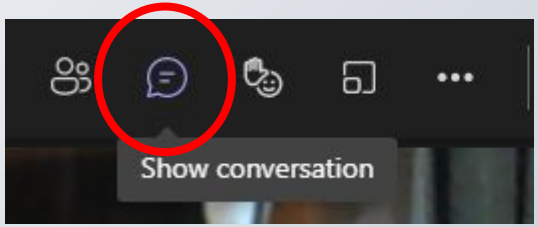
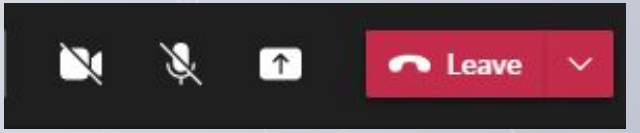
While we wait to get started ...

Open the chat



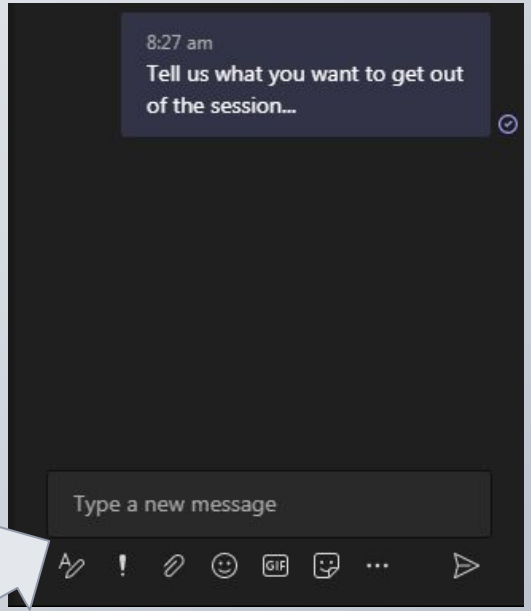


Your mic is on mute
... and camera disbaled

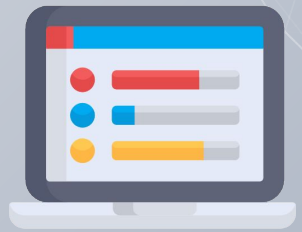
Tell us what you want to get out of the session.

NOTE:
your name will appear with your comment.

The chat won't be part of the recorded version.



Take our poll ... you will find it in the chat...



DIGITAL TECHNOLOGIES HUB

Discovering **Artificial Intelligence (AI)**

AI and conventional programming

DIGITAL TECHNOLOGIES HUB

Acknowledgement of Country

ESA acknowledges the Eastern Kulin Nation, Traditional Custodians of the land on which our head office stands, and pays our respects to Elders past and present.

We recognise the Traditional Custodians of Country across Australia and their continuing connection and contribution to lands, waters, communities and learning

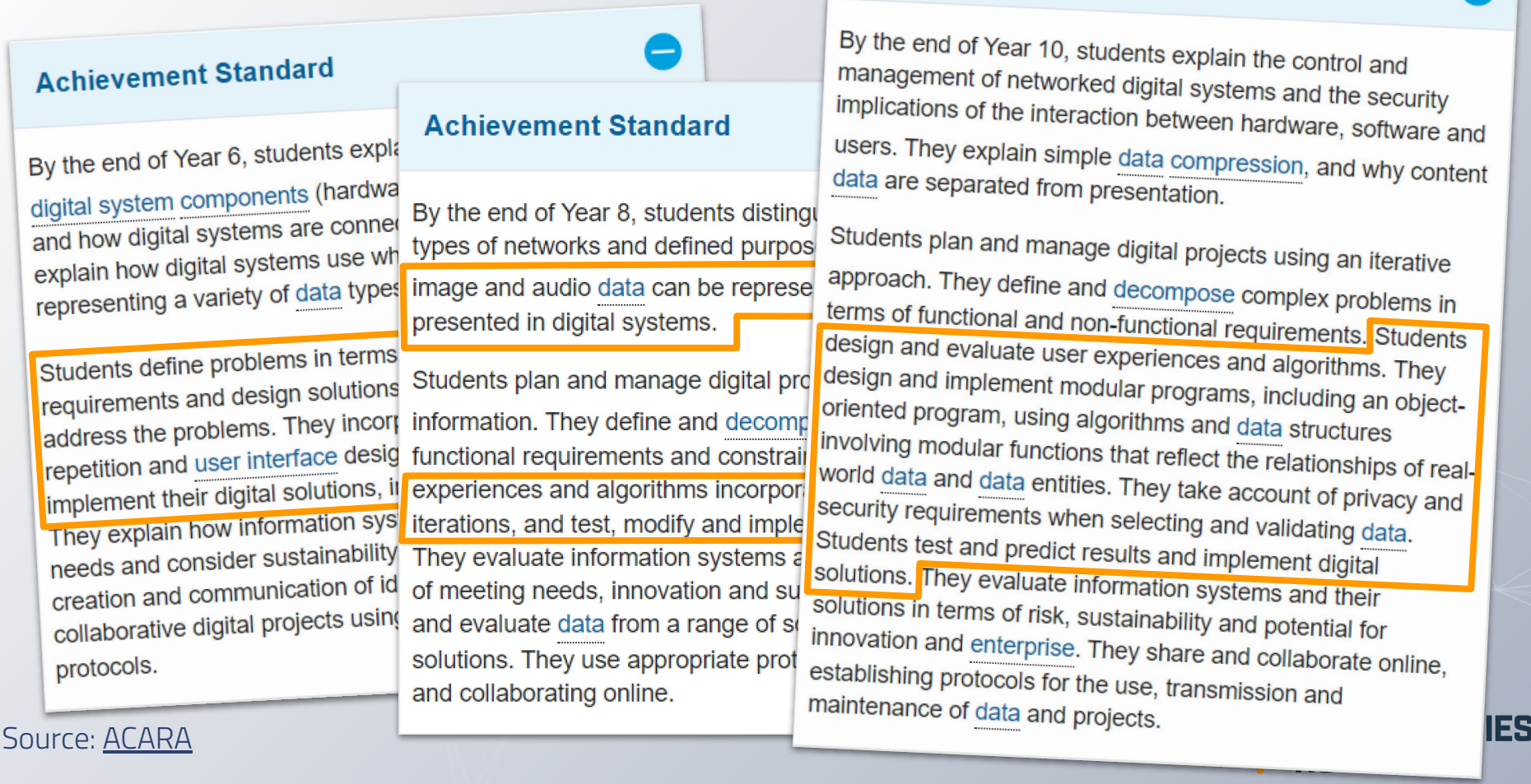
By the end of this session

Guide students in how machine learning differs from traditional code, especially in terms of **input data**.

Observe / try a hands-on example of writing a conventional program and adding **AI decisions** to it.

Look at **assessment** and **coding pedagogies**, as well as considerations around **IP** and **privacy**.

Achievement standards:



Achievement Standard

By the end of Year 6, students expla

digital system components (hardwa
and how digital systems are conne
explain how digital systems use wh
representing a variety of data type

Students define problems in terms
requirements and design solutions
address the problems. They incorp
repetition and user interface desig
implement their digital solutions, i
They explain how information sys
needs and consider sustainability
creation and communication of id
collaborative digital projects using
protocols.

Achievement Standard

By the end of Year 8, students distingu
types of networks and defined purpos

image and audio data can be represe
presented in digital systems.

Students plan and manage digital pro
information. They define and decomp
functional requirements and constrai
experiences and algorithms incorpor
iterations, and test, modify and imple
They evaluate information systems a
of meeting needs, innovation and su
and evaluate data from a range of s
solutions. They use appropriate prot
and collaborating online.

Achievement Standard

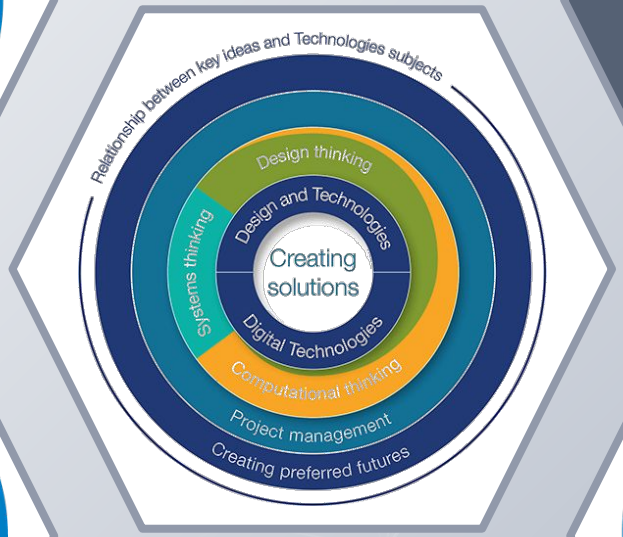
By the end of Year 10, students explain the control and management of networked digital systems and the security implications of the interaction between hardware, software and users. They explain simple data compression, and why content data are separated from presentation.

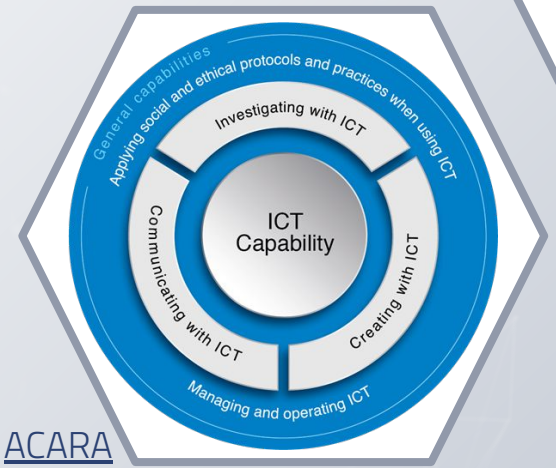
Students plan and manage digital projects using an iterative approach. They define and decompose complex problems in terms of functional and non-functional requirements. Students design and evaluate user experiences and algorithms. They design and implement modular programs, including an object-oriented program, using algorithms and data structures involving modular functions that reflect the relationships of real-world data and data entities. They take account of privacy and security requirements when selecting and validating data. Students test and predict results and implement digital solutions. They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise. They share and collaborate online, establishing protocols for the use, transmission and maintenance of data and projects.

