# Introduction to Machine Learning

AI Model Development

**Time:** 60 mins

## Introduction

In this class, the student/s will learn to use teachable machine that can be trained to identify objects in the image.

## New Commands Introduced

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| ● Teachable machine | The model can be trained to predict the class of image detected. The trained model will tell the accuracy level of each prediction |
| ● np.set_printoptions() | determine the way floating point numbers, arrays and other NumPy objects are displayed. |
| ● load_model() | Loads the trained model |
| ● open() | Opens a file and returns the file as an object |
| ● np.asarray() | Normailize an array |
| ● model.predict() | Predicts the image |
| ● np.ragmax() | Accepts an array of numbers and returns the highest number in the array |

## Vocabulary

- The **train model** is a technique used to train different machine learning models.
- **TenserFlow** is a free and open-source software library for machine learning and artificial intelligence. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks.
- **Neural network** is a method in artificial intelligence that teaches computers to process data in a way that is inspired by the human brain.

## Learning Objectives

Student/s should be able to:

- ***Recall*** how to detect face mesh with landmarks and place image filters over it
- ***Demonstrate*** how the teachable machine works to train a prediction model.
- ***Explain*** the working of trained model to predict the objects in the video.

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# Activities

1. **Class Narrative:** *(2 mins)*
    - Brief the student/s that you can train an model to detect any object with enough data of that object and test it using different objects.

2. **Concept Introduction Activity:** *(5 mins)*
    - Let the student/s play the explore-activity to see how teachable machine works.
    - Using the slides, explain that the student/s will learn:
        - to train a model.
        - to load the model
        - to predict image classes.

3. **Activity 1: Train a Model** *(14 mins)*

    **Teacher Activity:** *(7 mins)*
    - Introduce the Kearas library and explain how to prediction is done.
    - Explain how to train a model using teachable machine.

      https://teachablemachine.withgoogle.com/train.

    - Explain how to test the model using sample images

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      **Student Activity:** *(7 mins)*

    - Guide the student/s to train a model using teachable machine.

4. **Activity 2: Load the Model** *(12 mins)*

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    **Teacher Activity:** *(6 mins)* .
    - Demonstrate how download the trained model, unzip the folder and copy it into the project folder.
    - Explain how to load the model, resize and normalize the images.

      **Student Activity:** *(6 mins)*

    - Guide the student/s to download the trained model, unzip it and copy in the project folder.

5. **Activity 3: Predict Image Classes** *(12 mins)*

**Teacher Activity:** *(6 mins)*

- Ask the students to observe how the prediction percentages change depending on the images.
- Demonstrate displaying the class with highest prediction and print out its name.

**Student Activity:** *(6 mins)*

- Guide the student/s to display the class with highest prediction and print out its name.

6. **Introduce the Post class project:** *(2 min)*
   - .Identify the traffic signs of stop, turn left and turn right using machine learning.

7. **Test and Summarize the class learnings:** *(5 mins)*
   - Check for understanding through quizzes and summarize learning after respective missions.
   - Summarize the overall class learning towards the end of the class.

8. **Additional activities:**
   - Encourage the student/s to use a model that plays the game named rock paper, scissors.
   - Encourage the student/s to use a model count the fingers that are held up.

9. **State the Next Class Objective:** *(1 min)*
   - In the next class, student/s will learn to prepare data for an age prediction AI tool.

# U.S. Standards:

CSTA: 2-AP-11, 2-AP-12, 2-AP-13, 2-AP-14, 2-AP-19

| **Links Table** | | |
|---|---|---|
| **Activity** | **Activity Name** | **Link** |
| Class Presentation | Introduction to Machine Learning | https://s3-whjr-curriculum-uploads.whjr.online/5e1c48b2-5348-44c7-8d68-88325b3bc286.html |
| Explore Activity | Introduction to Machine Learning | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS-BP |
| Teacher Activity 1 | Train a Model | https://teachablemachine.withgoogle.com/train/image |
| Teacher Reference: Teacher Activity 1 Solution | Train a Model: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-TAS |
| Student Activity 1 | Train a Model | https://teachablemachine.withgoogle.com/train/image |
| Teacher Reference: Student Activity 1 Solution | Train a Modell: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS |
| Teacher Activity 2 | Load the Model | https://github.com/Tynker-Computer-Vi |

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| | | sion/TNK-M10-PRO-C73-TAS-BP |
| Teacher Reference: Teacher Activity 2 Solution | Load the Model: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-TAS |
| Student Activity 2 | Load the Model | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS-BP |
| Teacher Reference: Student Activity 2 Solution | Load the Model: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS |
| Teacher Activity 3 | Predict Image Classes | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-TAS-BP |
| Teacher Reference: Teacher Activity 3 Solution | Predict Image Classes: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-TAS |
| Student Activity 3 | Predict Image Classes | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS-BP |
| Teacher Reference: Student Activity 3 Solution | Predict Image Classes: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS |
| Student's Additional Activity 1 | Rock, Paper, Scissors | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS-BP |
| Teacher Reference: Student's Additional Activity 1 Solution | Rock, Paper, Scissors: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS |
| Student's Additional Activity 2 | Count the Fingers | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS-BP |
| Teacher Reference: Student's Additional Activity 2 Solution | Count the Fingers: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-SAS |
| Post Class Project | Identify the traffic signs | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-PCP-BP |
| Teacher Reference: Post Class Project Solution | Identify the traffic signs: Solution | https://github.com/Tynker-Computer-Vision/TNK-M10-PRO-C73-PCP |