Teachable Machine vs YOLOv5

Performance Comparison in Object Detection

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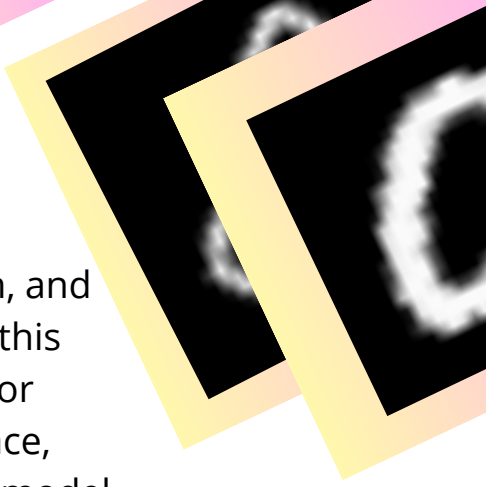


Introduction

Object detection is of utmost importance in computer vision, and Teachable Machine and YOLOv5 are two popular models in this field. Teachable Machine provides a user-friendly platform for training custom object detection models using a web interface, while YOLOv5 is an advanced state-of-the-art deep learning model known for its real-time detection capabilities. This report aims to compare their performance in object detection, considering factors such as accuracy, speed, and suitability for different applications. The following paragraphs will provide details on the datasets used, the comparison between the models, and the obtained results.

Data used

The datasets used in the comparison are as follows:

1. Google Teachable Machine:
    - Dataset: MNIST dataset
    - Description: The MNIST dataset consists of grayscale images of handwritten digits from 0 to 9. It was used to train a Teachable Machine image model specifically for recognizing numbers 0, 1, and 2.
2. YOLOv5:
    - Dataset: Cell images from the Roboflow website
    - Description: The dataset for YOLOv5 comprised images of cells captured under a microscope. These images were sourced from the Roboflow website and selected for training and evaluating the YOLOv5 object detection model.

It's important to note that the datasets used for Teachable Machine and YOLOv5 are different. Teachable Machine used the MNIST dataset for digit recognition, while YOLOv5 utilized a dataset of cell images for object detection.

Object Detection using Teachable machine Steps

To perform object detection using YOLOv5 and Roboflow, we followed these steps:

1.Collect and label the dataset: We used cells dataset from robflow that contain the objects we want to detect. We used a labeling tool to annotate the objects in the images with bounding boxes.

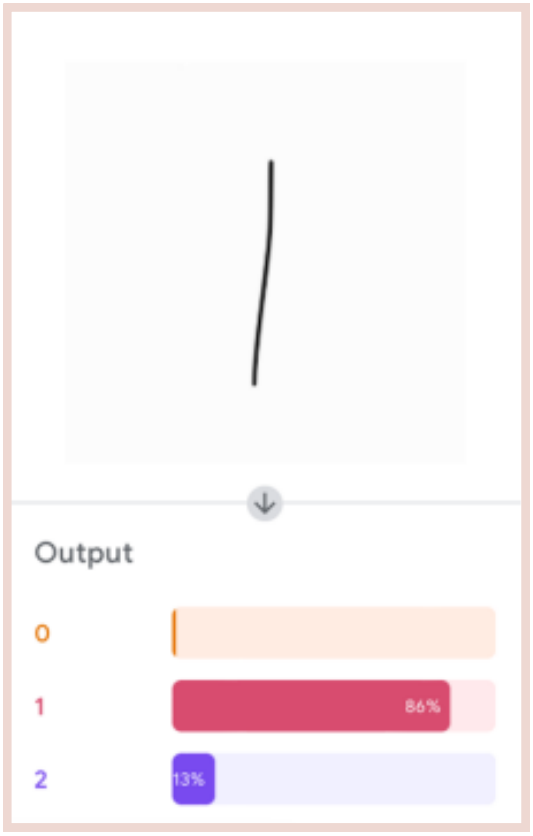
2. Preprocess the dataset: We used Roboflow to upload our labeled dataset and preprocess it.

3. Train the model: With our preprocessed dataset, we trained the YOLOv5 model using Roboflow. The training involved feeding the labeled images into the model and adjusting the model's parameters to optimize its performance.

4. Evaluate the model: Once the training is complete, we evaluated the model's performance using a separate test dataset.