Source: ACARA

Australian CURRICULUM

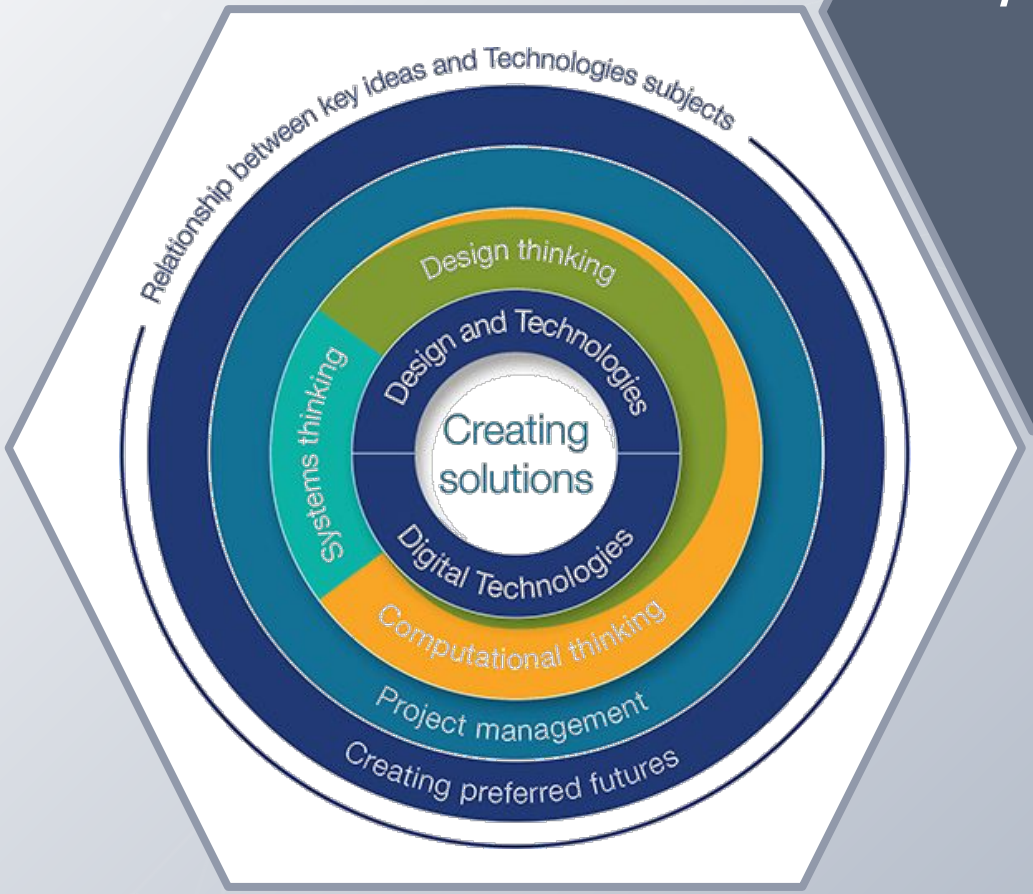
AI topics



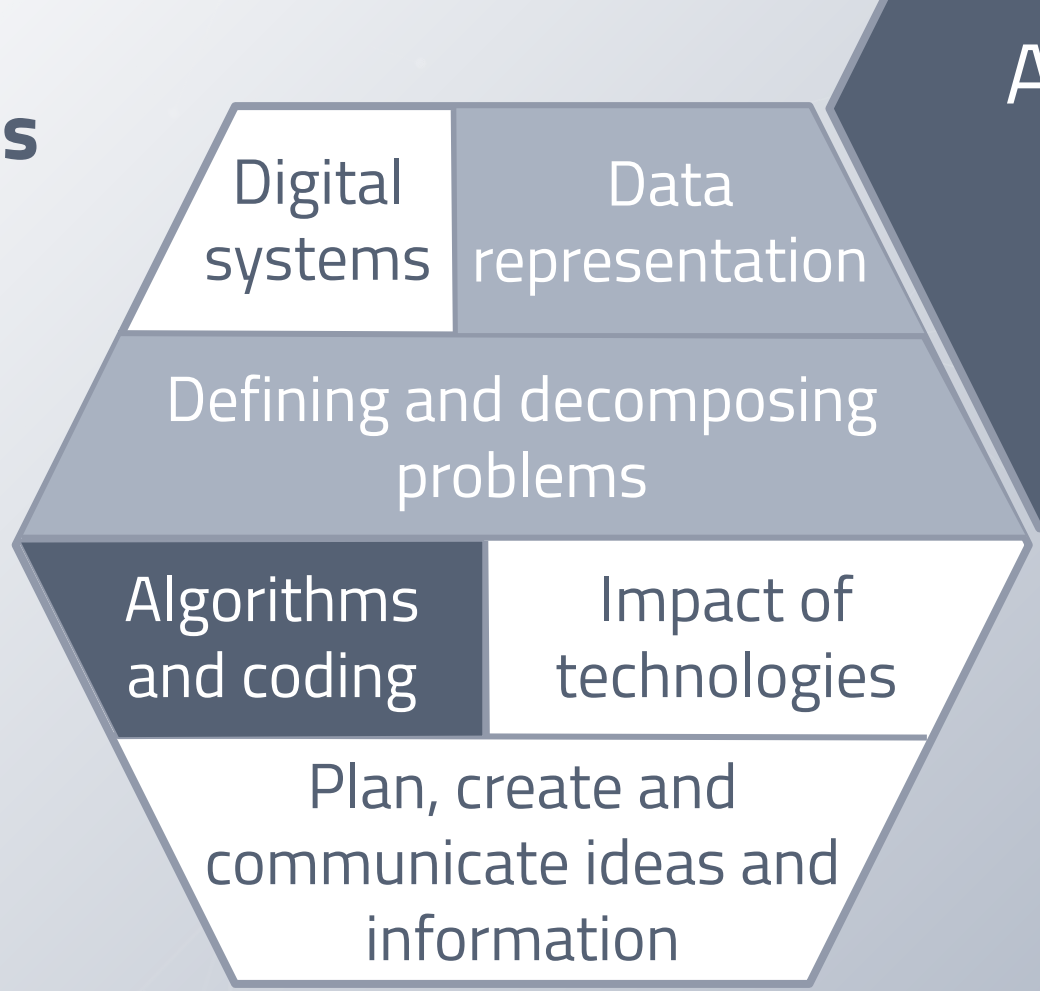


Source: ACARA

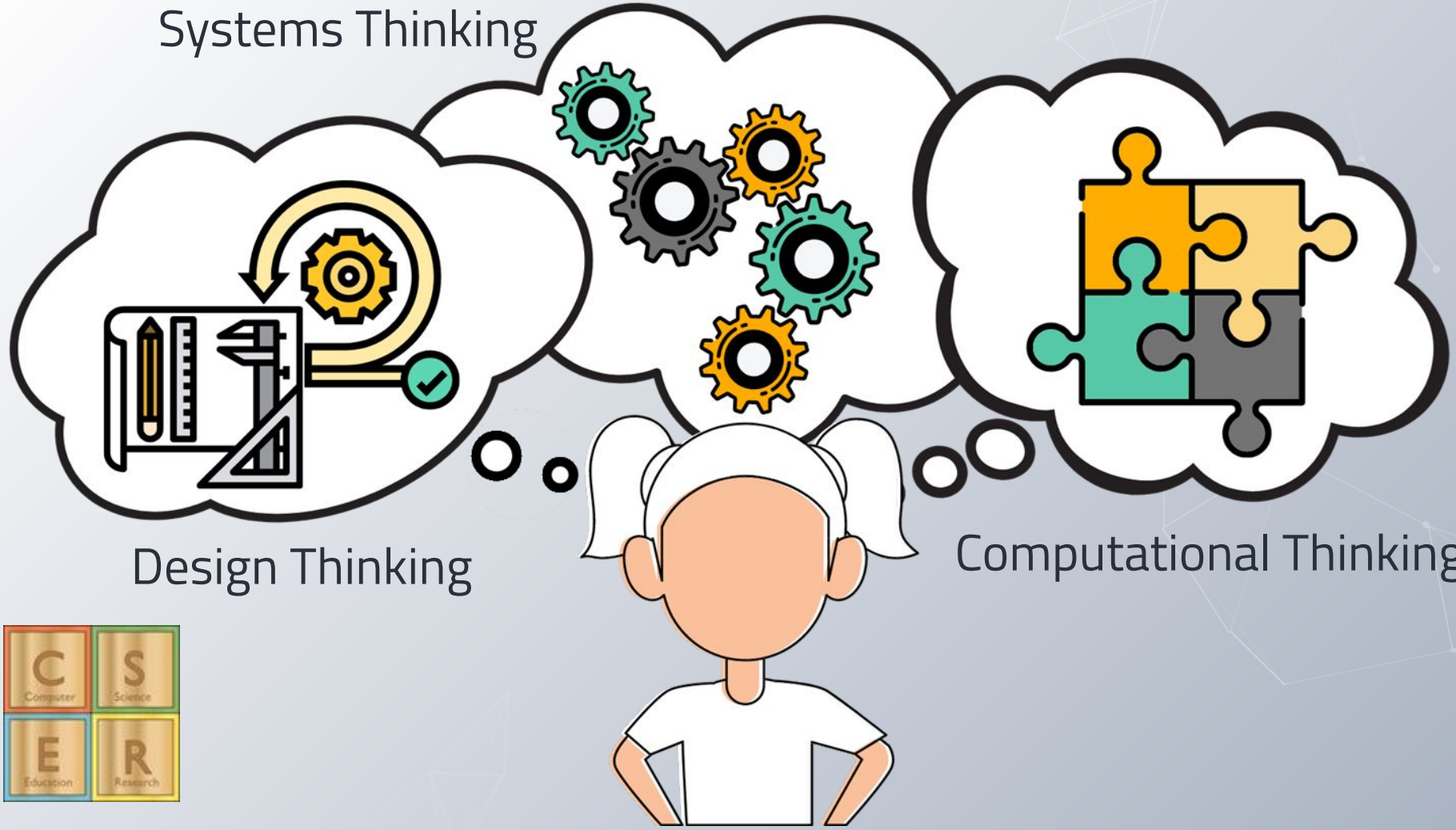
AI topics


Relationship between key ideas and Technologies subjects
Design thinking
Design and Technologies
Systems thinking
Creating solutions
Digital Technologies
Computational thinking
Project management
Creating preferred futures

