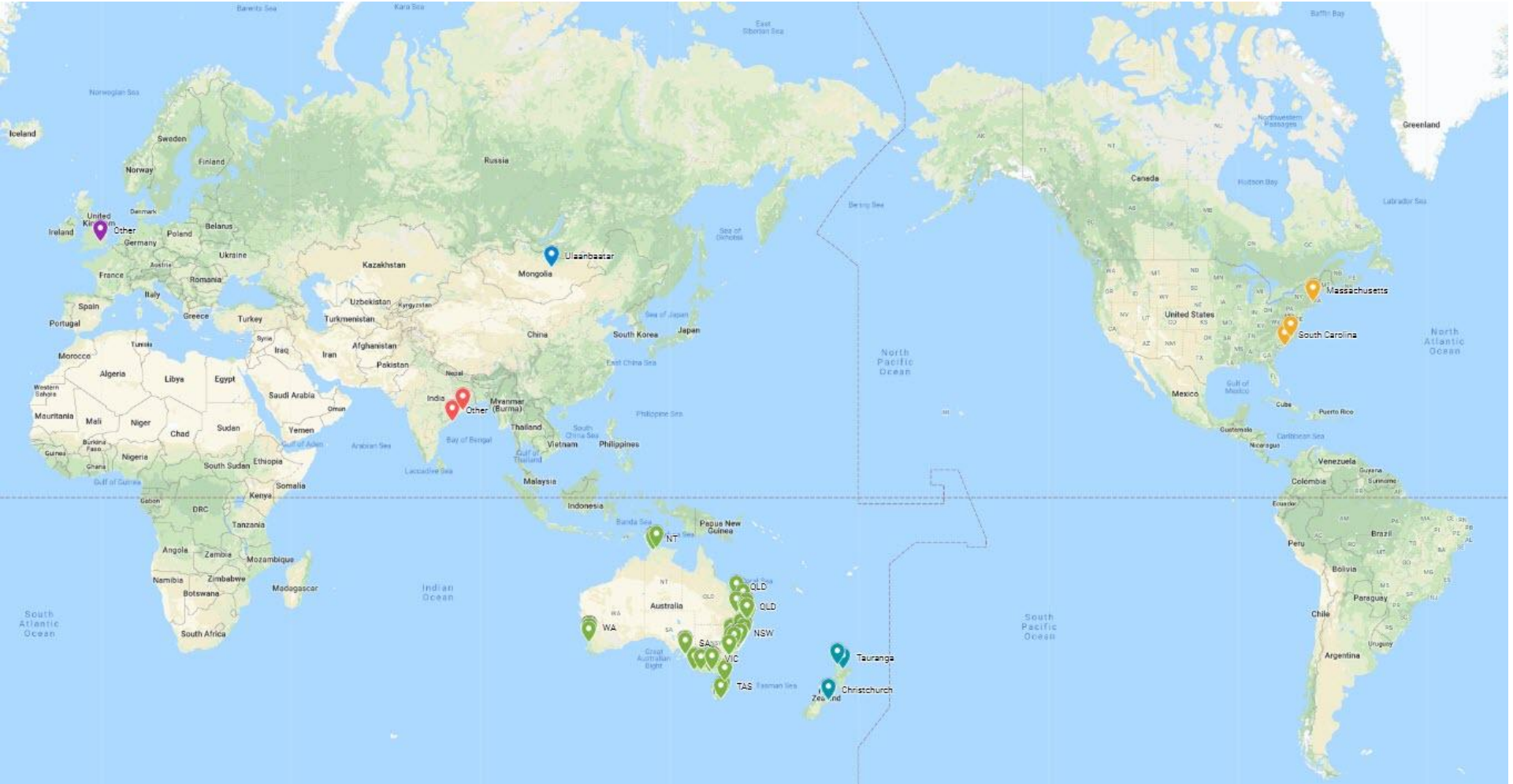
Digital Technologies Hub
Education Services Australia



Registrations for webinar by location



DIGITAL TECHNOLOGIES HUB

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  - ARTIFICIAL INTELLIGENCE
  - ALGORITHMS
  - BINARY

What is Artificial Intelligence?

Artificial Intelligence is the ability of machines to mimic human capabilities in a way that we would consider 'smart'.

You most likely have come across – or are aware of – AI applications such as self-driving cars, facial recognition, Chess/Go players, security systems, or speech/voice recognition (eg. those used in an intelligent virtual assistant).

How is AI different from 'normal' computing?

In conventional computing, a programmer writes a computer program that precisely instructs a computer what to do to solve a particular problem. With AI, however, the programmer instead writes a program that

CSER Computer Science Education Research

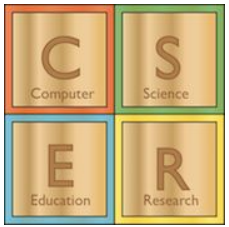
csermoocs.adelaide.edu.au/available-moocs

Teaching AI in the Classroom

We have two courses available for Teaching Artificial Intelligence (AI) in the classroom - one for primary teachers and one for secondary teachers. These free online courses are presented as two related parts. Firstly, we provide teachers with the necessary background information to teach and contextualise AI in the classroom. The second half of the course presents the practical implementation of classroom activities suitable for teaching AI and the concepts of AI primary or secondary years.

GO TO COURSE: TEACHING AI IN THE PRIMARY CLASSROOM

GO TO COURSE: TEACHING AI IN THE SECONDARY CLASSROOM



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PROFESSIONAL DEVELOPMENT FOR DIGITAL TECHNOLOGIES

F-6 FOUNDATIONS | F-6 EXTENDED | NEXT STEPS: 7 & 8 | EXPLORE! 9 & 10 | TEACHING AI!

NEWS & INFORMATION

Joining the community

If you have not registered on our community site before, you will first need to either create a WordPress account, or log into an existing..

JUNE 20, 2019 0 0

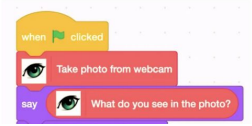
AI EXAMPLES

AI in the Classroom as learning support

Hi all,

There are a number of ways AI could effectively be used in the classoom context is as a means of Learning Support for students ..

OCTOBER 11, 2019 0 0



DISCUSSION

NLP – lots of fun

I am a words person! I love the English language and if more time persisted in a day I would enjoy the challenge of le..

OCTOBER 17, 2019 0 0

AI EXAMPLES

NLP Ideas and Chatbots

Hi there,

Examples of How NLP can be used in the classroom are:

Presentation Translator

Where students can apply thisw addon..

OCTOBER 12, 2019 0 0

INTRODUCING AI

Artificial Intelligence –

DISCUSSION

Computer Vision....to be continued

Computer Vision

This is a section I think I need to read more than once. I haven't ever given a lot of thought into how computer images ..

OCTOBER 17, 2019 0 0

ADDITIONAL RESOURCES

Teaching AI

Template

OCTOBER 8, 2019 0 0

DISCUSSION

AI – gaining an understanding as a class

Have you tried one of the suggested tools in the course (e.g. a Google Experiment or Cognimates project)? What was your experience? How ha..

OCTOBER 8, 2019 0 0

WELCOME TO THE TEACHING AI! COMMUNITY

Welcome, rebeccajvivian

Congratulations, you're logged in.

Log out | Profile

Overview

What is Artificial Intelligence?

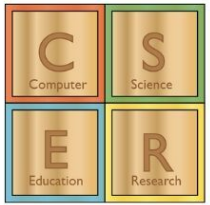
- Defining AI
- Real world examples
- How does it work?

Classroom activities

- Computer Vision
- Natural Language Processing

What is Artificial Intelligence?

The creation of machines to **mimic human capabilities**, such as **teaching a machine** to see (recognise objects in an image) and listen (interpret and analyse sounds).



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Artificial Intelligence

Sense

AI takes raw data (images, sound, text) and processes it using image or text processing.

Reason

AI thinks about the information it has received and how it relates to what it recognises and has learned previously.

