American Sign Language Detection using YOLOv7

```
This project aims to detect American Sign Language (ASL) gestures using
the YOLOv7 object detection model.

The application is built using Flask for the backend and integrates with
YOLOv7 for real-time and image-based ASL detection.
```

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Installation

Cloning the Repository

First, clone the YOLOv7 repository and install the required dependencies.

```
!git clone https://github.com/augmentedstartups/yolov7.git
%cd yolov7
!pip install -r requirements.txt
!pip install roboflow
```

Dataset

Downloading the Dataset

We will use Roboflow to download the ASL dataset.

```
from roboflow import Roboflow
rf = Roboflow(api_key="BwXJGIF4PyPURTjVcg0y")
project = rf.workspace("yolo-bkh56").project("signlanguage-hcsec")
dataset = project.version(3).download("yolov7")
```

Training

Downloading Pre-trained Weights

Download the pre-trained YOLOv7 weights.

```
wget
https://github.com/WongKinYiu/yolov7/releases/download/v0.1/yolov7.pt
```

Training the Model

Train the YOLOv7 model on the ASL dataset with 60 epochs.

Running the Application

Flask Application

The Flask application (`app.py`) handles image uploads and real-time detection.

Run the Flask application to start the server.

```
python app.py
```

Results

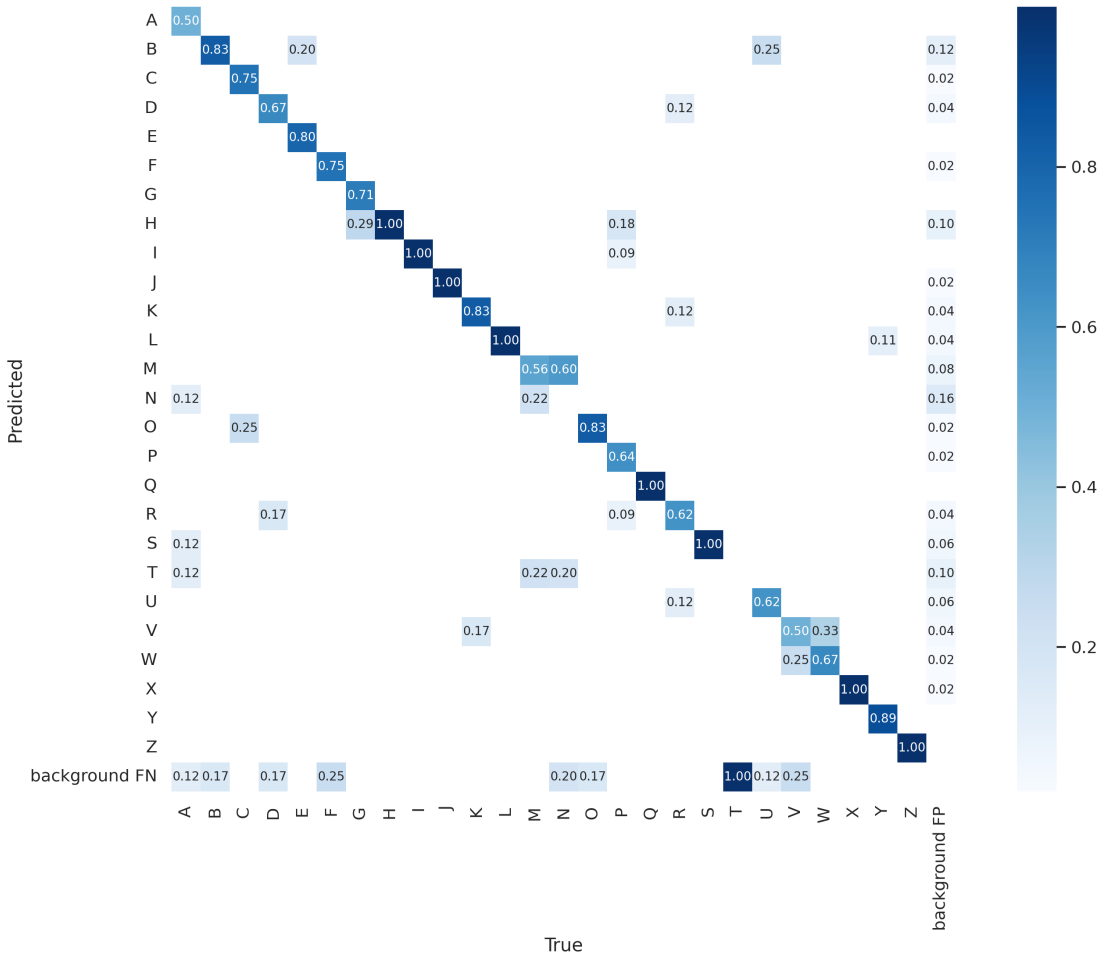
Evaluation Metrics

The model's performance is evaluated using F1 score, precision, and confusion matrix.

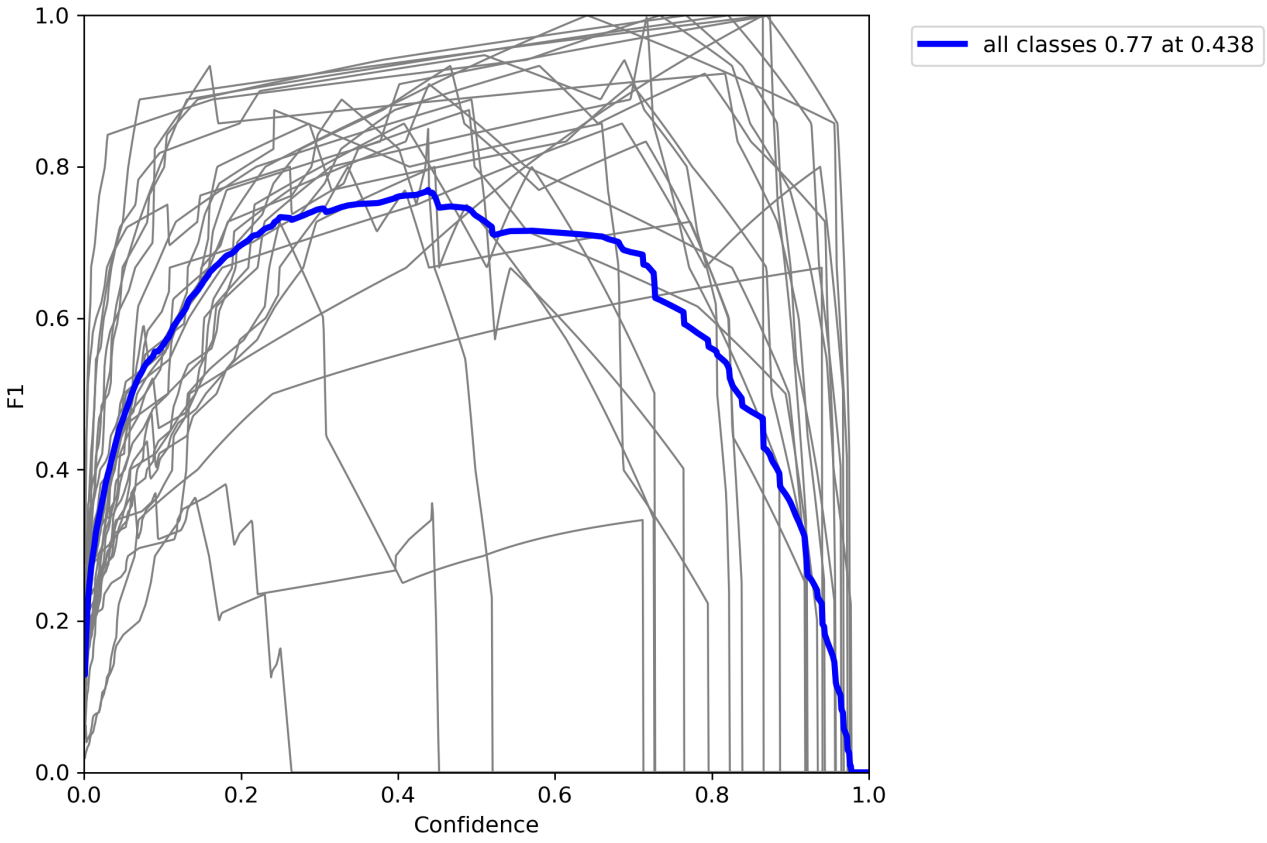
Testing the Model

Test the model on the ASL test images.