Foci for this deep dive:



Systems Thinking



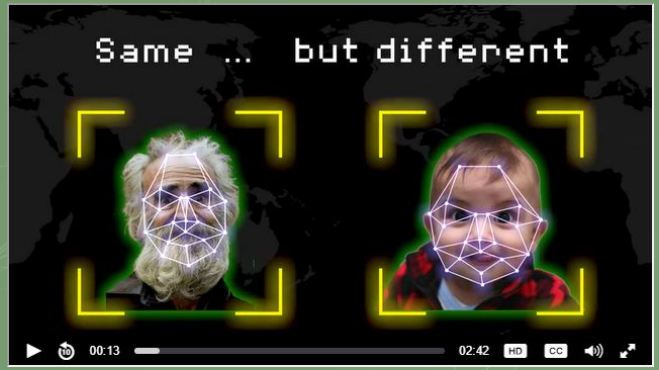
Design Thinking

Computational Thinking

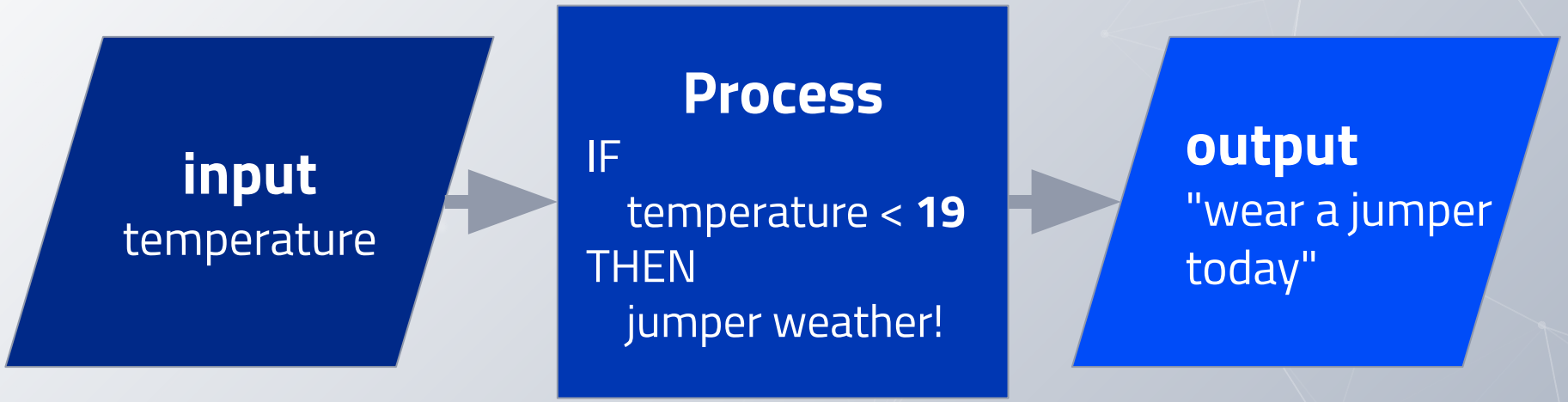
Artificial Intelligence and conventional programming

Differences and opportunities

EXPLAINER VIDEO: Introduction to AI and machine learning



Traditional programming



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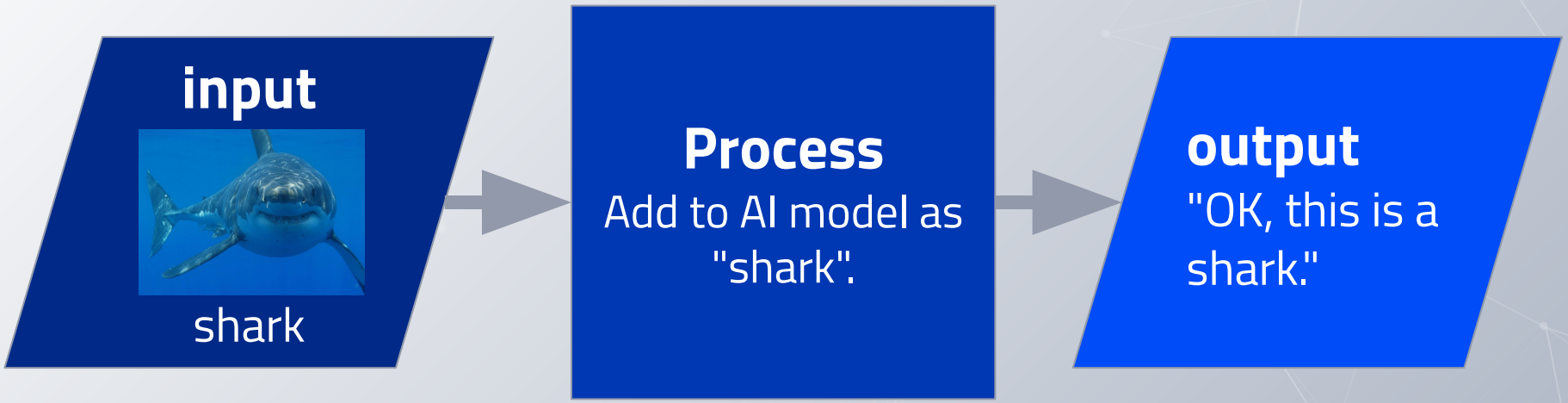
Machine learning: training



Do this with 100s of known shark images...

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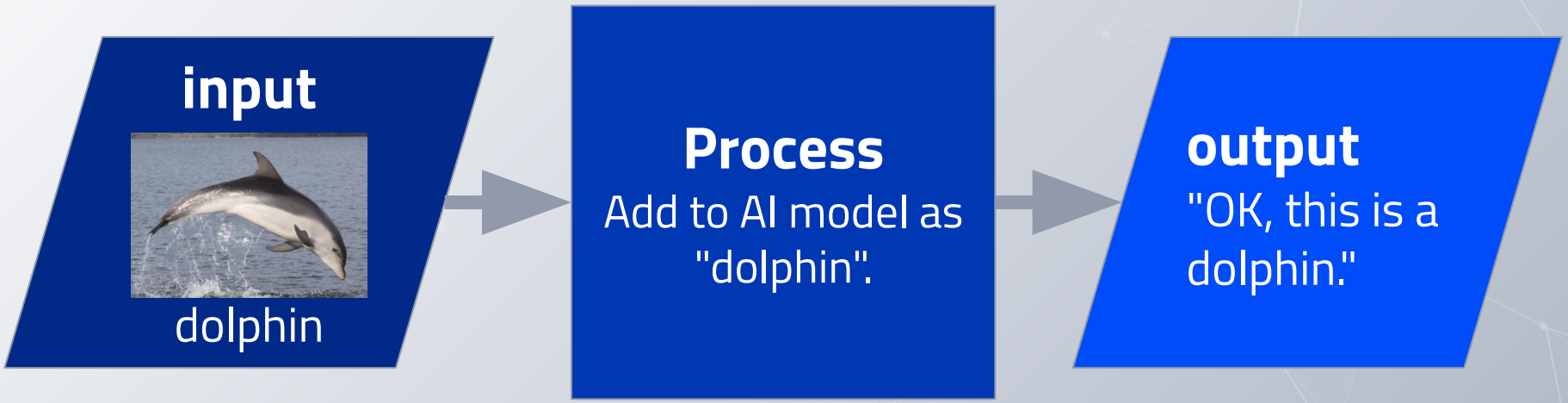
Machine learning: training



Do this with 100s of known dolphin images...

Machine learning: testing

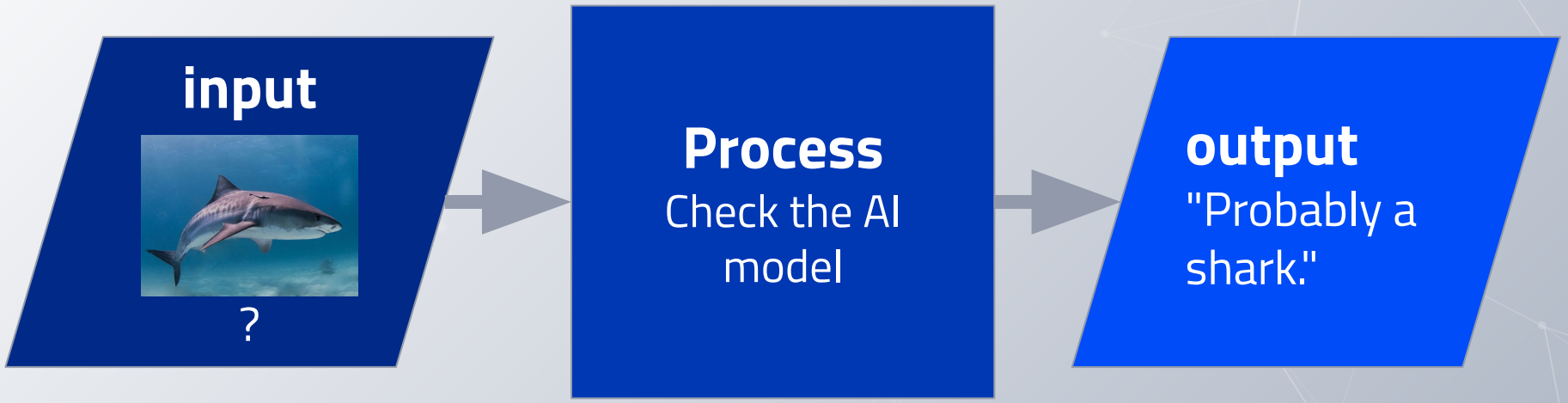


Image CC-BY Albert kok (Wikimedia Commons)

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What do you notice about the input data...