Act

The AI performs a task or action based on the information it has processed.

Adapt

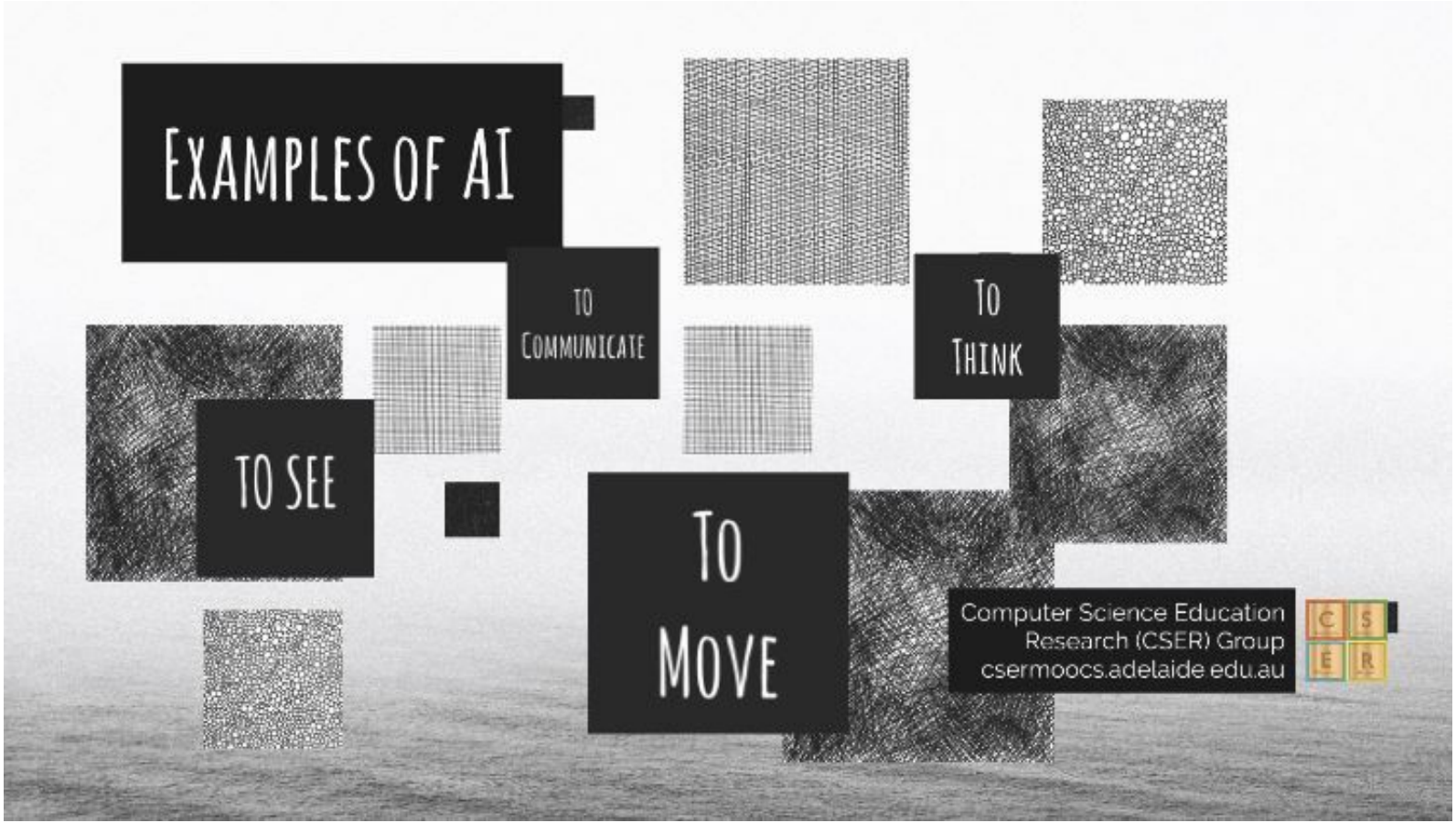
The AI uses the successful or unsuccessful outcome as feedback.

What is Machine Learning?

The process of achieving Artificial Intelligence. In Machine Learning, we teach the machine by training with lot of examples.

What technologies use AI?

https://padlet.com/CSER/AI_examples_cser


Examples of AI
to Communicate
To Think
to See
To Move
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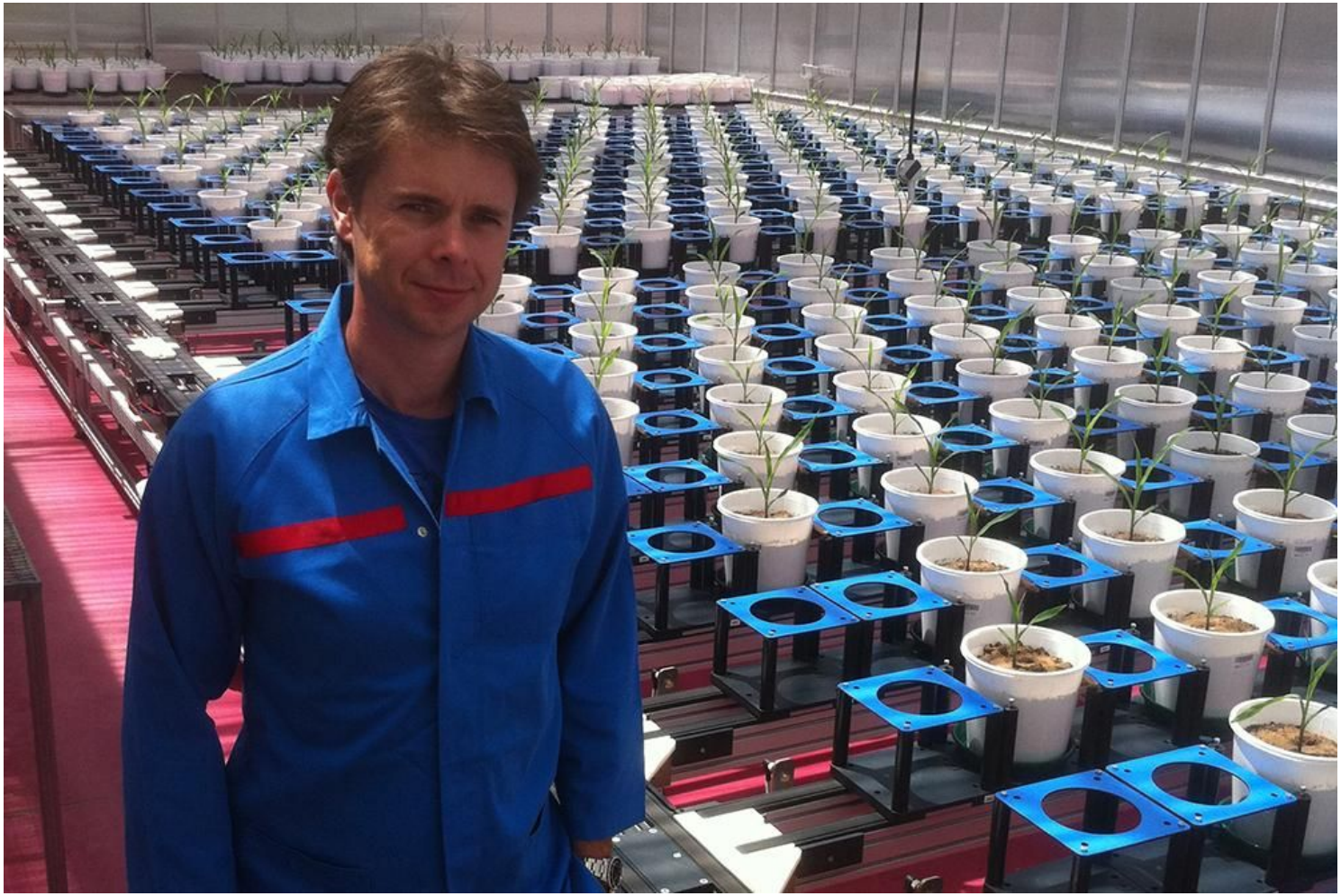
C Computer
S Science
E Education
R Research

