

part 1 | launch

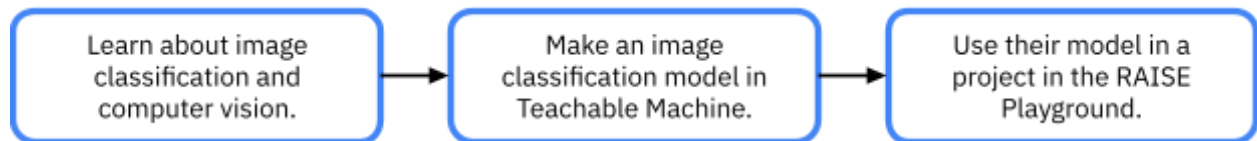
Welcome to *Picture This*! For the launch of this module, students will be introduced to some of the big ideas we'll be covering and the relevant tools we'll be using for the next several weeks. This module introduces students to the field of **computer vision**, and one particular type of pattern recognition in the field: **image classification**. In this lesson, students will be introduced to Teachable Machine and the RAISE Playground, two programs with high payoff in terms of project creation. Both of these tools will be used extensively throughout the module, so hopefully this launch can be used as a low-risk exploration of the tools.

Learning targets

Students will be able to:

- Define **image classification** as a type of **computer vision**. ([Associated Standards](#))
- Create an image classification model. ([Associated Standards](#))

Students will...



Key vocab

- Computer vision: The field of AI focused on computers' ability to process and analyze images.
- Image classification: an AI process that tells pictures apart.

Prep

- Print the cognitive content dictionary and distribute it to students.
- Ensure students have access to the following links:
 - ↳ [Teachable Machine](#)
 - ↳ [RAISE Playground](#)
 - ↳ [Template project](#) for putting Teachable Machine models into the RAISE Playground
- The RAISE Playground's interface is taken from Scratch, so students should have working knowledge of Scratch. If your class has not used Scratch yet, consider

running an intro lesson before proceeding here. We recommend the [Creative Computing Curriculum](#).

facilitator note

Some teachers have found that this lesson can be spread across two class periods. If you decide to do that, we recommend splitting it up as follows:

1. Warm-up through Exploring with teachable machine
2. Coding with image classification and Exit ticket

Students can use the cognitive content dictionary to record the vocabulary they learn throughout the module. Whenever there is an instruction to define a word, use this as an opportunity for full class engagement in filling out the dictionaries.

warm-up | whole-class | 8-10 min

Ask students:

- How do you think your phone can identify the faces of your friends?
- How can a self-driving car see pedestrians crossing the road?

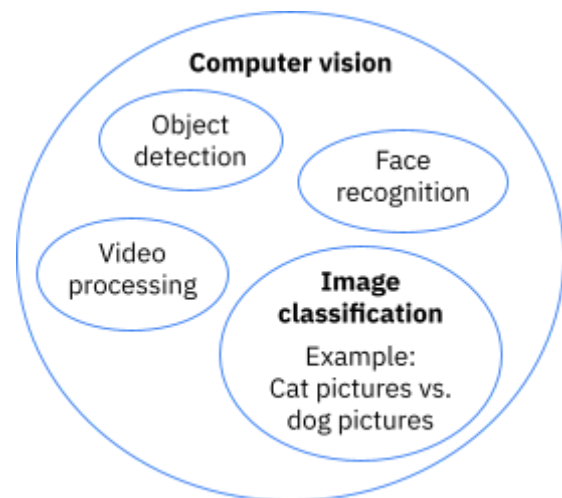
intro | whole-class | 8-10 min

Preview the day's learning targets with students.

Introduce **computer vision** as the field of AI that is focused on copying humans' ability to see and understand things in pictures and videos.

Next, introduce **image classification** as one part of computer vision. Image classification is all about telling types of pictures apart. For example, image classification could be used to tell apart pictures of:

- Healthy vs. diseased tissue in the body
- Croissants vs. bagels at a grocery store checkout
- Players on your team vs. my team on the football field



Computer vision and some of its fields.

vocab spotlight

Computer vision is the field of AI focused on computers' ability to process and analyze images.

Image classification is an AI process that tells pictures apart. It's a subfield of computer vision.