...in traditional programming?

- discrete, quantifiable

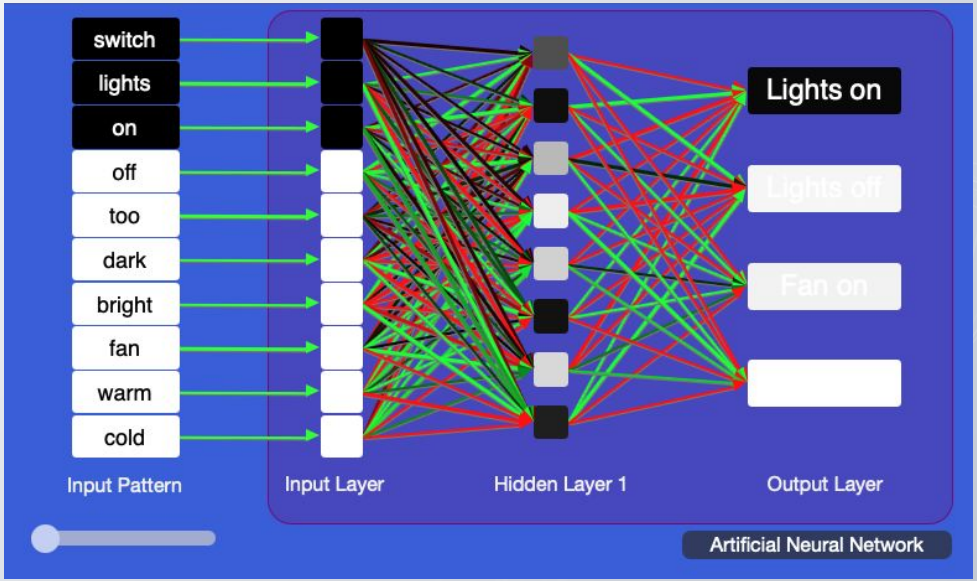
...with machine learning?

- text, sound, image, sensory
- often very large amounts of data

What's so special about AI?

Like us, AIs are able to fill in knowledge gaps.

They can draw on similarities. Let's do a **demonstration**.



RESOURCE: Simulation at **My Computer Brain**

LESSON: **Home automation with AI** (Years 5-8)

Considerations when teaching to the curriculum

What does Artificial Intelligence add?

When and how to combine AI and conventional programming?

Conventional Programming

Algorithms

- opportunities to design, trace and test

Implementation

- General Purpose programs involving branching, iteration, functions, data structures

Artificial Intelligence

Data Representation

- text, image and audio in binary

Data Collection, Data Interpretation

Impact

Our hands-on example

A **simple 1-question quiz**.

User can answer by pressing **y** or **n** on the keyboard.

Then, upgrade user interface so the user can answer with **thumbs-up** or **thumbs-down** on webcam.

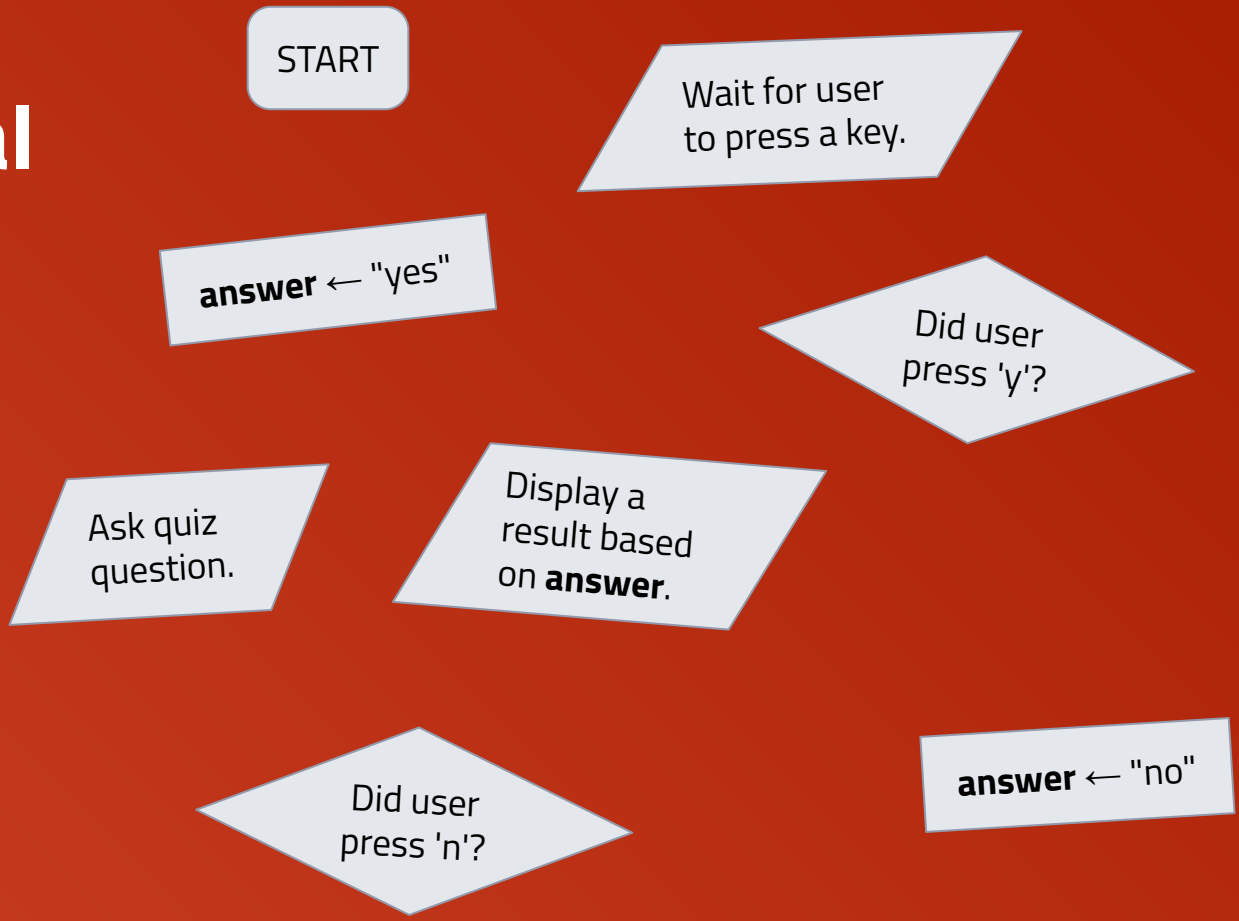
Our hands-on example

1. Design and code a **conventional program**. (P5 JavaScript environment)

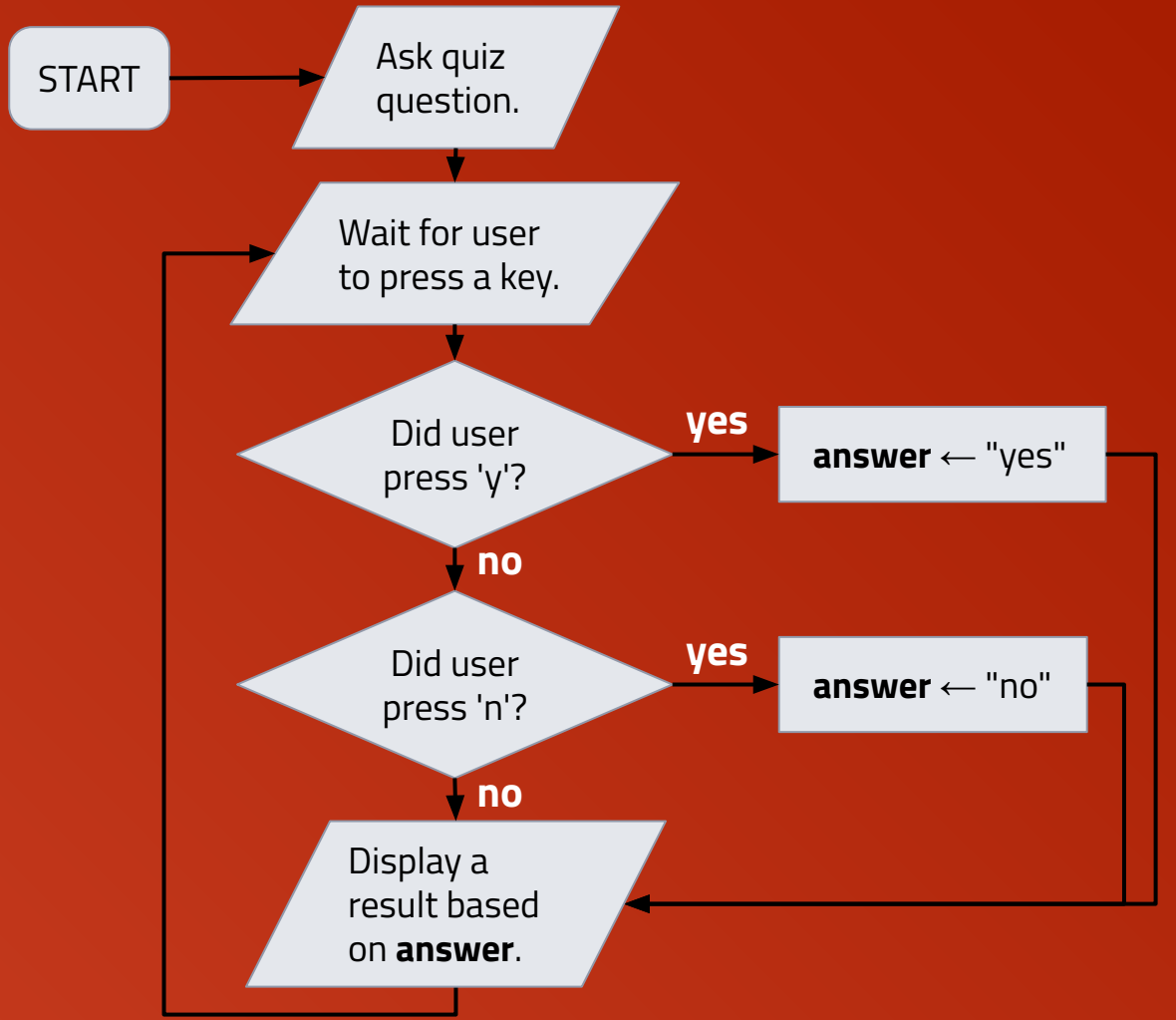
2. Prepare an **AI model** for recognising thumb gestures. (Teachable Machine)