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Science
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Education
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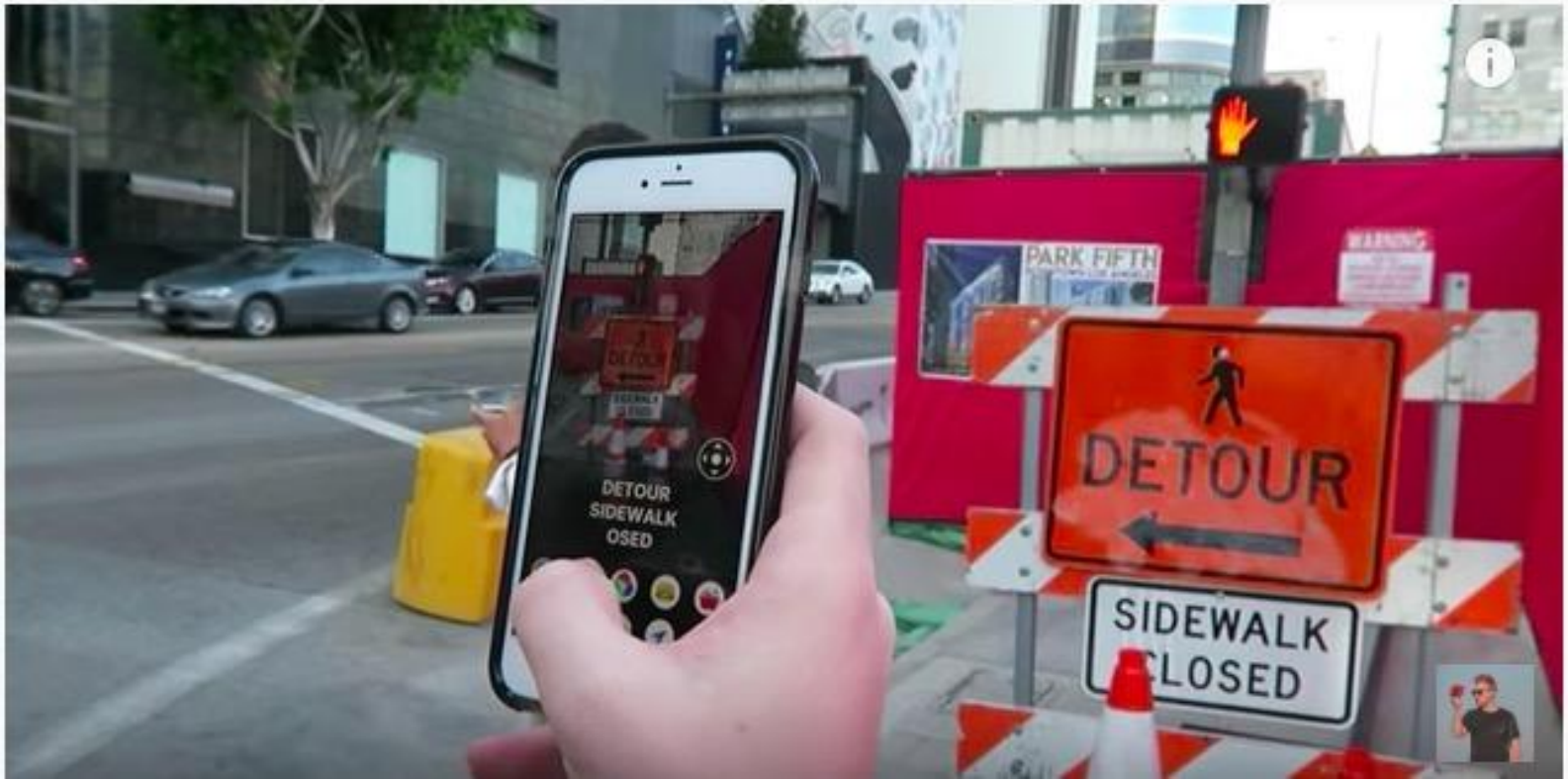
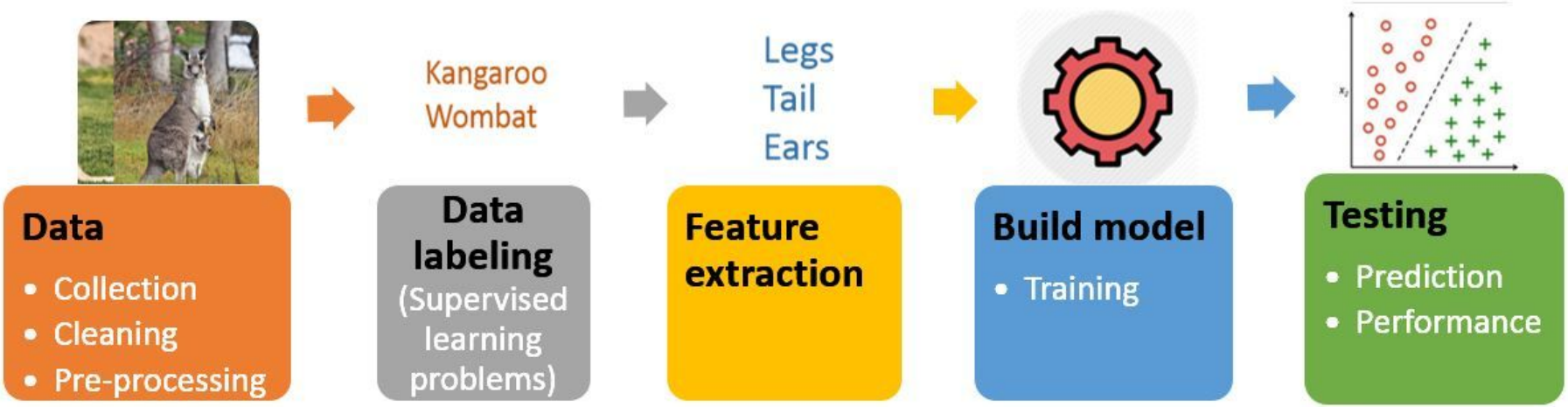
Research



C Computer S Science
E Education R Research

How does AI work?

