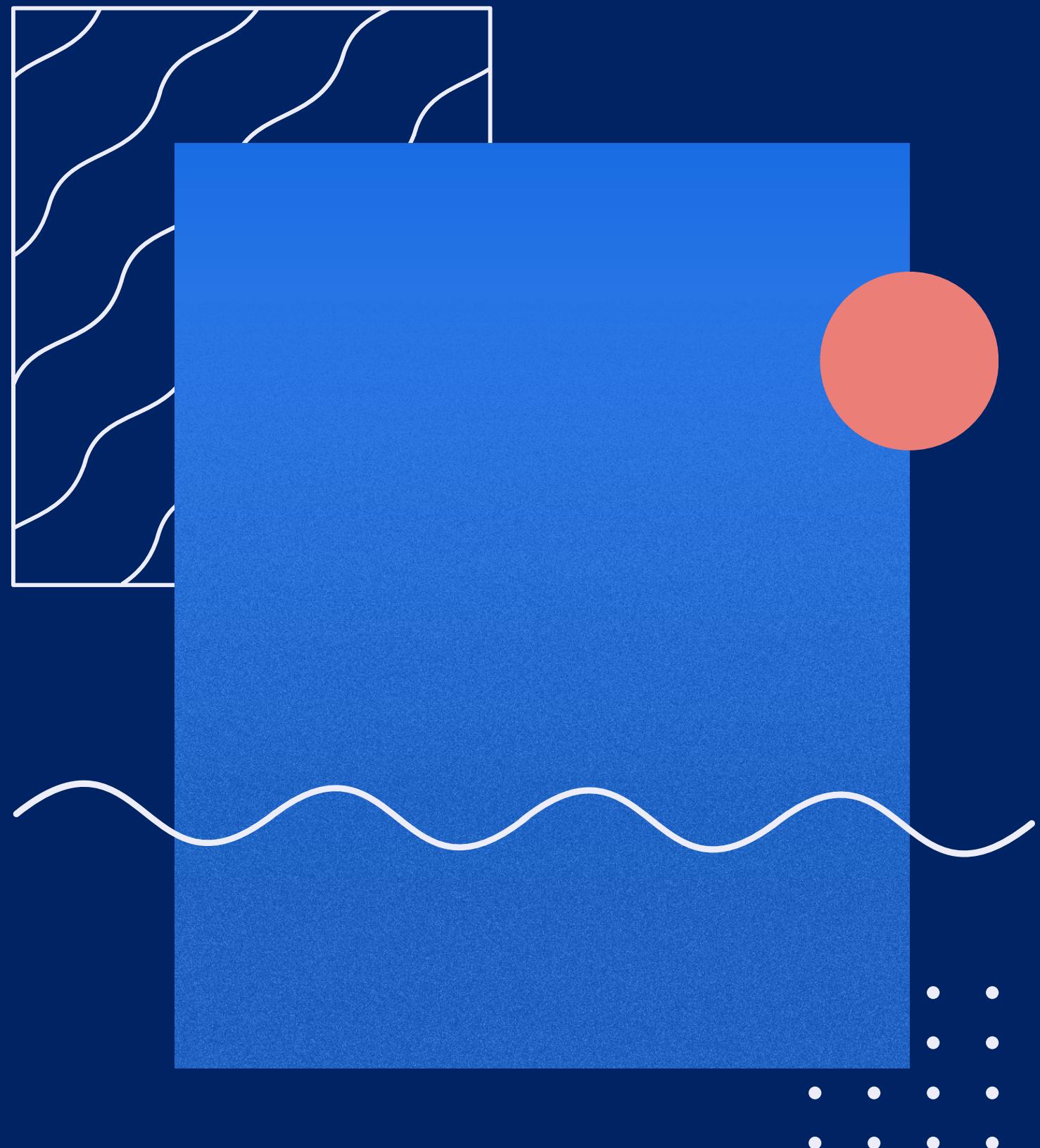


AUTOMATIC NUMBER PLATE RECOGNITION (ANPR)

22B0307 - YASH TOSHNIWAL
210260022 - SHUBHAM INGALE
210040048 - DHRUV PANDEY
210110004 - AARYAN SHINDE
200100103 - NAVEEN GOWDA



Objectives

- To make a system that can find and read the number plates of cars in pictures
- To think of how the system can be useful for different purposes, such as managing traffic, collecting tolls, keeping safe, and watching.