3. Bring the trained model into our program.

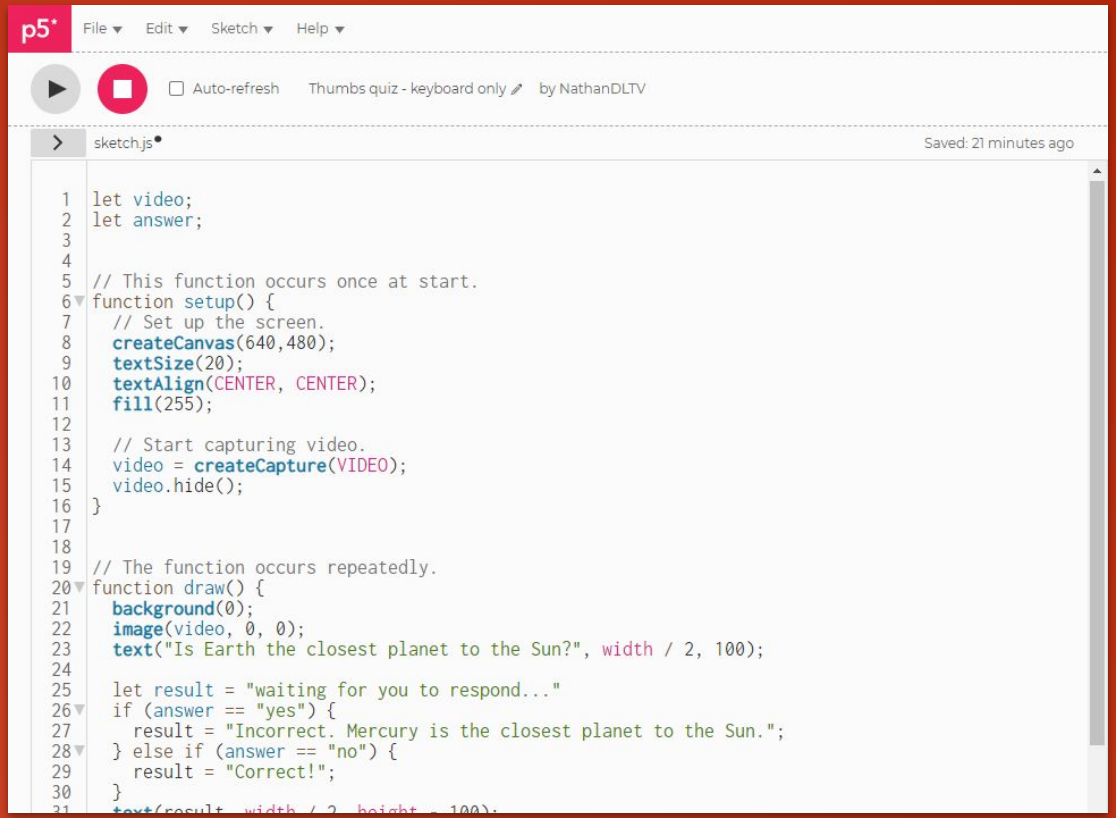
1. Design a conventional program



1. Design a conventional program



1. Code our conventional program



We're using the **p5 environment** for JavaScript coding.

- **Starting point**
- **Finished program (keyboard input only)**

2. Prepare an AI model: consider data

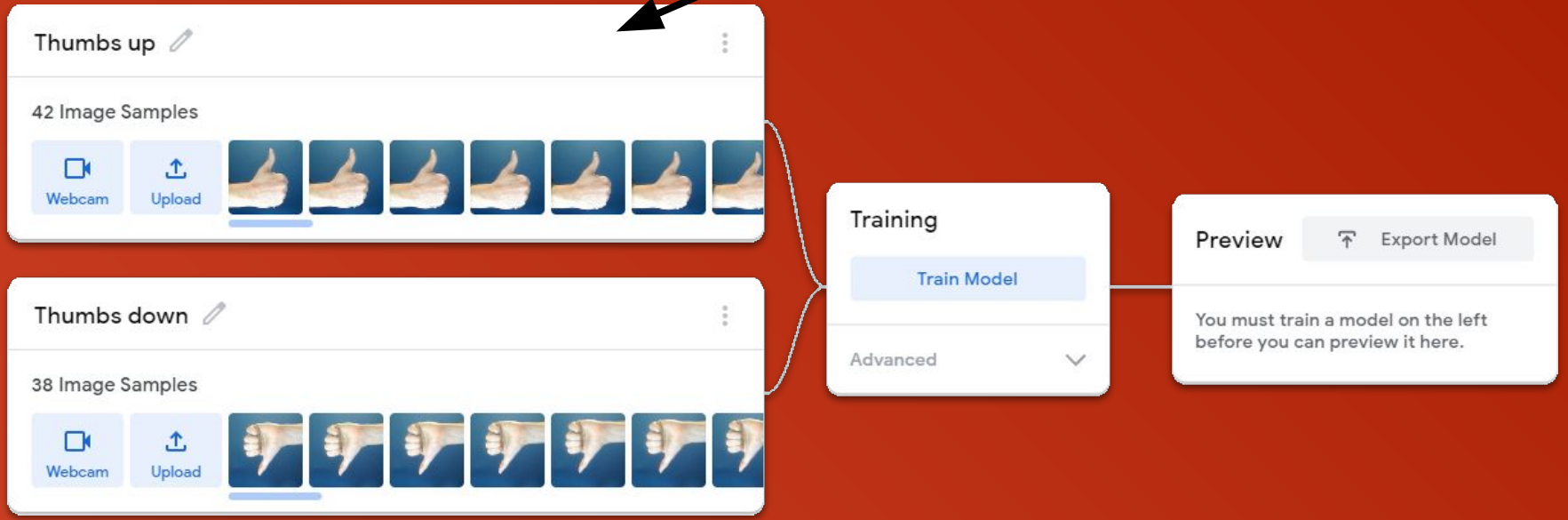
How can we represent **Y** and **N** clearly?

We need **multiple photos** and different **angles** / **directions**.

What about background?

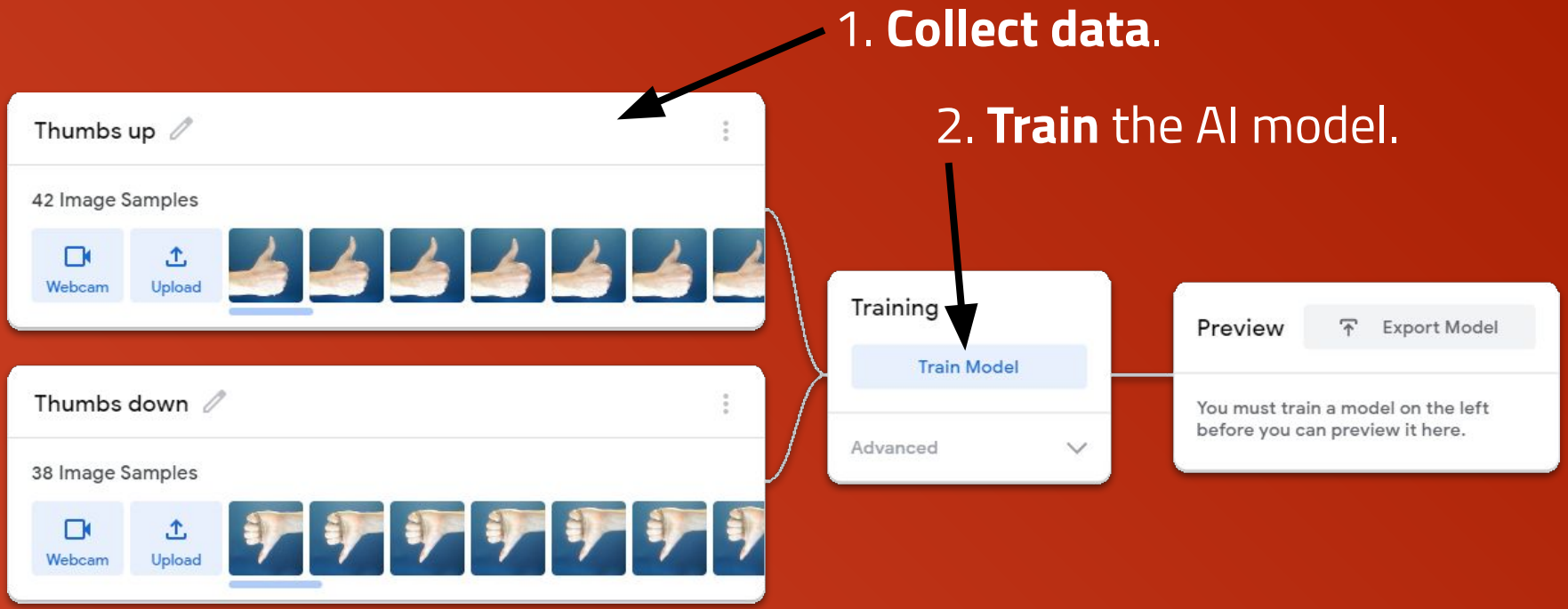
2. Prepare an AI model: train the AI

1. **Collect data**.