AI Workflow

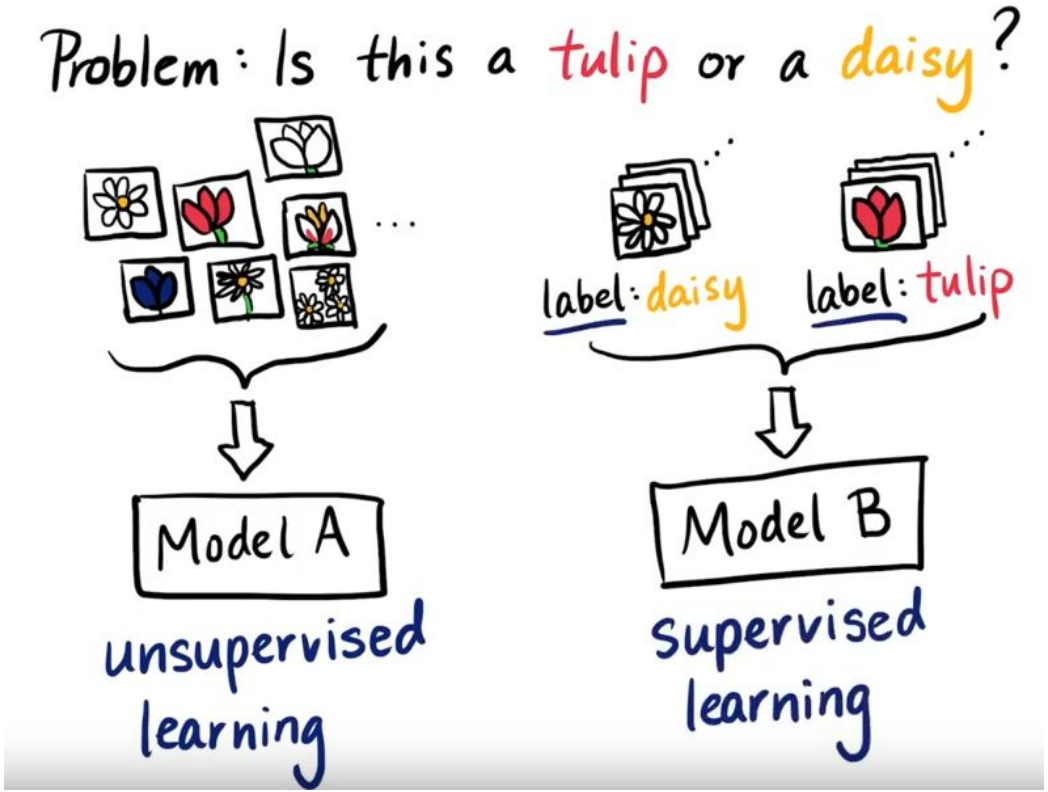

Kangaroo
Wombat
Legs
Tail
Ears
Data
• Collection
• Cleaning
• Pre-processing
Data labeling
(Supervised learning problems)
Feature extraction
Build model
• Training
Testing
• Prediction
• Performance

Supervised Learning

The process of the human providing the program with many examples of what it is we are wanting it to learn, along with a label that helps the machine classify or identify an object.

Unsupervised Learning

Involves providing the machine with a large amount of data and letting it find patterns in the data on its own, by trying to identify patterns in the features included. The machine then determines its own set of categories or labels by grouping the data.



Video on ‘Types of Machine Learning’ by ML Tidbits

Labels

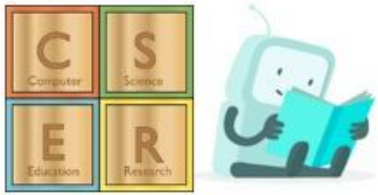
Bird

Two legs, Feathers, Beak

Cat

Four legs, Tail, Fur, Whiskers

Features



HOW DOES AI SEE IMAGES?

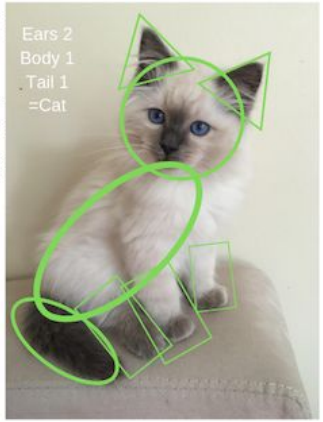
AI WORKS WITH DIGITAL DATA

DIGITAL IMAGE DATA HAS PIXELS

WE APPLY LABELS AND FEATURES TO THE DATA TO TELL THE AI WHAT ATTRIBUTES AN OBJECT HAS. BUT HOW DOES AI KNOW WHAT A "TAIL" IS??

THE AI ALGORITHM WILL LOOK FOR VISUAL PATTERNS ACROSS THE IMAGES BASED ON THE FEATURES WE DESCRIBE.

FOR EXAMPLE, WITH LOTS OF IMAGES OF CATS, IT WILL SEE PATTERNS OF FEATURES BASED ON THE SHAPES IT SEES. IT WILL START TO "SEE" CATS HAVE A CERTAIN SHAPE FOR EARS.



THE AI ALGORITHM "SEES" THE IMAGE USING THE PIXELS AND LOOKS FOR THE DIFFERENCES IN COLOUR GRADIENTS BETWEEN THE PIXELS. IT USES THE PIXELS TO LOOK FOR AN "OUTLINE". THIS IS KNOWN AS "EDGE DETECTION".

FOR SOUND AND TEXT, THE AI WILL ALSO FIND SHAPES AND PATTERNS REPRESENTED IN THE DIGITAL DATA

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(Download CSER resource)

Classroom Activities

Computer Vision

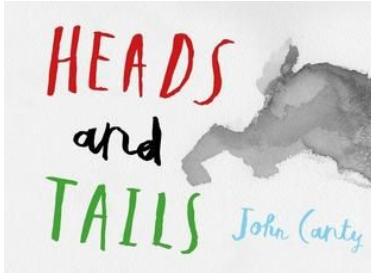
Feature Extraction (Unplugged)

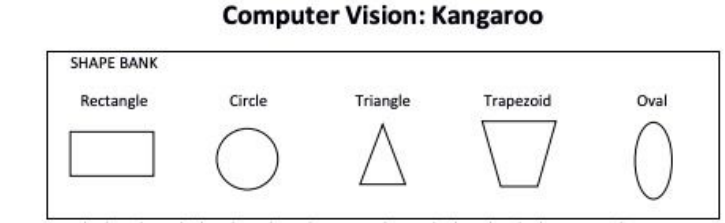
Sorting and Organising Data by Features (e.g. images of transport, people, animals, etc).

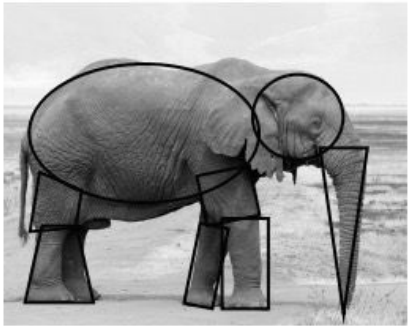
Storybooks that talk about features of things (e.g. examples about animal features).

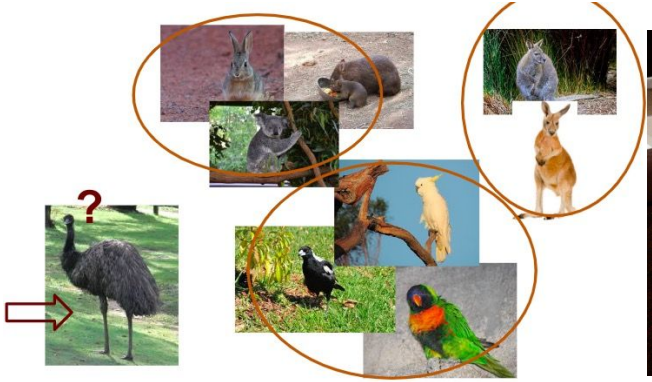
Data projects extracting features from images and presenting them as numeric data for analysis.

Games, such as Guess Who, that involve identifying features.





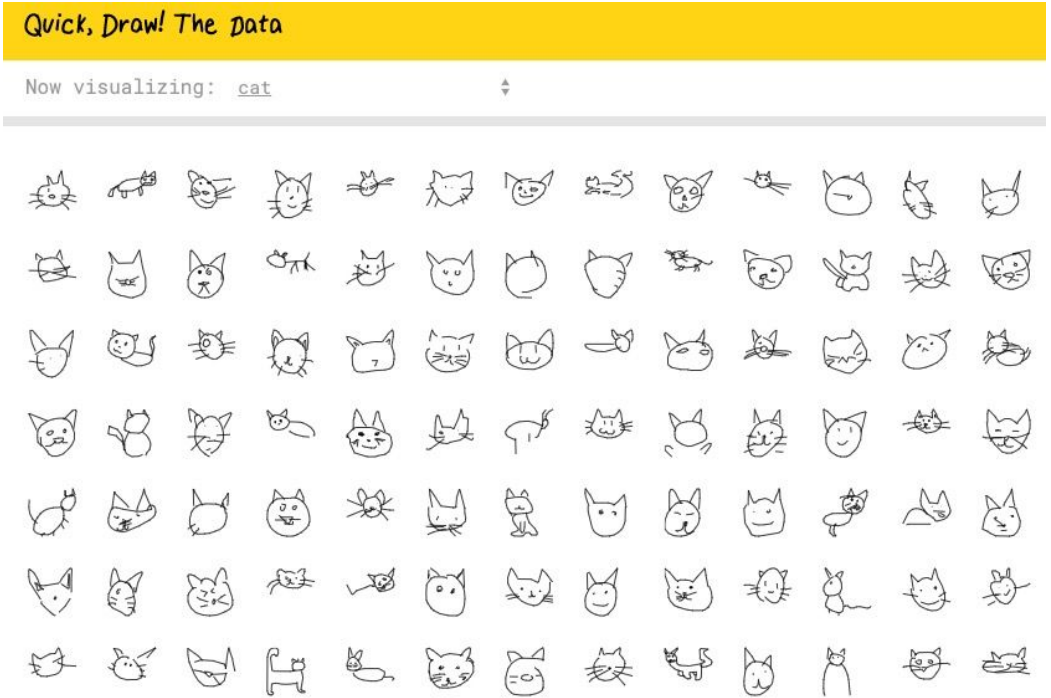




Feature Extraction (Plugged)

Google experiments that highlight classification (e.g. Quick Draw or Safari Mixer).