An image classifier performs image classification. Crucially, a classifier isn't recognizing any objects. All it does is predict which category an image belongs to (for example, cat pictures vs. dog pictures). It's important to note that classification is exclusive: there isn't an "other" or "nothing" category. So, if you tried feeding an image of a bagel to a cat vs. dog classifier, it would either predict "cat" or "dog." Also of note— a classifier cannot count the number of objects in a picture.

check for understanding

Guide students through interpreting whether technologies use image classification or not. Students can discuss in groups or pairs, then share out. Make sure to show students the correct answer and explanation to clear up confusion.

Does this technology use computer vision?

- Self-driving cars
 - ↳ Yes. Self driving cars use cameras to perceive the surrounding environment. They classify things like stop signs, pedestrians, and road lines.
- Alexa and Siri
 - ↳ Explanation. No. These technologies use **voice recognition**, which is related to computer vision, but involves sound rather than images.
- Automatic doors
 - ↳ No. Automatic doors use sensors that track motion, but they do not capture and analyze or classify images.
- Phone face unlock
 - ↳ Yes. The phone captures an image of a person's face and categorizes it as either the owner of the phone or not.

exploring Teachable Machine | independent | 10-15 min

Distribute craft supplies for making a Teachable Machine model and direct students to the [Teachable Machine](#) website. Prompt students to make their own image classification model in Teachable Machine, either by using pictures from the internet or by taking pictures with a webcam.

If students can't decide what to make, suggest:

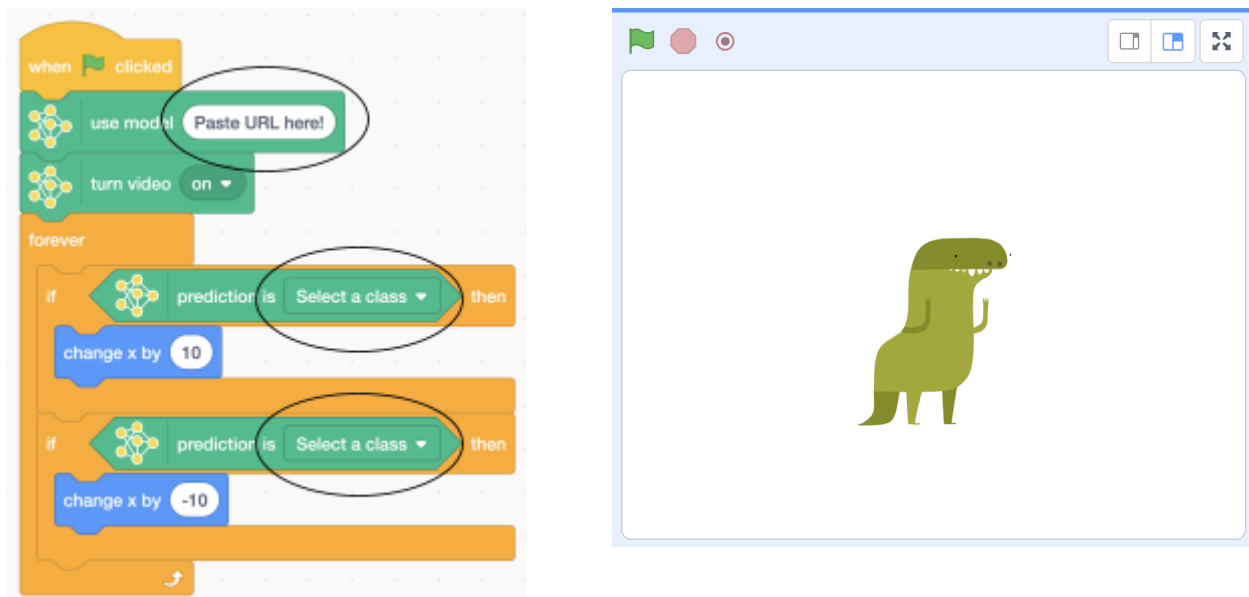
- Thumbs up vs. thumbs down
- Red vs. orange vs. yellow (using lots of different examples for each color)
- Hands in the air vs. hands to the side vs. hands down
- Books I've read vs. books I haven't read

facilitator note

A full guide for using Teachable Machine can be found in [this tutorial](#).

coding with an image classifier | independent | 20-25 min

Demonstrate to students the steps of importing a Teachable Machine model into the RAISE Playground, using this [template project](#).



Students should replace the circled components in their code to make the dinosaur move.

facilitator note

When a model is exported in Teachable Machine, none of the source data (i.e., the pictures students take) are visible to other users.

exit ticket | independent | 3-5 min

Prompt students to complete the exit ticket.