Model Details

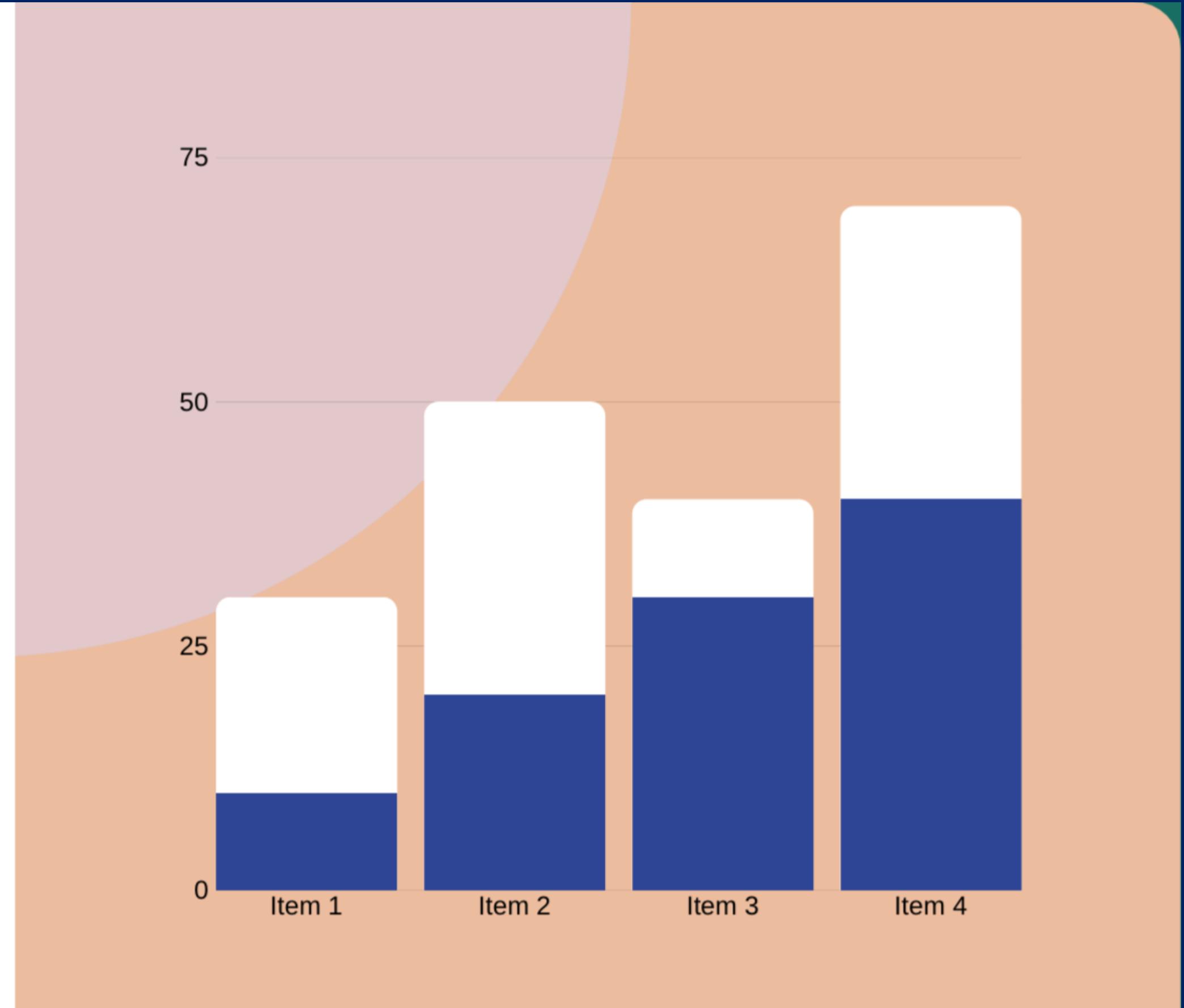
We have used Tensorflow Object Detection and EasyOCR