Search some great AI examples on Google Experiments
experiments.withgoogle.com/collection/ai



How do I use it?

1 Gather

Gather and group your examples into classes, or categories, that you want the computer to learn.

Tutorial: Gather samples

2 Train

Train your model, then instantly test it out to see whether it can correctly classify new examples.

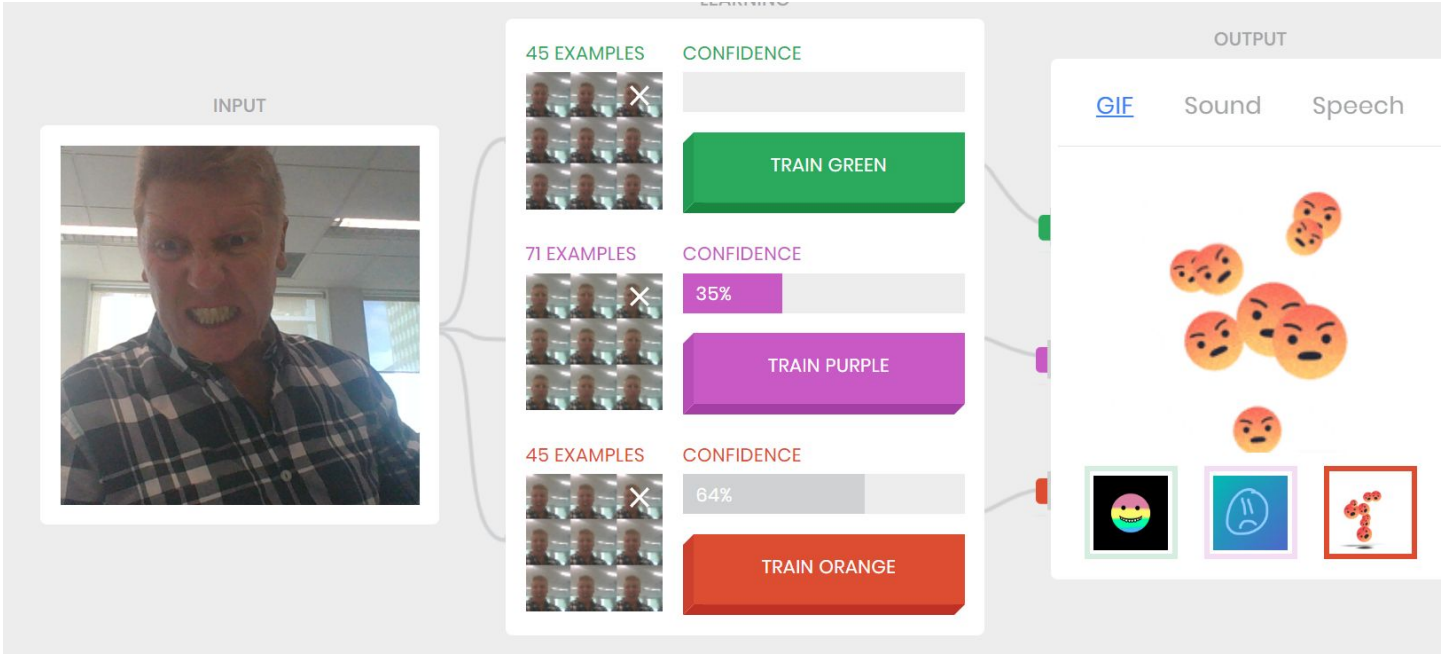
Tutorial: Train your model

3 Export

Export your model for your projects: sites, apps, and more. You can download your model or host it online for free.

Tutorial: Export your model

Can AI Guess your emotion?



- green = happy
- purple = sad
- red = angry

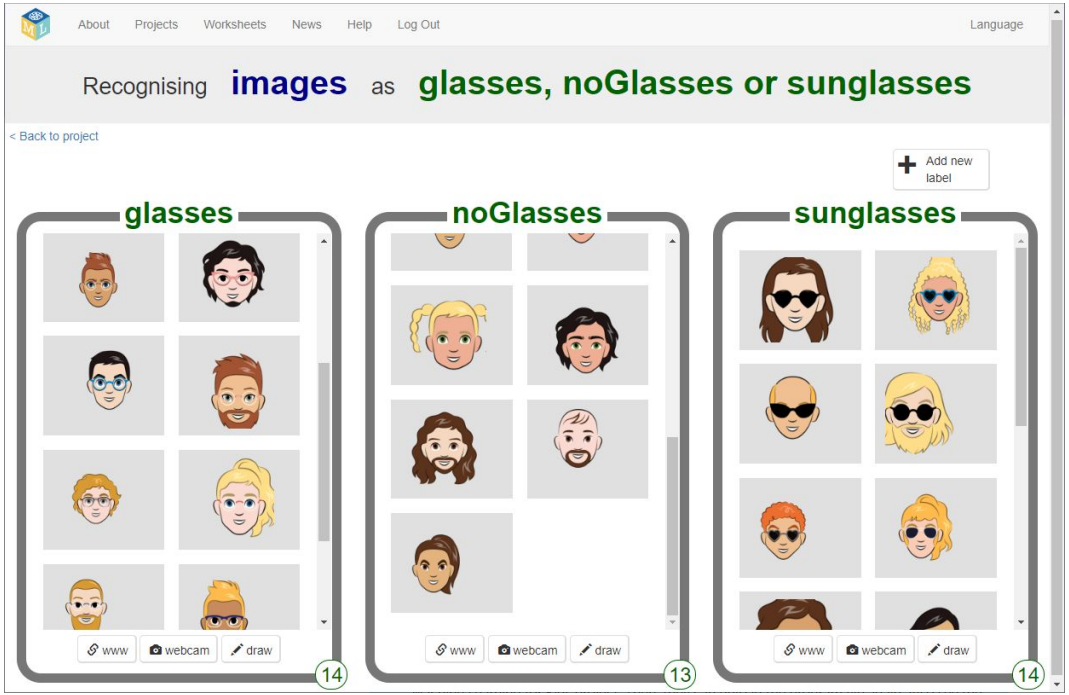
AI IMAGE RECOGNITION – EXPLORING LIMITATIONS AND BIAS

Train AI to recognise faces with without glasses.

Incorporate an AI model using Machine Learning for Kids.

Challenge in set up (we provide a step by step video)

Students create their own models and train the AI. Incorporate into Scratch or Python.