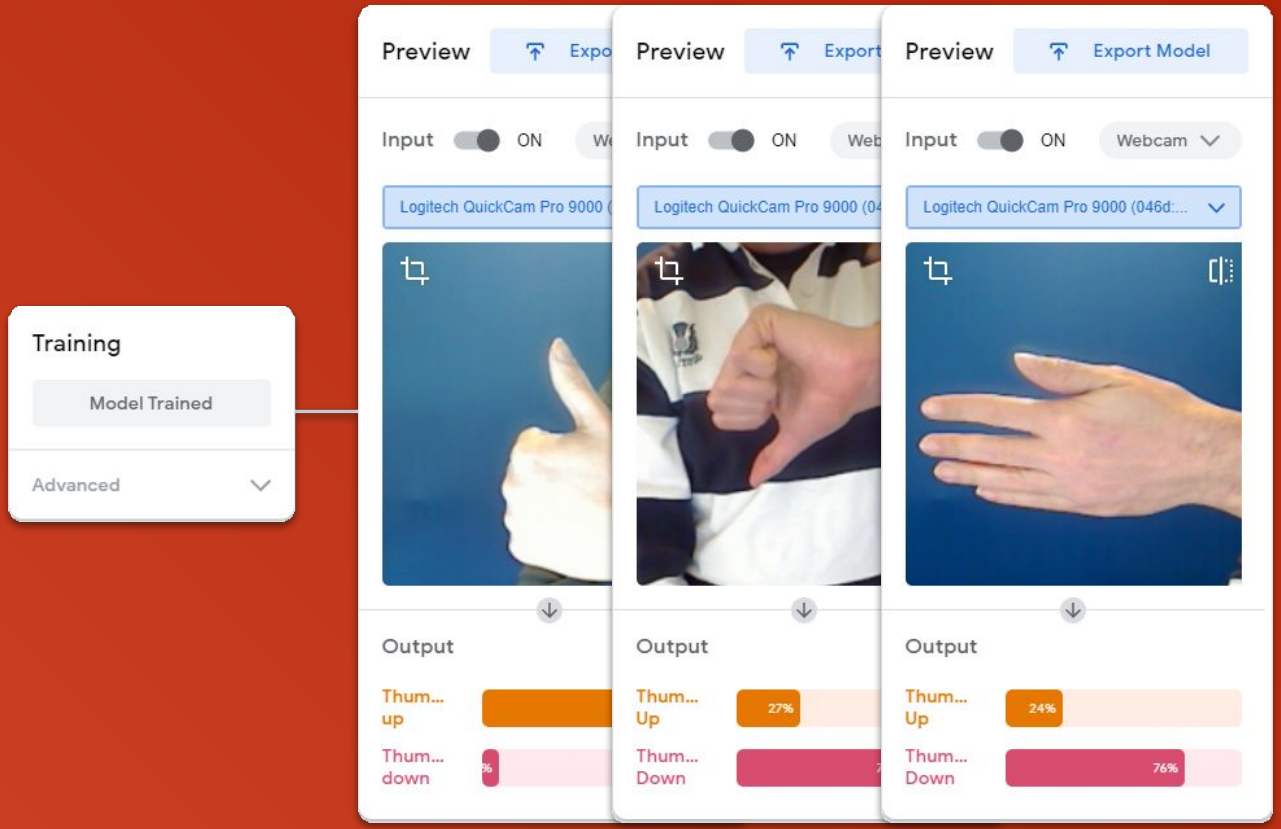
Google **Teachable Machine**

2. **Prepare an AI model:** train the AI



Google **Teachable Machine**

2. Prepare an AI model: test the model



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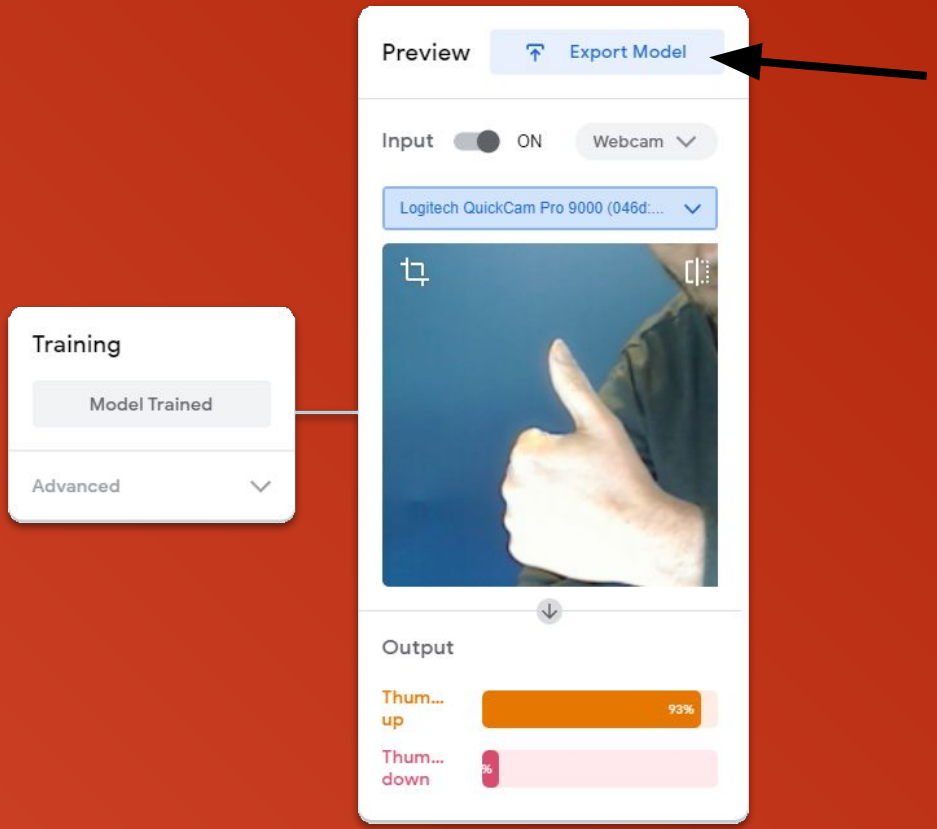
3. Export the model



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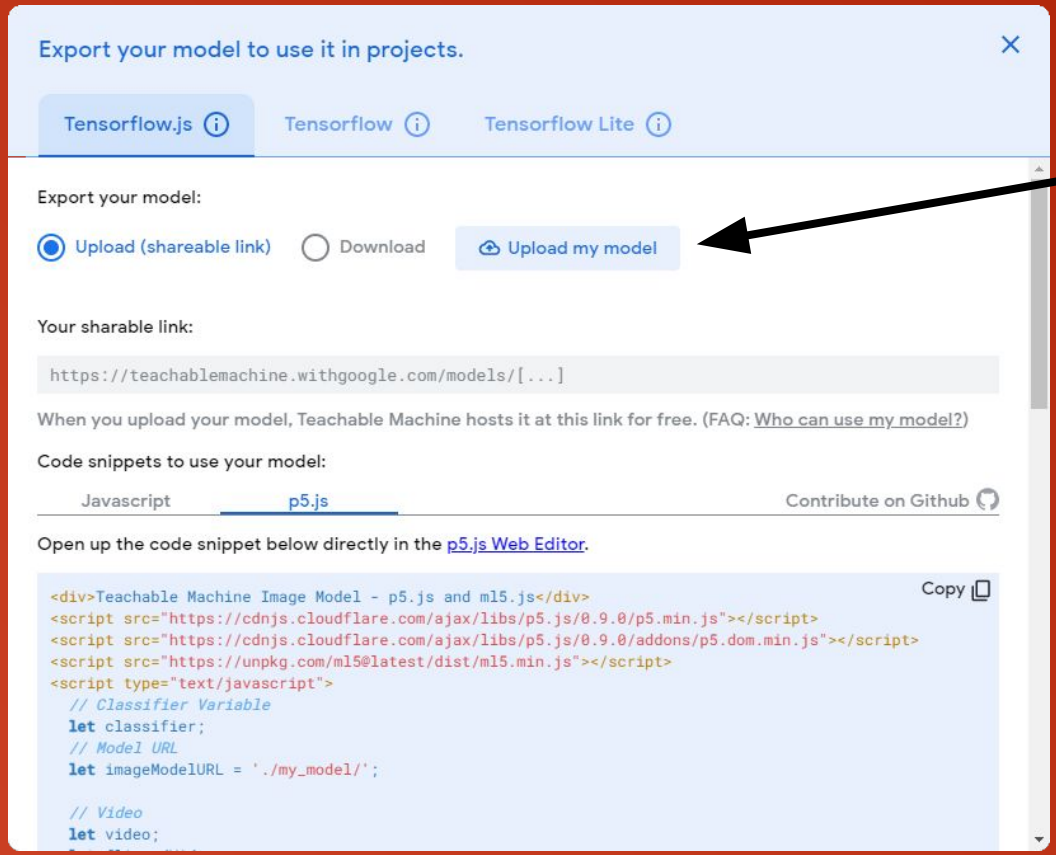
3. Export the model



Teachable Machine hosts the model.

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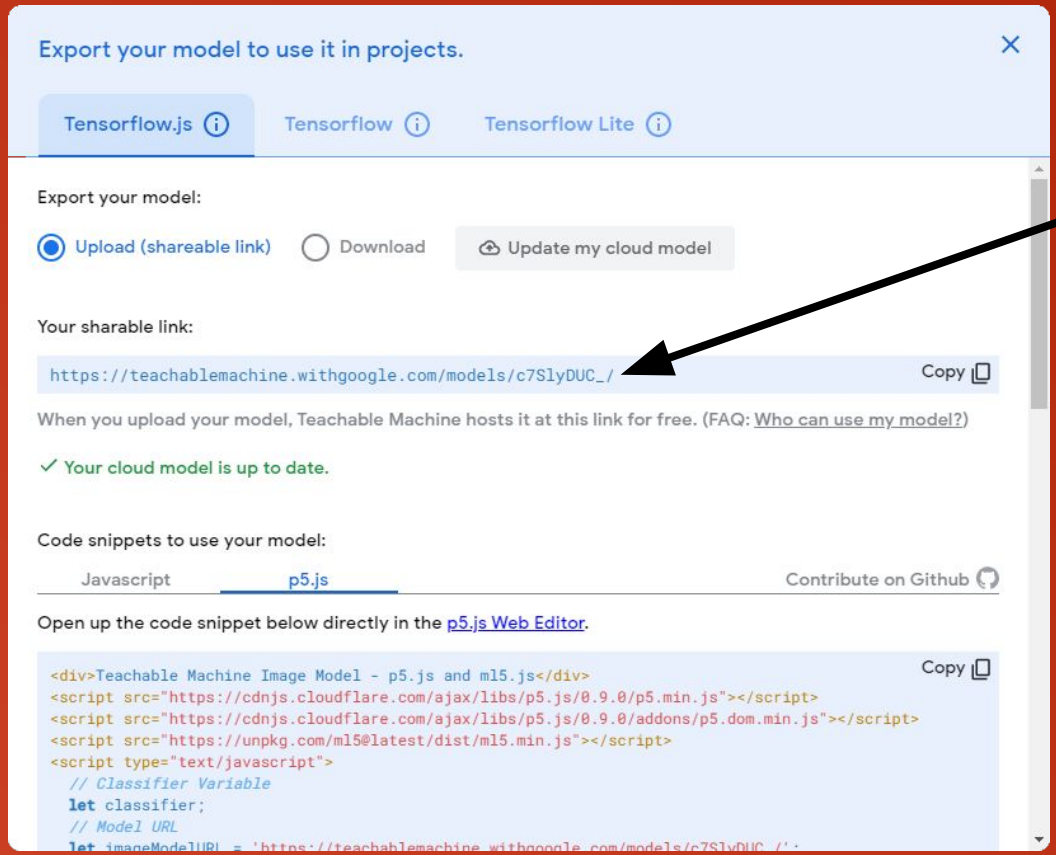
3. Export the model



This unique URL is what we need to use the model.