Object Detection using Teachable machine Results

Results of training the Teachable machine model using its default settings:



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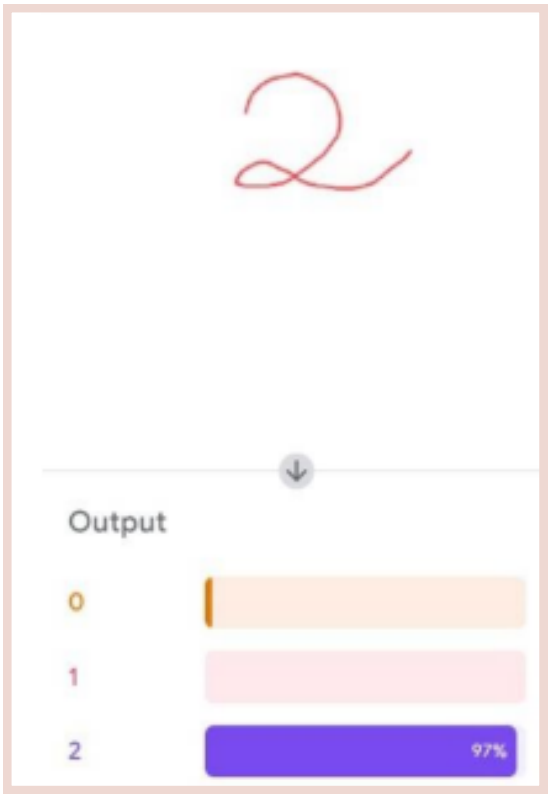

Object Detection using YOLOV5 and Roboflow Steps

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YOLOV5 Results

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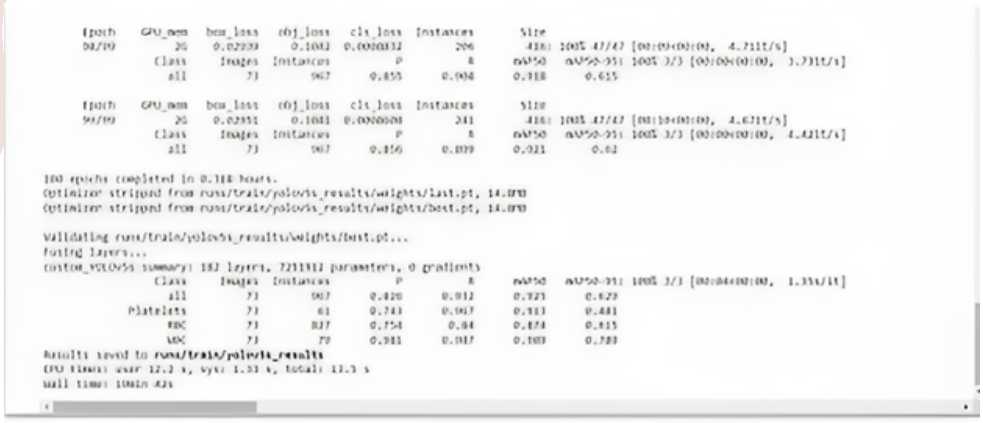
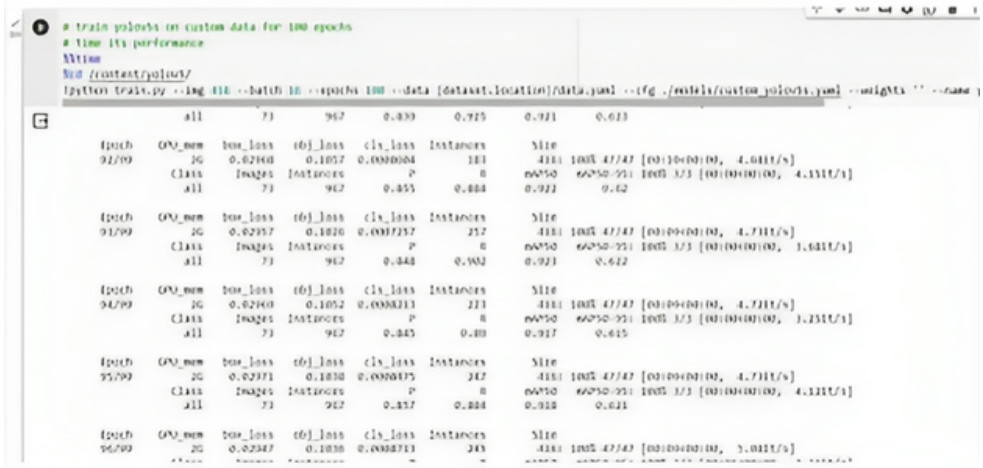
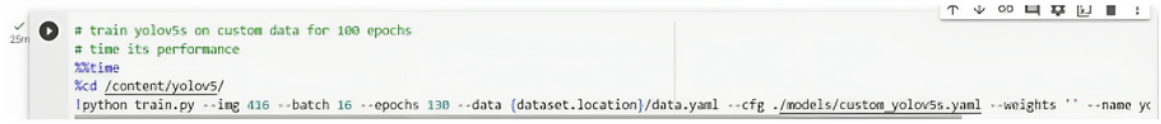
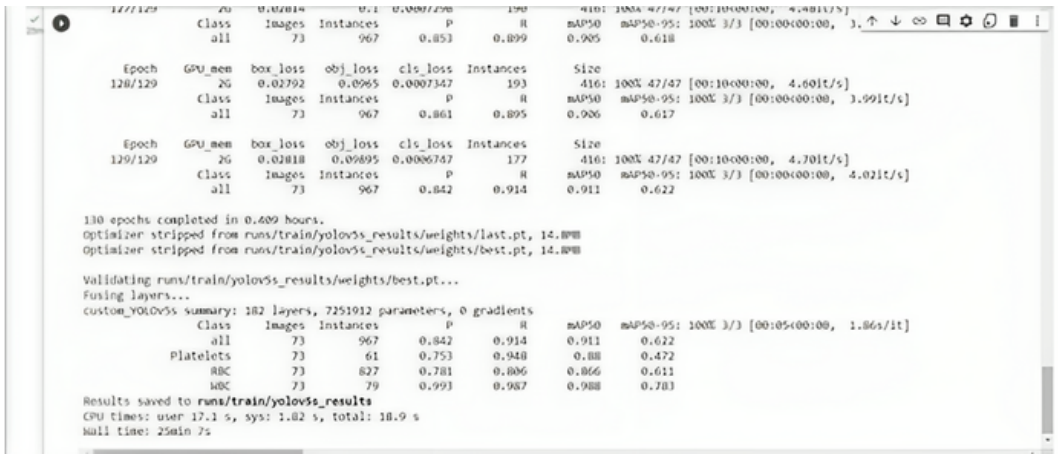