AI SMARTPHONE SECURITY

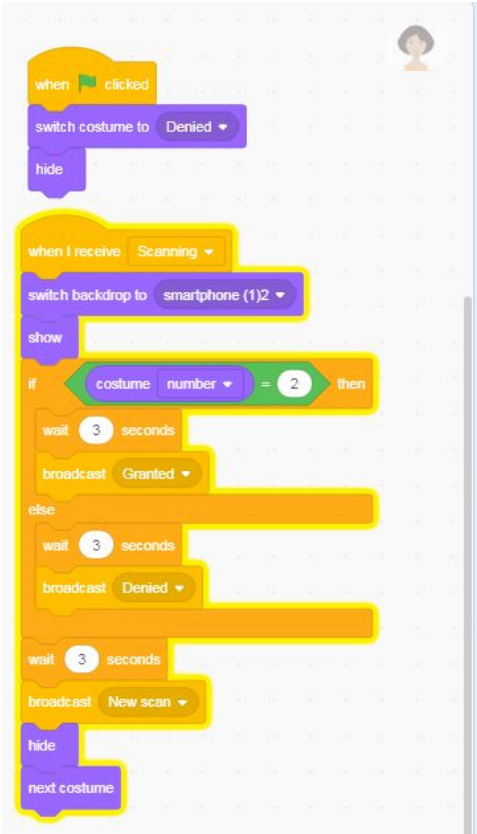
Scratch Basic Phone lock/unlock

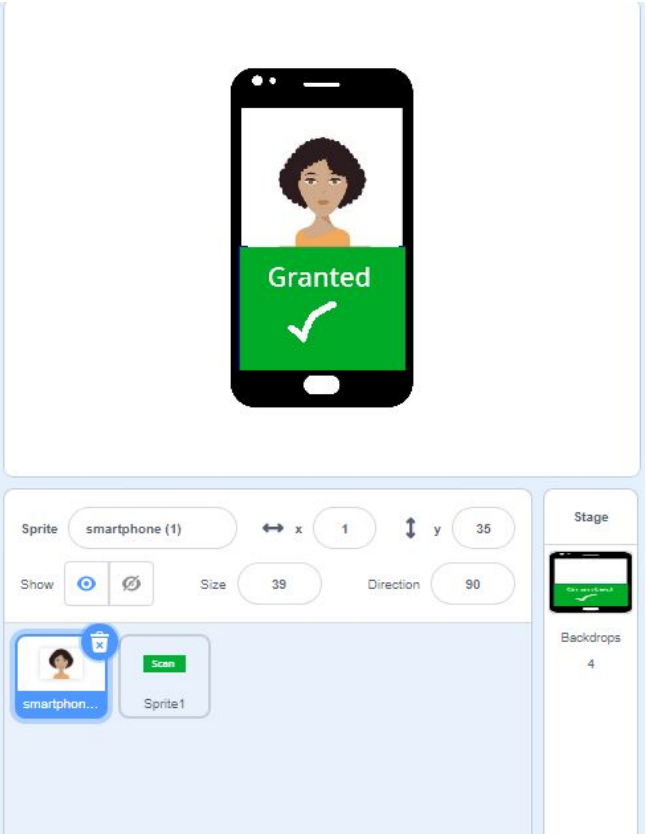
Unplugged: PIN, Fingerprint and Iris scanning (what is powered by AI?)

Plugged:
Train AI (Teachable Machine) to recognise the correct face (easy)

Hard code PIN (easy)
Hard code Image recognised (granted broadcast a message to unlock) (med)

Incorporate an AI model using Machine Learning for Kids. (Med to hard)





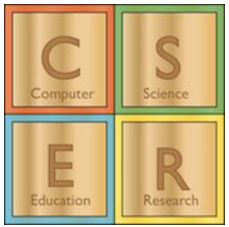
Data bias in AI

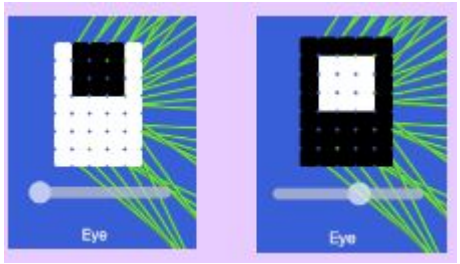
Unplugged: intro **bias** with an activity- draw a doctor, teacher, manager, court judge, receptionist (uncover gender bias)

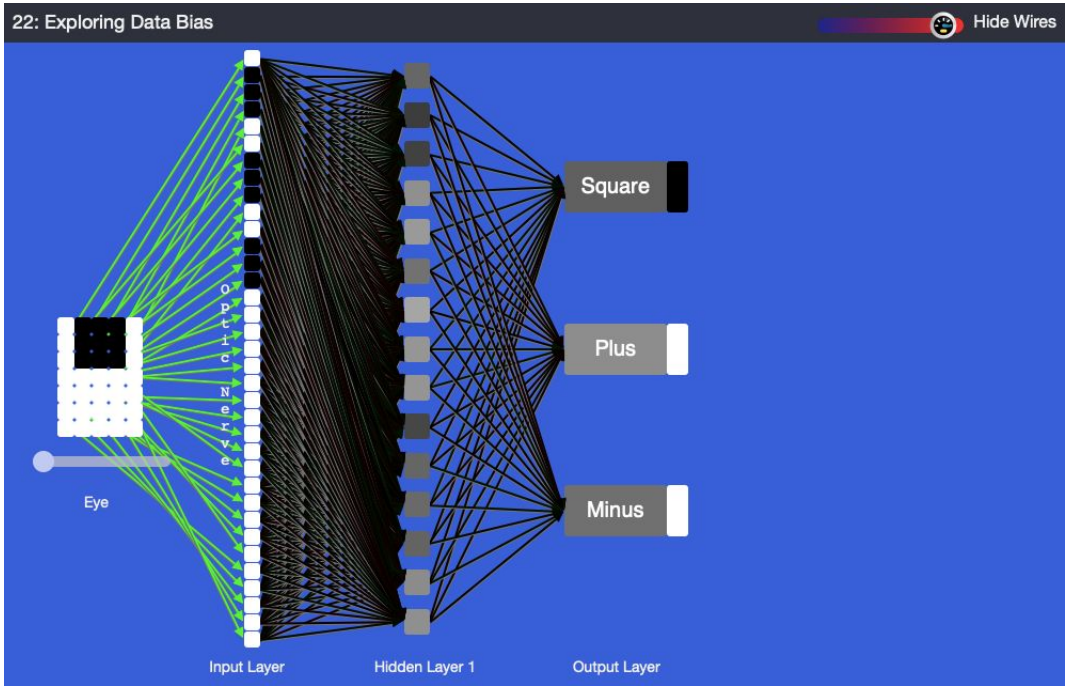
Plugged:
Use an AI tool to test data bias based on backgrounds (ANN artificial neural network)

Train using only black images on white background. Test using white and black backgrounds. AI low confidence on new data.

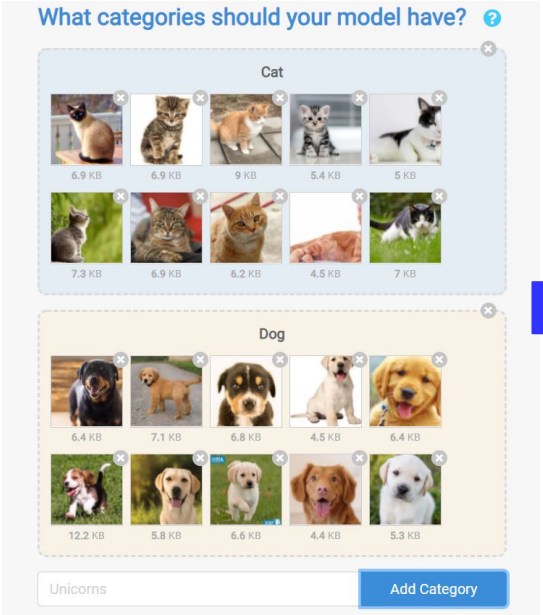
Retrain and test.