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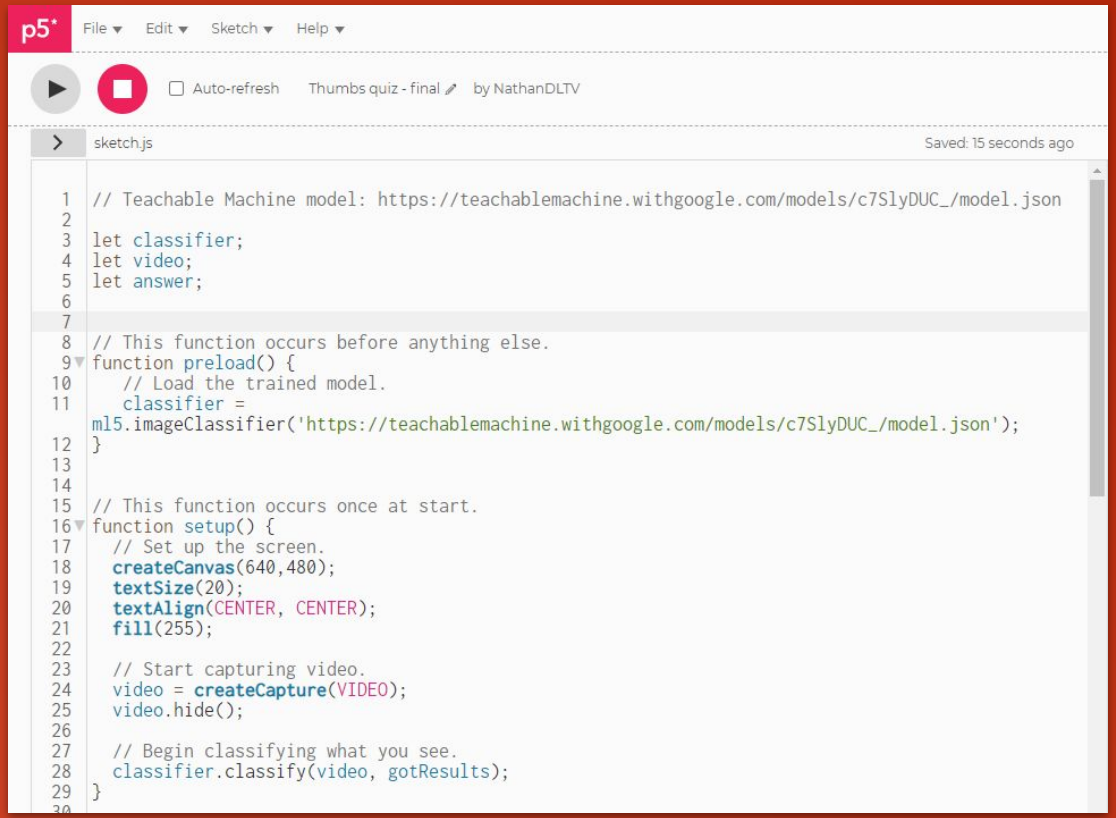
3. Bring the model into our program



Back to the p5 environment.

- **New starting point**
- **Final program with gesture recognition**

Relevant lesson ideas

Rock, Paper, Scissors, AI!

Similar to the hands-on example we just did. Train an AI model and demonstrate adding it to a program.

Expand on this lesson to have the computer play Rock, Paper, Scissors with you!

Home automation: General Purpose programming

Use JavaScript in the Pencil Code environment to incorporate speech recognition in a program.

Also can be done in Python (with limitations).

LESSON: Rock, Paper, Scissors, AI! (Years 7-8)

LESSON: Home automation: General Purpose programming (Years 7-8)

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Pedagogy, property and privacy

Coding brings its own pedagogical challenges.

Remixing is a chance to discuss intellectual property.

AI involving images and voices also bring privacy considerations.

Remixing

In each programming lesson, sample code is provided.

Isn't that just giving students the answer?

This is an **evidenced-based approach**, and reflective of **real world** programming.

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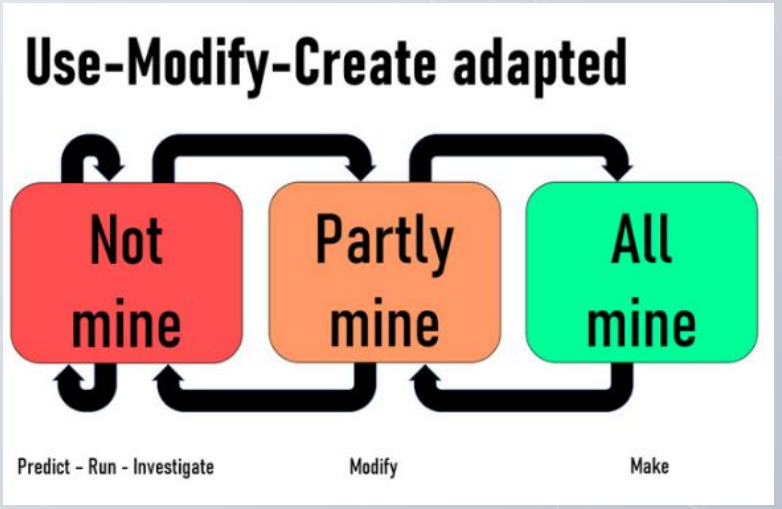
Image: United Kingdom Department of Education



From blog post: Exploring pedagogies for teaching programming in school

PRIMM is one approach that can help teachers structure lessons in programming.

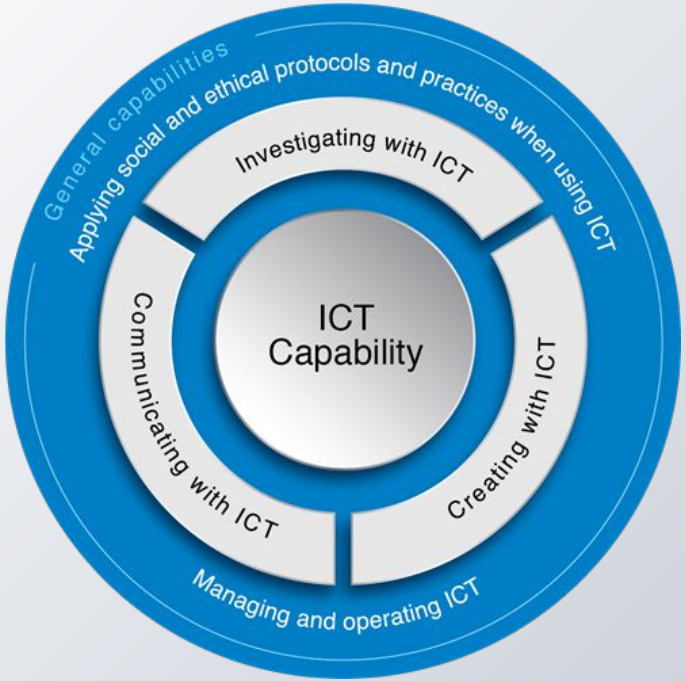
A learner runs (**uses**) an existing program to see what it does, then **modifies** it, and then when able, **creates** a new project of their own.

Let's apply remixing

What could students do to tinker with the quiz program we just made?

What fresh projects could be inspired?

- add a third gesture ("not sure")
- multiple choice quiz and use AUSLAN letters **A**, **B**, **C** or **D** to answer
- three quiz questions and give a score
- a timed game: choose the right gesture quickly



Also an opportunity to discuss **intellectual property**, part of ICT General Capability.

In the real world programmers often **adapt** others' work. Where is the line between adapting and simply copying?

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Privacy

Students photographing their own face or recording their own voice is a privacy concern.

What alternatives could you do for your coding activities?

- emojis
- toys
- fruit / vegetables
- semaphore and poses
- sign language**

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E-safety: risk assessment

Effectively plan and assess risks and benefits before introducing any new online platforms or technologies.

eSafetyeducation

Prepare: Resource 3

New technologies risk-assessment tool

eSafety Toolkit for Schools

Creating safer online environments

This risk-assessment tool can help schools to effectively plan and assess risks and benefits before introducing any new online platforms or technologies. Additional research about the platform/technology is recommended if you are unsure of the answer to one or more of the questions.

For technical questions, ask for guidance from an appropriately qualified advisor, member association or technology support staff. You might also check with staff who have already adopted the technology. Once your school has decided on the technology or platform it wishes to use, staff will need to be shown how to use the technology, and how to integrate its use into the curriculum. Staged implementation may help to avoid unintended or unexpected consequences of student use. Usage should be consistent with, and informed by, education department or sector policies and procedures.