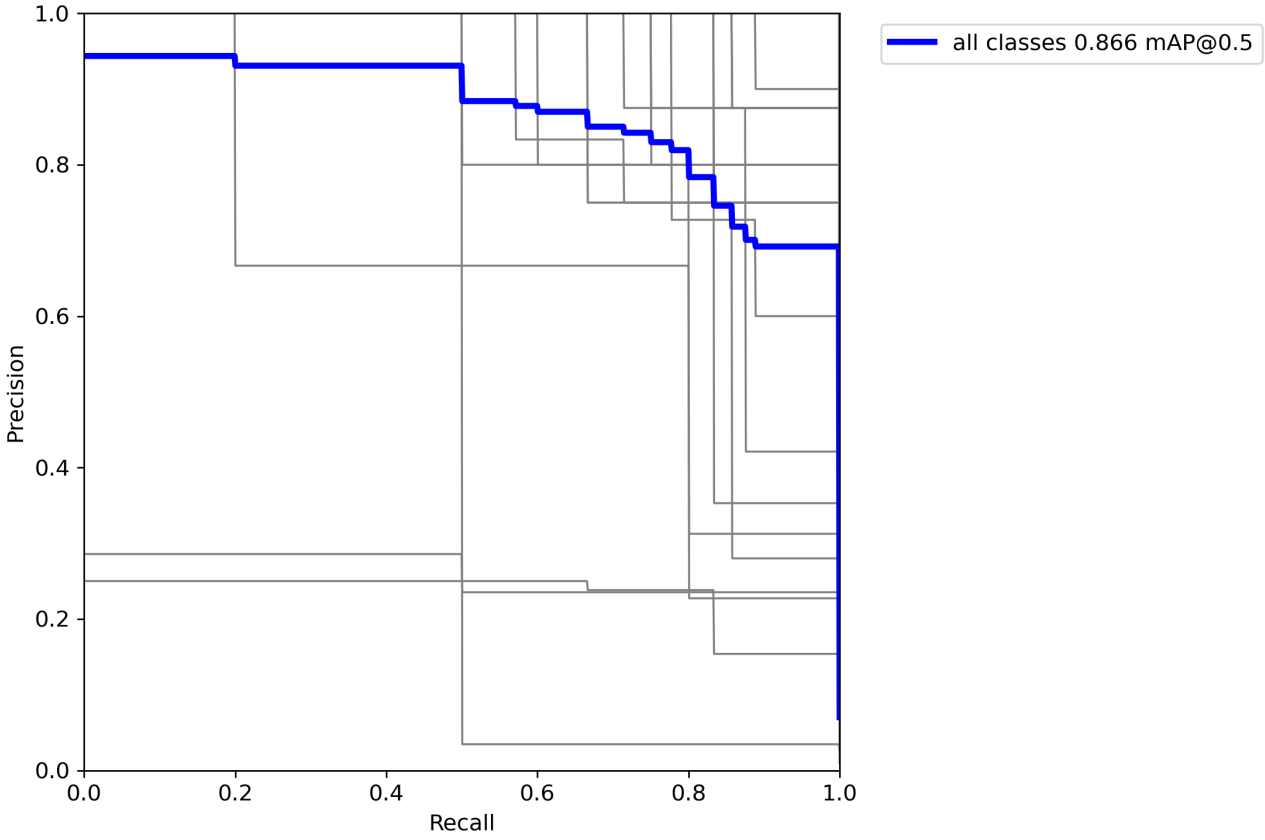
Confusion Matrix


Predicted
True
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z background FN
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z background FP
0.8
0.6
0.4
0.2

F1 Curve


all classes 0.77 at 0.438
F1
Confidence
0.0
0.2
0.4
0.6
0.8
1.0

PR Curve



Citations:

[1] https://github.com/augmentedstartups/yolov7.git

[2] https://github.com/WongKinYiu/yolov7/releases/download/v0.1/yolov7.pt