AI Professional Learning: Creating an AI model

PRIMARY DD3: Session overview

DT Curriculum focus	Relevant slides	Covered in the session	Resources
Impact and interactions		You should be able to: • Describe how to train an AI and choose a context for students to create their own model. • Develop an understanding of bias and how to limit it in their AI model. • Use an AI model in a Scratch 3.0 project.	
Digital systems/Data representation		Curriculum connections • Digital Technologies: Focus on information systems the related key concepts include impacts, interactions and digital systems: **Data representation:** Deals with the way different types of data is represented (text, images, sound), stored and used in digital systems.	

	 	**Defining and decomposing problems:** the focus on the precise definition and communication of problems and their solutions. **Implementation**: the automation of an algorithm, typically by using appropriate software or writing a computer program. **Algorithms:** precise description of the steps and decisions needed to solve a problem. While focussing on implementation we can incorporate relevant general capabilities. • General capability: ICT capability • General capability: Critical and creative thinking We also include ways of thinking, particularly: • computational thinking and design thinking	

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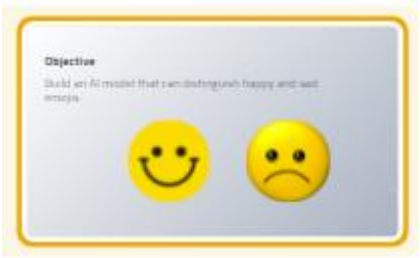
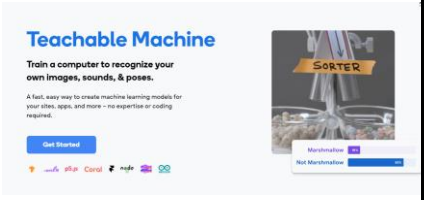
Data representation	 	An AI (artificial intelligence) model is a program that has been trained on a set of data (called the training set) to recognize certain types of patterns. So the AI is a program that can learn. It needs learning data to carry out the learning process. And (usually) our feedback to get it right We use test data to check if the learning was successful	
Data representation		Objective: Build an AI model that can distinguish happy and sad emojis. Teaching tips • Discuss Abstraction: What information do we need to include? What is not needed? • We end up extracting the important features that make it recognisable.	Lesson ideas • Can AI recognise what you are drawing? (Years F-4)
Data representation/ Digital systems/ ICT Capabilities		We use Teachable machine to create, test and use an AI model	Downloadable resources/links Teachable machine

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	  	1) Collect Learning Data We collect images of happy and sad emojis 2) Group the learning Data We then group and label the learning data, for example by placing the images in labelled buckets 3. Configuring the AI Set up the groups in the AI. Happy and Sad. Also, add a Background Group	
Data representation/ Digital systems/ ICT Capabilities		5. Start the learning process Tell the AI to begin learning. Internally, the AI will begin a process of adjusting its internal values. 6) Learning process complete	Downloadable resources/links **LESSON:** HOW CAN AN AI RECOGNISE WHAT IT SEES?

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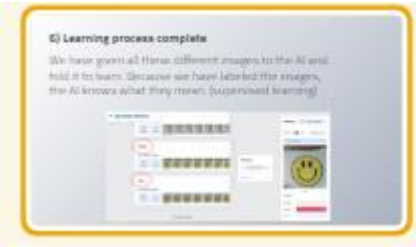
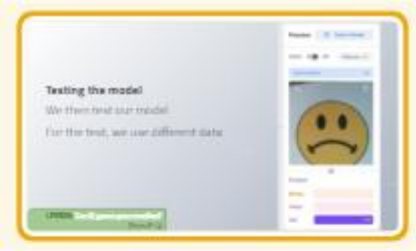
		• We have given all these different images to the AI and told it to learn. Because we have labelled the images, the AI knows what they mean. (supervised learning)	
Data representation/ Digital systems/ ICT Capabilities	  	Testing the model We then test our model For the test, we use different data Confidence The AI tells us how likely it is that the input belongs to a certain class. Here, the AI is 17% certain that this is a happy face, but 78% that it is a sad face. Confidence issues The AI can be confident, but still be wrong.	Downloadable resources/links

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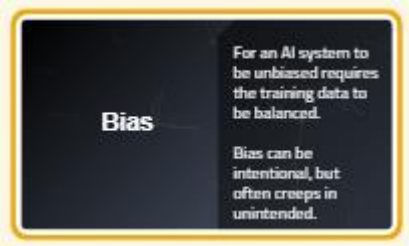
Data representation/ Digital systems/ ICT Capabilities	  	For an AI system to be unbiased requires the training data to be balanced. Bias can be intentional, but often creeps in unintended. Our model has a number of biases: • Shape • Colour • Size • Backgrounds • Rotation • Eye, mouth shape ... We introduce a data chart to record data to be used in training the AI.	Data chart