TensorFlow object detection is a framework that provides a collection of pre-trained models and tools for building, training, and deploying custom object detection systems

EasyOCR is a Python package that allows you to easily extract text from images and scanned documents using image processing and machine learning techniques

The model has been trained for 5000 steps. However, better performance can be achieved by training the model for longer (as the model has not overfit yet), albeit at the cost of greater runtime

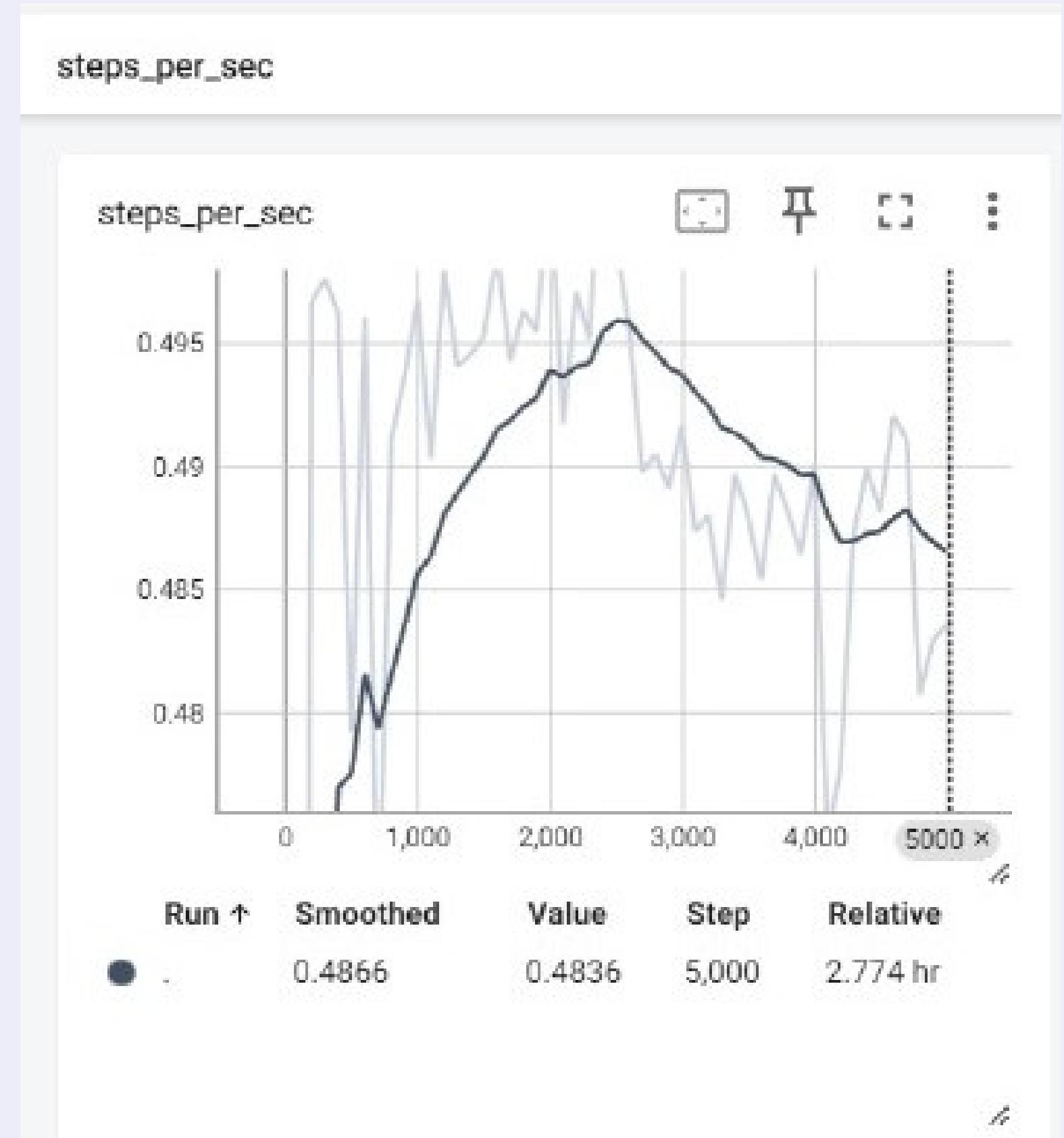
Model Testing and Training



Learning rate

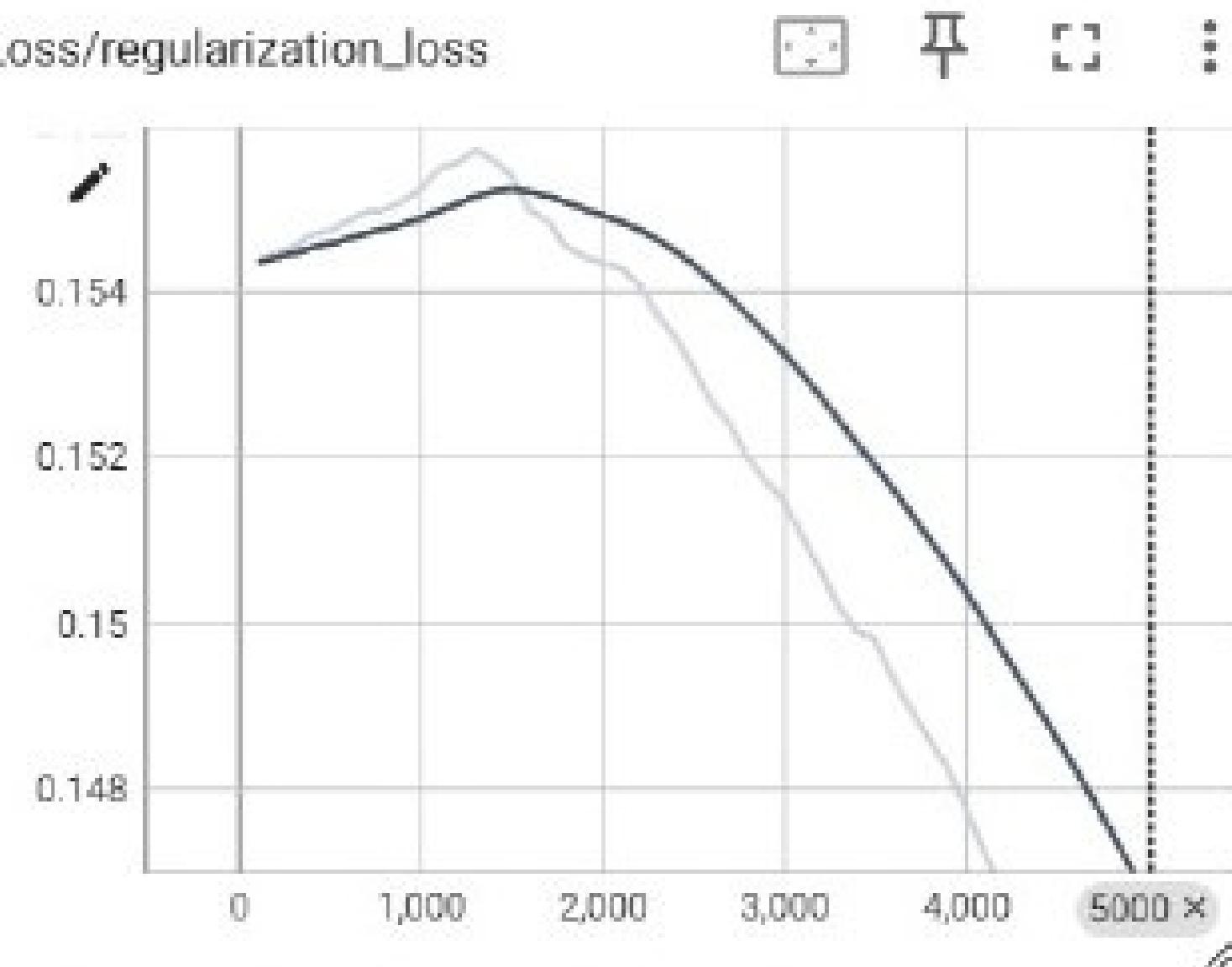