After changing the epochs



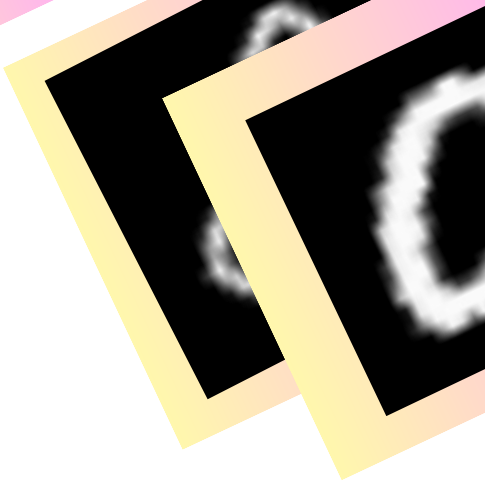


Comparison

	Teachable machine	YOLOV5
Approach	An online platform developed by Google. Allows users to train machine learning models using a simple drag-and-drop interface. It uses transfer learning techniques to train models quickly and easily.	An open-source deep learning framework developed by Ultralytics. Uses a single-stage object detection algorithm that divides the input image into a grid and predicts bounding boxes and class probabilities directly.
Performane	Has lower performance in object detection tasks. The accuracy of the models trained can vary depending on the complexity of the task and the amount of training data available.	Has higher performance in object detection tasks. Offers state-of-the-art accuracy and speed, making it suitable for real-time applications.
Customization	have limitations in terms of customization options compared to more advanced frameworks like YOLOv5	offers extensive customization options, allowing users to fine-tune various parameters. Enables users to optimize the model's performance for specific use cases.
Deployment	provides easy deployment options, including exporting trained models as TensorFlow.js or TensorFlow Lite formats for web or mobile applications.	supports deployment on various platforms, including desktop applications, web services, mobile devices, and edge devices.

Recommendations

we can say If you're looking for a quick and easy way to create simple image or sound classification models, Teachable Machine might be the better option. On the other hand, if you need more advanced object detection capabilities and are comfortable with the technical aspects of training and deploying models, YOLOv5 could be a better choice.



Conclusion

In conclusion, our team decided that YOLOv5 was the best model for object recognition and classification because of its effectiveness, precision in predictions, and manageable training duration. Because of YOLOv5's better performance and less training time than YOLOv8, it was decided to concentrate on it.