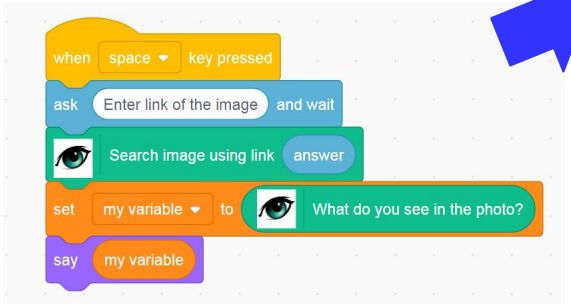


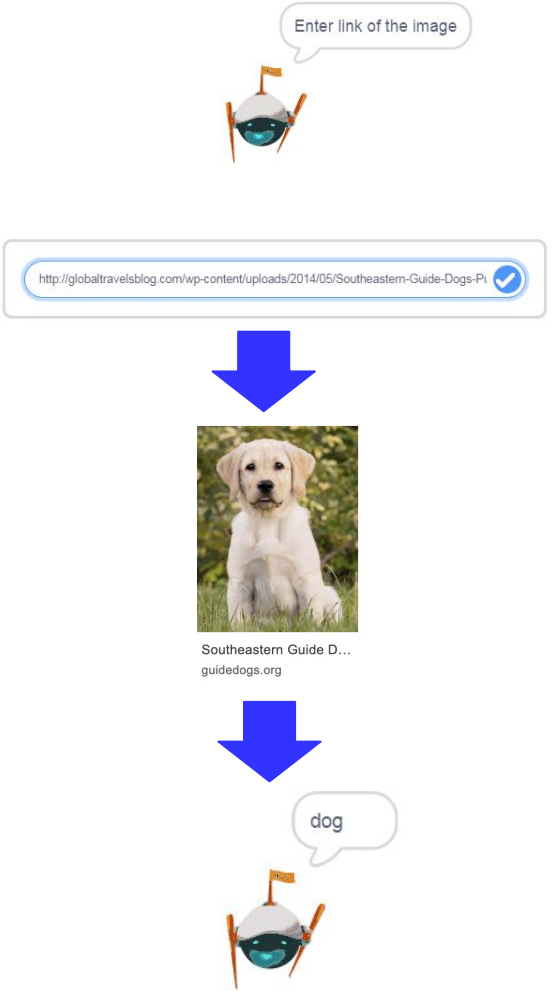


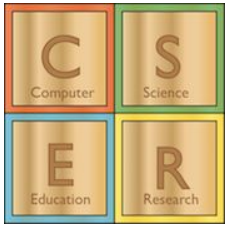


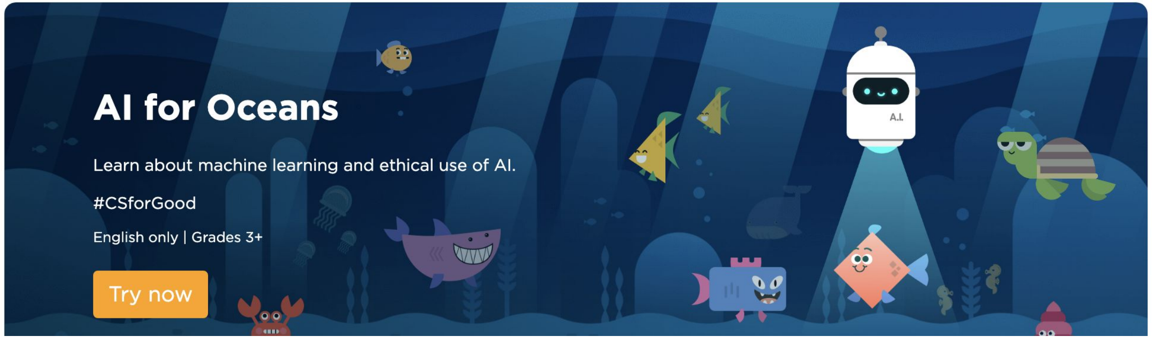
Cognimates image classification project

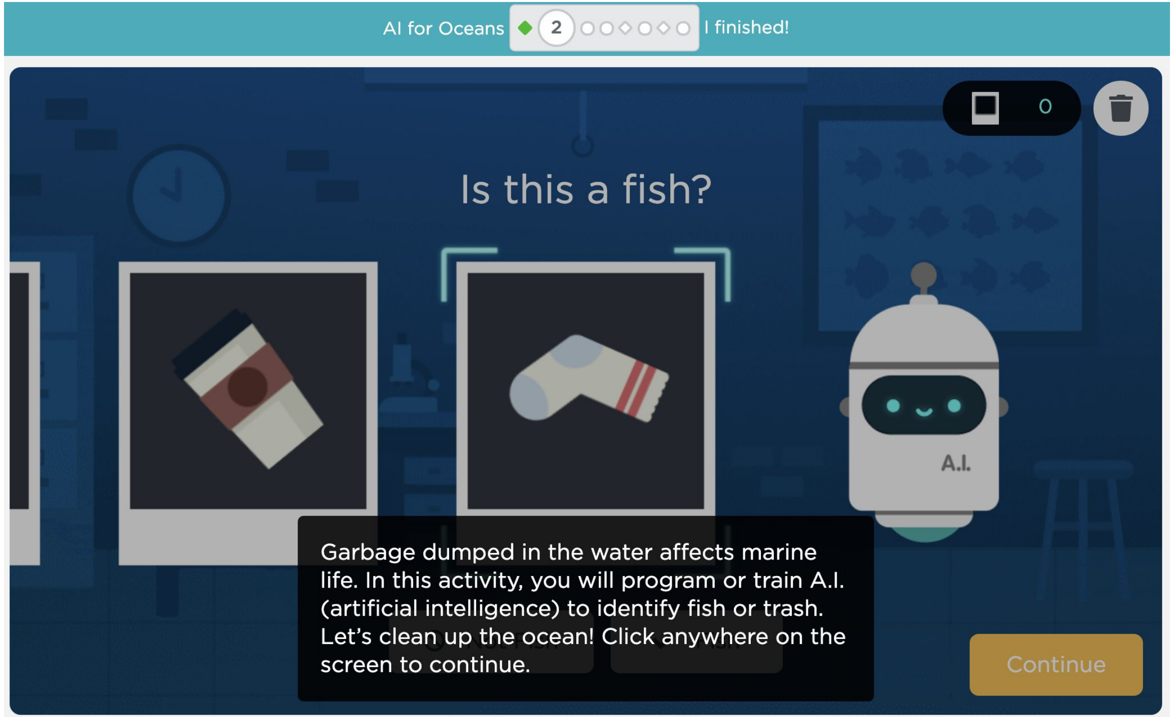








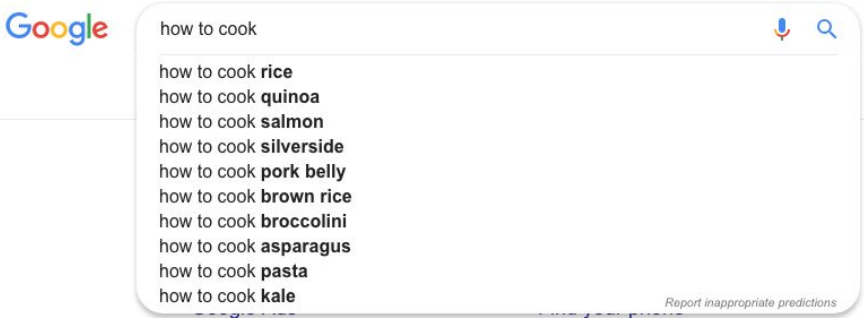




Computer Science Education Research

Natural Language Processing

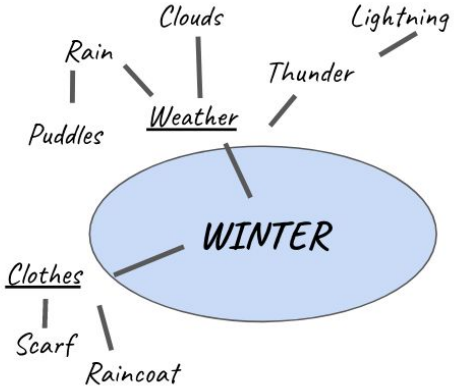
NLP (Unplugged)