Steps per second



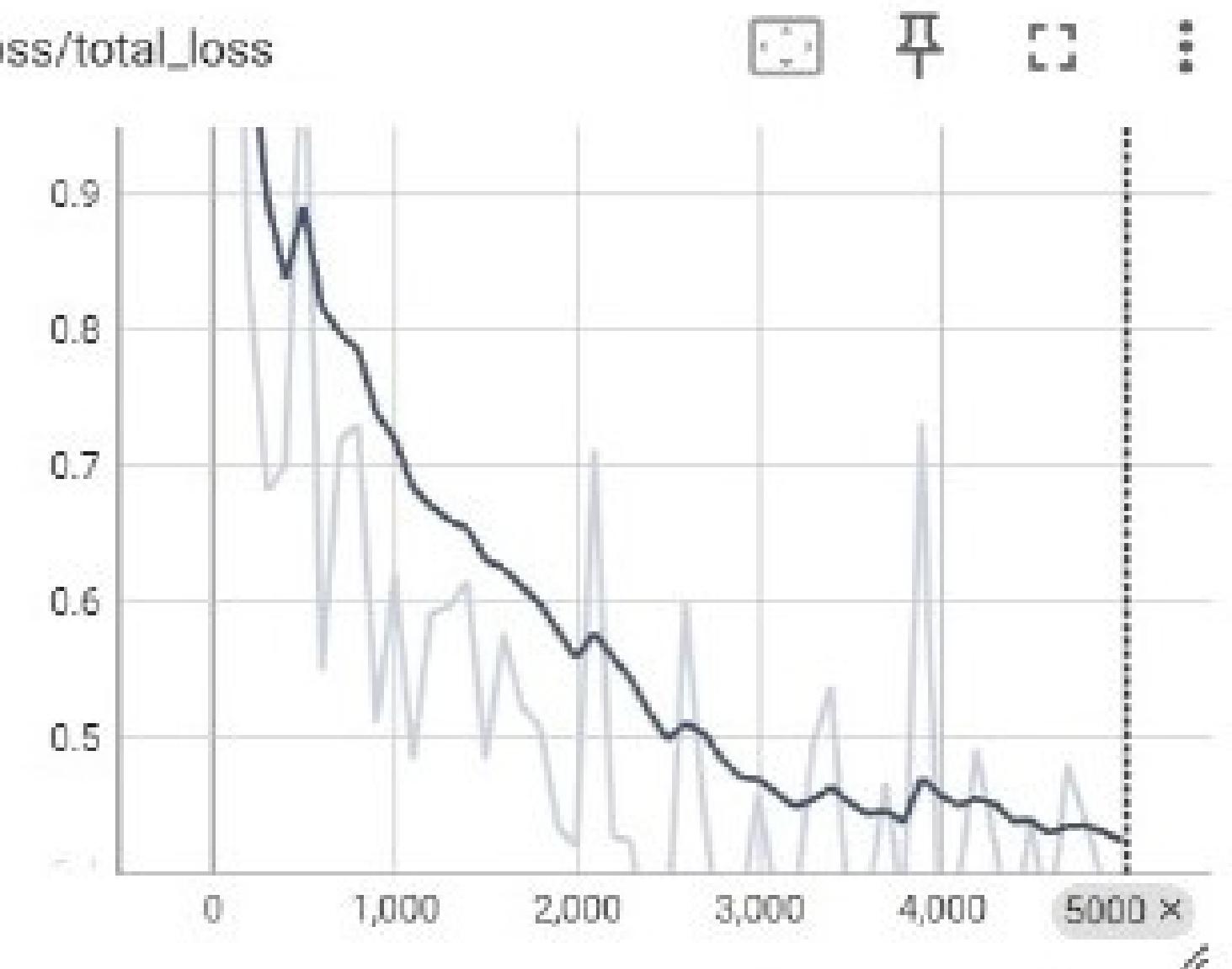
Regularization and Loss

Loss/regularization_loss



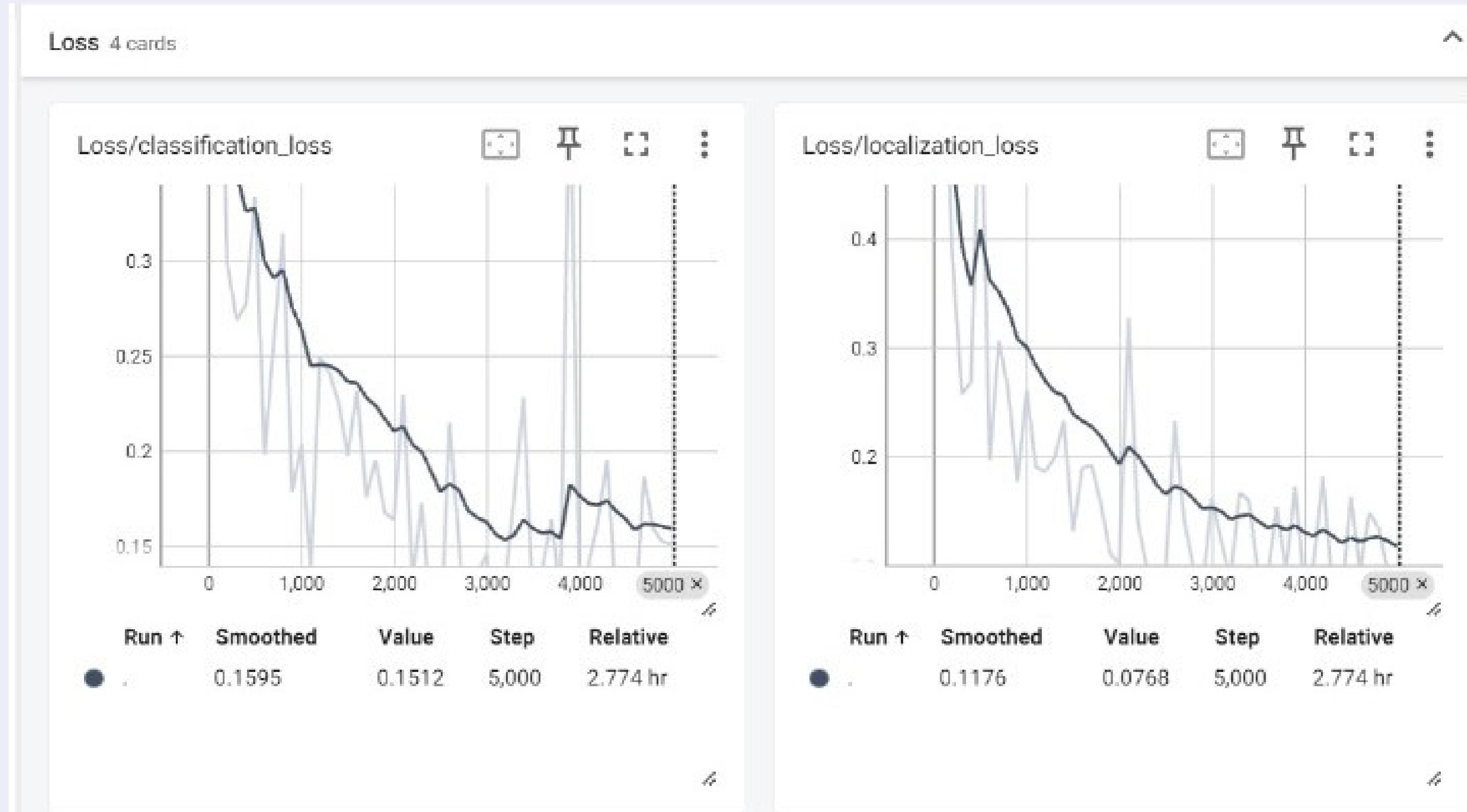
Run ↑	Smoothed	Value	Step	Relative
● .	0.1467	0.1435	5,000	2.774 hr