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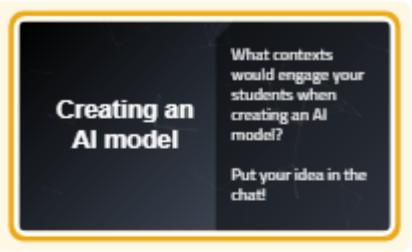
Data representation/ Digital systems/ ICT Capabilities	  	What contexts would engage your students when creating an AI model? We discuss possible contexts including: • Paper, scissors, rock game • AI fruit and veg identifier • Cat sensor cat door (no dogs allowed!) • Landmark identifier • Flag recogniser • Litter sorter (waste, recyclable, organic) We discuss ways to avoid bias in these contexts.	Downloadable resources/links
ICT Capabilities		Data: sourcing images Recognise intellectual property Part of Applying social and ethical protocols and practices when using ICT Provide links to image free library or provide a folder of images (teacher curated)	

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Data representation/ Digital systems		Use image recognition to introduce student AI projects The ability of machines to recognise objects in images or videos (part of computer vision).	
Data representation/ Digital systems	 	AI Scratch blocks A new version of Scratch that is AI compatible! We demonstrate how to do a simple coding project to recognise litter. The AI model has been trained to recognise: • Soft drink bottles • Chip /lollies packets • Banana skin.	AI Scratch blocks https://www.media.mit.edu/posts/ai-blocks/ Scratch blocks editor: https://mitmedialab.github.io/prg-extension-boilerplate/create/ Trained AI model to include in the AI scratch version to test https://teachablemachine.withgoogle.com/models/uWryl1Rue/

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Data representation/ Digital systems	  	We discuss training the model TIPS… Have all your data samples ready Have your classes (buckets) worked out Have something in place for the time taken to train the model. … wait When training is finished Copy and save the URL. Test in new browser	Downloadable resources/links Trained AI model to include in the AI scratch version to test https://teachablemachine.withgoogle.com/models/uWryl1Rue/
Defining and decomposing problems/ Implementation/ Algorithms		5 step process: Using an AI model in Scratch 1. Define the problem and data requirements 2. Collect the data (folder) 3. Train and test the model (copy URL of model) 4. Design and represent the algorithm 5. Build the program (user input) then modify to include AI model (URL)	Downloadable resources/links

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Defining and decomposing problems/ Implementation/ Algorithms	 	Build on this basic translating app to include other languages. We draw on: • design thinking skills for layout (how it will look) • computational thinking to program the solution (how it will work). We demonstrate an algorithm to help map out how the app could be programmed.	Lesson plan: Fun projects with language translation A basic translator app program in Scratch
Defining and decomposing problems/ Implementation/ Algorithms	 	We discuss how to set up a Scratch program using images as the input where the user clicks on the image of a flag. (We will later replace that input with the AI input.) • One way is for the user to select the language by clicking on a flag (sprite) • A neat feature in scratch is When this sprite is clicked (we code that sprite to run the translate program for that language) • We could have also chosen buttons FRENCH, ITALIAN, JAPANESE • We have a character to tell the user what to do.(use say blocks) •	Lesson plan: Fun projects with language translation

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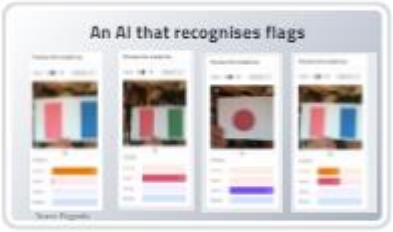
Defining and decomposing problems/ Implementation/ Algorithms	  	We show how to modify the program to accept the AI model of recognising a flag to select the language to translate in.	Lesson plan: Fun projects with language translation AI flag model (pre-made) recognises French, Italian and Japanese flags

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Defining and decomposing problems/ Implementation/ Algorithms	   	We use the game Paper scissors rock as another way to change a conventional program to one that includes an AI input.	For a lesson on how to program paper scissors rock game Visual to text coding Lesson 4: Scissors, Paper, Rock Data chart: paper scissors rock A completed rock, paper, scissors classifier AI model: Rock, paper, scissors. [Requires device with camera enabled].

	 	We discuss conducting a risk assessment We discuss how to go through a risk assessment for teachable machine Check FAQ, for privacy issues:	New technologies risk-assessment tool

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	  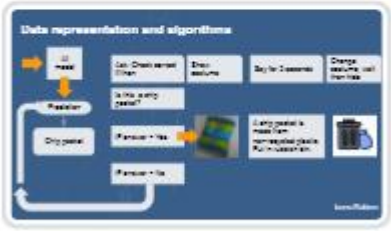 	We discuss the opportunities for assessment Evidence of learning: Trained and tested AI model Plan of the training data (data chart) How well did they avoid bias? How well did their model work? (Star rating) Think aloud (student records a video of the AI model in action with commentary or as an interview with the teacher. Use post it notes for algorithms and use in formative assessment	