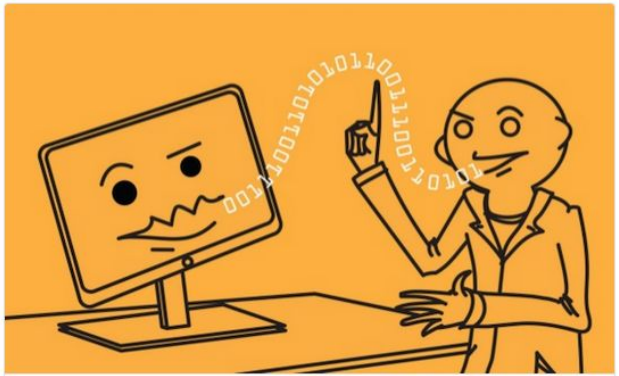
https://www.twinword.com/ideas/graph/

Winter

1. Rain
2. Clouds
3. Cold
4. Snow
5. Thunder
6. Lightning
7. Raincoat
8. Umbrella
9. Puddles
10. Scarf

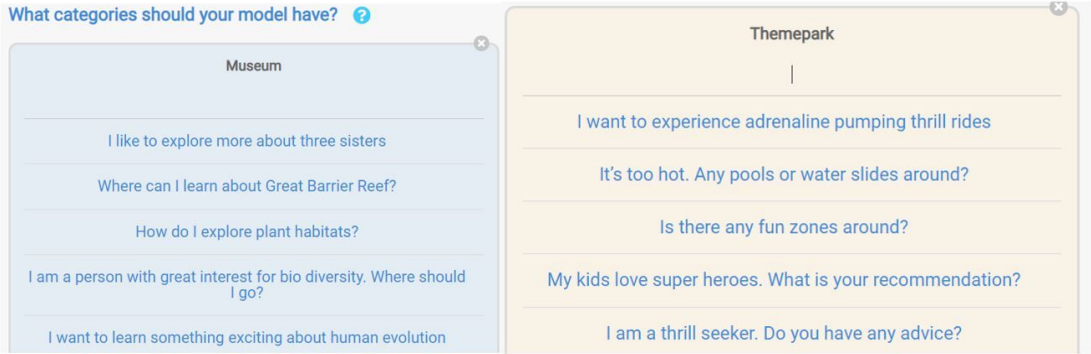


Cognimates - AI Travel Assistant

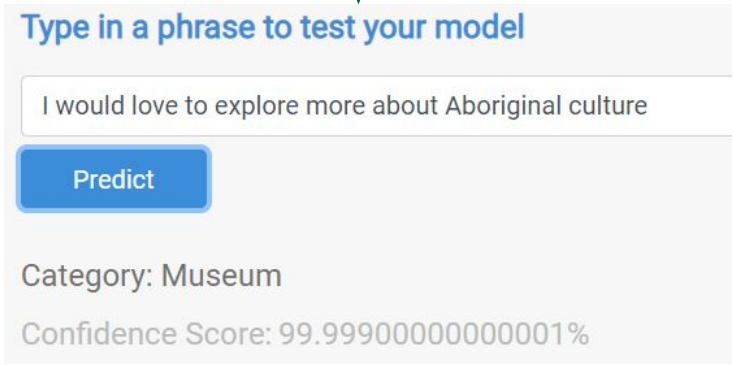


Train Text

https://cognimate.me:2635/text_home

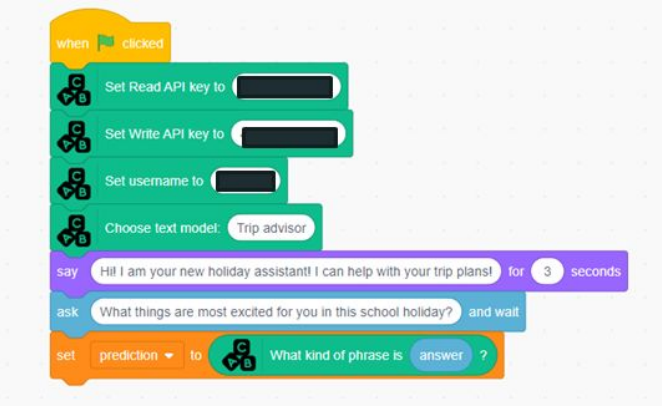


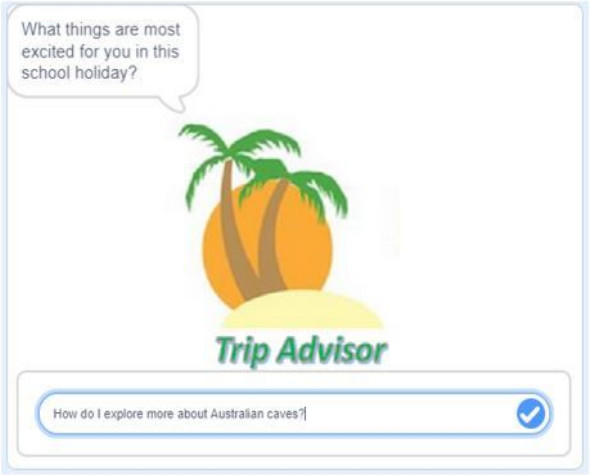
Train Model

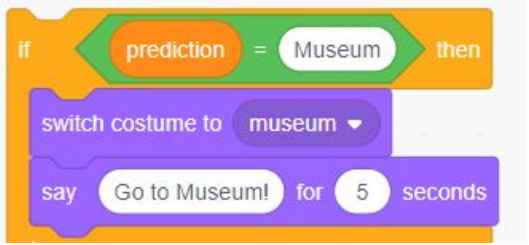


Try with Cognimates

https://codelab.cognimates.me/







FUN PROJECTS WITH LANGUAGE TRANSLATION

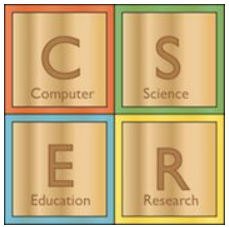
Sample code: Text to speech translator

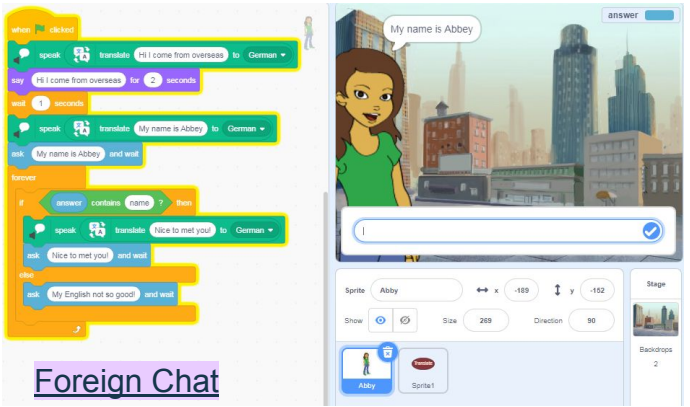
Unplugged: modelling a conversation
If the question is about finding out my name **then … my response is …**

Plugged:
Language translator: Text to speech using Scratch 3.0

Chatbot with foreign visitor
(Mimic AI) If the string contains a specific keyword and reply …

Python examples available in 2020 (module with video tutorials.





Slide deck:
http://bit.ly/AI_DTHub

Questions?

csermoocs.adelaide.edu.au

digitaltechnologieshub.edu.au

Resources

- This session can be delivered alongside or in support of our AI MOOCs for primary (https://csermoocs.appspot.com/ai_primary) and secondary teachers (https://csermoocs.appspot.com/ai_secondary).
- AI resources on the Digital Technologies hub https://www.digitaltechnologieshub.edu.au/teachers/topics/artificial-intelligence
- Hour of Code AI
    - https://studio.code.org/s/oceans/stage/1/puzzle/1