

Hour of AI Activity: Exploring Bias with a Wave Detector

Teacher Guide

Resources

- Student Worksheet
- Detailed Blog
- Educator Guided Course
- Video Tutorial: <u>Training a Machine</u>
 <u>Learning Model with CreateAl</u>



Overview

In this activity, students explore how machine learning models can reflect bias based on the data they are trained on. Using a micro:bit and the CreateAl platform, students will train a simple model to recognize hand gestures—such as waves—and observe how data limitations can affect a model's performance. Through discussion and experimentation, students will connect this experience to real-world examples of bias in Al systems.

Learning Objectives

- Understand that AI models learn from data and can reflect biases present in that data.
- Use micro:bit and CreateAI to train and test a machine learning model.
- Evaluate how training data impacts a model's fairness and accuracy.
- Reflect on human responsibility when creating and using AI systems.

Materials Needed

- micro:bit with battery pack and wrist strap (such as <u>CHARGE</u>)
- Access to <u>CreateAl</u>
- Computer or tablet with internet connection



Lesson Steps

- 1. Begin with a class discussion about waving. Ask students to wave and notice how each wave differs (right vs. left hand, big vs. small, fingers open or closed).
 - Encourage students to get creative: try a 'queen wave' or an 'ocean wave'
- Introduce the concept of bias in AI by explaining that AI models learn from data. If we only teach the model one kind of wave, it may not recognize others.
- 3. Have students connect their micro:bit to CreateAI and record at least three samples of their individual wave gesture.
- 4. Record two additional actions (e.g., thumbs up, resting hand) to help the model distinguish between gestures.
- 5. Click 'Train model' in CreateAI to generate the machine learning model.
- 6. Test the model by performing each gesture and observing the certainty scores.
 - Optional: Ask students to switch micro:bits and test their wave on a classmate's model - is CreateAl able to recognize the wave?
- 7. Discuss: Does the model correctly identify different kinds of waves? What happens if the wave differs from the training data?
- 8. Encourage students to add more diverse data (e.g., left-hand waves) and retrain their model to improve fairness and accuracy.
- 9. Optionally, open the model in MakeCode and use it to trigger LED or sound outputs when a wave or other action is detected.

Discussion & Reflection

- How accurate was your machine learning model? Was it able to detect a wave?
- What happened when you switched micro:bits with a classmate? Was your machine learning model biased towards your individual wave?



- If the machine learning model wasn't able to detect a classmate's wave, does that mean their wave didn't happen? Or is it not a real wave?
- If our wave detector can only accurately detect certain types of waves is that fair?
- How could you make your model more fair or accurate for all users?
- Why is it important to think critically about the output of the AI machine learning model?
- What responsibilities do humans have when creating AI models?

Extension Ideas

- Train a model to recognize sign language gestures or other helpful hand signals.
- Use a machine learning model to control a physical robot. (<u>Video</u> tutorial)
- Collect data from multiple students and compare how model performance changes with more diverse samples.
- Research examples of bias in facial recognition or voice recognition systems and discuss their real-world impacts.