New technologies risk-assessment tool

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E-safety: risk assessment

Risk identified: take appropriate action to mitigate risks before using

Proceed with caution: continue to monitor for risks

Consider	Yes	No	Suggestions to mitigate risks
Will students' personal information be publicly displayed (e.g. photograph, date of birth, gender or name of school)?	☐	☐	• Obtain consent from students and their parents/carers before displaying personal information online. • Where possible, de-identify student information.
Can external, unauthorised users communicate with students?	☐	☐	• Install appropriate technologies to monitor and filter activities on school ICT systems. • Teach students strategies to report external, unauthorised communication and block inappropriate content or contact.
Does the platform encourage students to use their existing email or social networking accounts for sign in or use?	☐	☐	• Often platforms also have the option to sign up or log in using unique usernames and passwords. While using existing social networking accounts might be quicker, unique logins are a safer option. • Teach students the importance of strong passwords and not sharing passwords.
Are student profiles linked to apps that can display their location?	☐	☐	• Teach students strategies to turn off location services functions, or to block apps that have these turned on.
Does the education department prohibit the use of this technology or platform?	☐	☐	• If the education department's policies prohibit the use of this technology or platform it is recommended not to use it.
Can students access inappropriate content using this technology or platform?	☐	☐	• Install appropriate technologies to monitor and filter activities on school ICT systems. • Encourage help-seeking behaviours so students know the steps to take if they come across inappropriate content.

E-safety: risk assessment

Consider	Yes	No	Suggestions to mitigate risks
Have minimum age requirements for the technology or platform been adhered to?	☐	☐	• Check age appropriateness prior to use. • Teach students about age recommendations and the reasons behind them.
Does the platform promote privacy and security for students and their accounts?	☐	☐	• Empower students to protect their privacy and explain how to adjust security settings.
Have parents/carers consented to their child using this technology or platform?	☐	☐	• Ensure appropriate consent has been provided by parents/carers. Some schools request consent to use a broad range of platforms at the start of the school year to avoid having to ask for consent each time a new platform is used. It's important to be as clear as possible about what this consent includes, as well as providing information on any possible risks to users and how the school mitigates them.
Are staff comfortable and confident using the platform?	☐	☐	• Provide access to professional learning so staff are skilled in the platforms/technologies they use.
Is there a staff member moderator for chat or comment functions?	☐	☐	• A staff member (or team) would ideally be appointed to moderate chat or comment functions, to encourage safe and positive interactions and to take down and investigate inappropriate posts.
Does the platform have capacity to report problems or misuse?	☐	☐	• All platforms should have terms of use that clearly identify inappropriate content or behaviour, and how to report problems or misuse. • Visit The eSafety Guide for more information.
Do all users know how to set the platforms' privacy settings?	☐	☐	• Share The eSafety Guide with staff. This has links to the latest games, apps and social media, with tips on how to set privacy settings.
Have you identified how data is stored and used by the platform?	☐	☐	• Privacy issues arise when data is collected and not stored securely or shared inappropriately. Good practice is to find out how data will be stored and who has access. • Check education department or sector policies to see if there are any standard protocols schools should follow, as well as advice about privacy legislation and data storage.

Assessment

Artificial Intelligence is a rich field for assessment opportunities.

Here are a few examples in the core concept areas of data, algorithms, implementation and impact.

Data representation, Impact

Train and test an AI model

- Rate how well the AI recognised objects.
- Discuss the training data used.
- List ways it may be improved.

Research Algorithmic Bias

- Discuss real-world examples of algorithmic bias.
- Consider social impact.

Data representation, Algorithms, Implementation

Utilise a trained AI model in a coded program

- Design and develop a program in a suitable environment such as **p5** JavaScript.
- Import the AI model and use it to drive the program's decisions.
- Assess General Purpose Programming with a suitable rubric.

Students' use of apps & tools

Think Aloud: Student interview

- Screen captures or saved program

Self-reflection

- What they learned, challenges, checklist/rating their skills before/after

Analysis

- Artefacts such as worksheets or analysis of AI tools, applications and real world uses.
- Criteria used

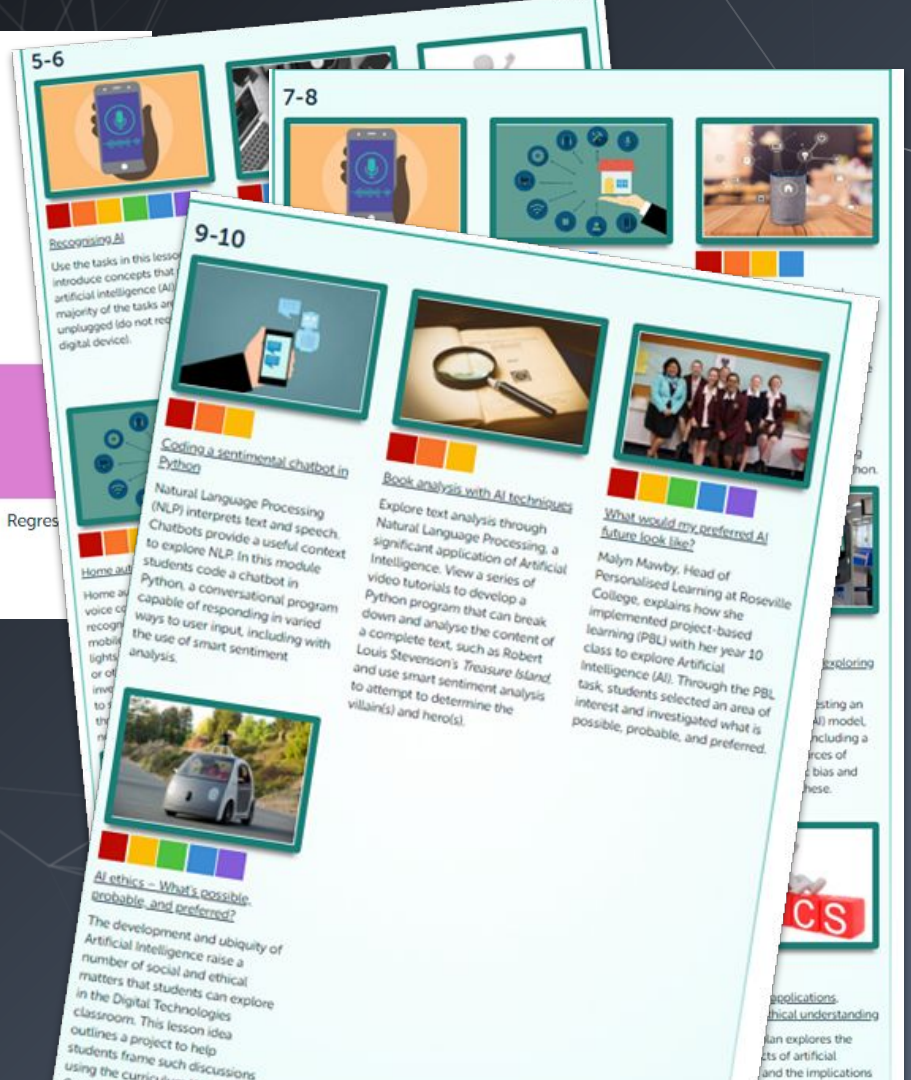
Artificial Intelligence lesson plans

Humans display natural intelligence in contrast to machines that demonstrate artificial intelligence (AI).

AI has various definitions however for our purposes we are using the definition 'any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals' [1]. Read more...

The following lesson ideas cover a range of specialisations and subsets as indicated by the colour coding. Click on the coloured squares to learn more about each definition.

Machine learning | Supervised learning | Natural language processing | Computer vision | Classification | Clustering | Regres



Lesson plans

Artificial Intelligence

Access DT Hub AI lesson plans

A chance to ask questions …

Use the chat…

How can you incorporate these teaching ideas?

What do you feel more confident about?

What do you still need to know?

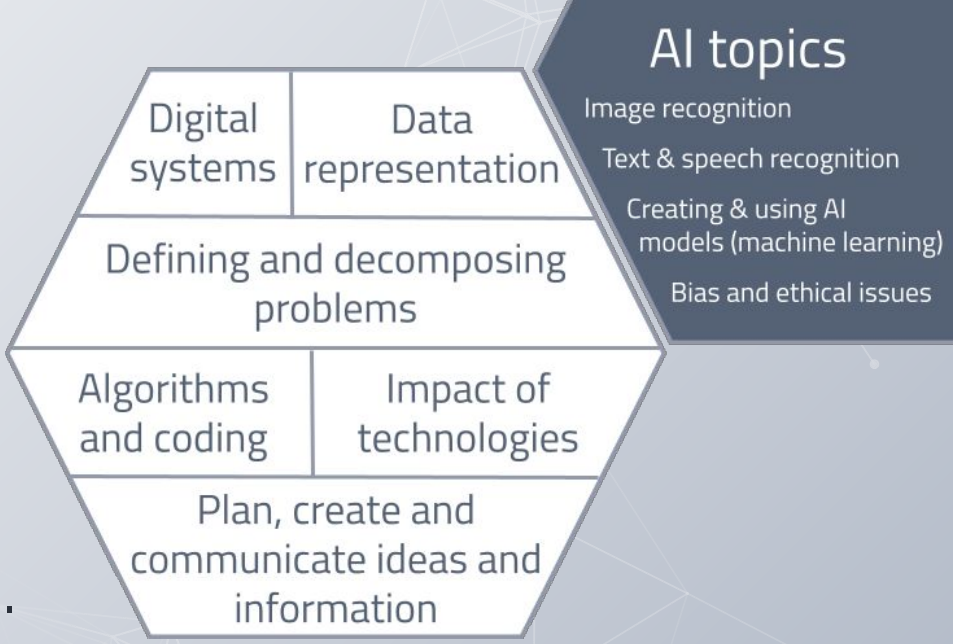
Next steps

Making a commitment to implementing AI in your classroom

Use the chat to **write your idea** of where you will include AI as part of your teaching and learning program.

Connecting and sharing with the group.

email:
digitaltechnologieshub@esa.edu.au



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Other Deep Dives

Deep dive 2: Investigate a machine learning model	Thurs 19th August 2021
Deep dive 3: Natural language processing for large text analysis	Tues 24th August 2021
Deep dive 4: AI, ethics and systems thinking	Tues 7th Sept 2021

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