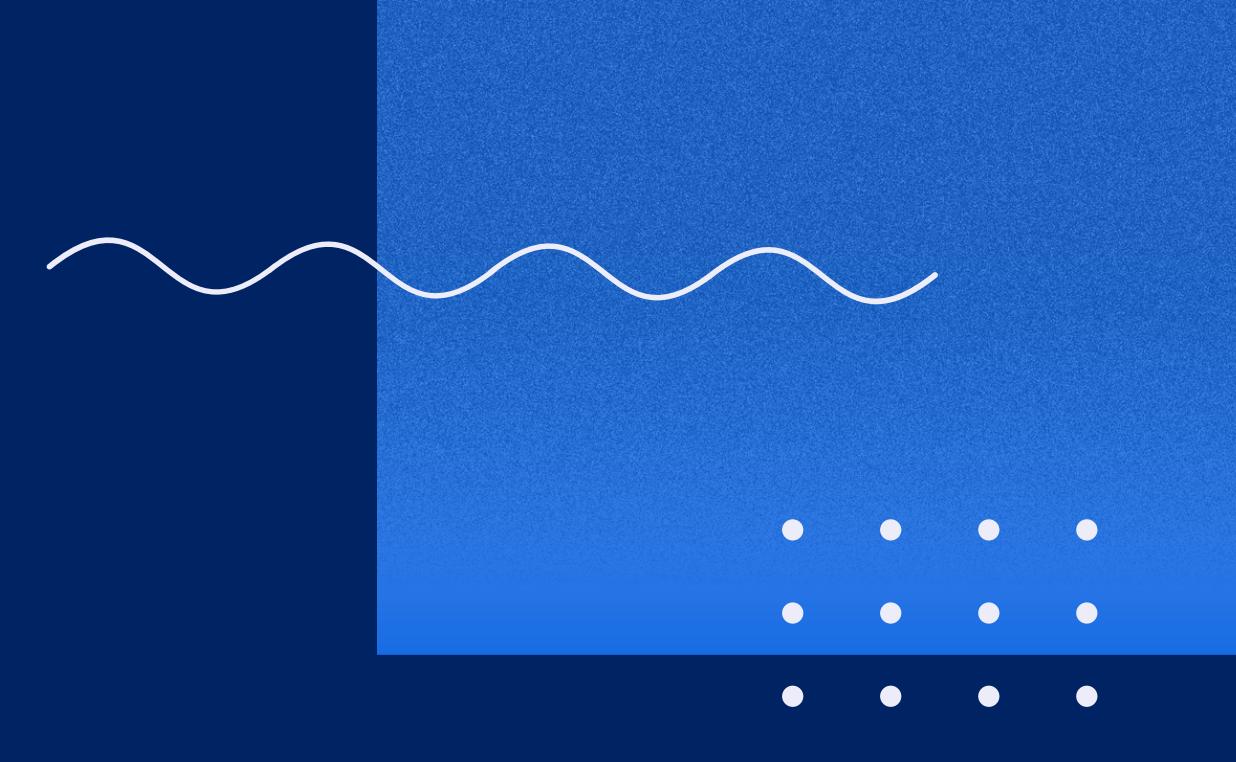
Loss/total_loss



Run ↑	Smoothed	Value	Step	Relative
● .	0.4238	0.3715	5,000	2.774 hr

LOSS





LETS APPLY THE
MODEL

USAGE GUIDE -

If you wish to train the model yourself -

1. Start running the cells from the top in the ‘Training.ipynb’ Jupyter notebook until you reach this cell -

```
# this is to download the dataset directly from kaggle without going through the hassle of downloading the archive and then
# uploading it
# However, the user will have to enter his/her Kaggle credentials to download the datasets
# These are my Kaggle credentials -
# {"username":"dhruvp2003","key":"ed9d209999600b4b5563eea3c6f7e47c"}
# only write the part within the inverted commas into the dialog box. These should work fine.
# If they do not, then you will have to enter your own Kaggle API credentials
import opendatasets
opendatasets.download(r"https://www.kaggle.com/datasets/andrewmvd/car-plate-detection")
```

2. Now enter the details for the Kaggle API that I have mentioned in the cell itself. This is to download the dataset without going through the hassle of manually uploading the data.

3. Now keep on running the subsequent cells until you reach the model training part. This section is a bit involved. Go to - ‘usr/local/lib/python3.10/dist-packages/tf_slim/data/tfexample_decoder.py’ and replace ‘control_flow_ops’ with tensorflow. Do not forget to import TensorFlow at the beginning of this file.

MODEL EVALUTION USING REAL-TIME DATA

Without using Gradio -

Open the ‘Testing.ipynb’ Jupyter notebook

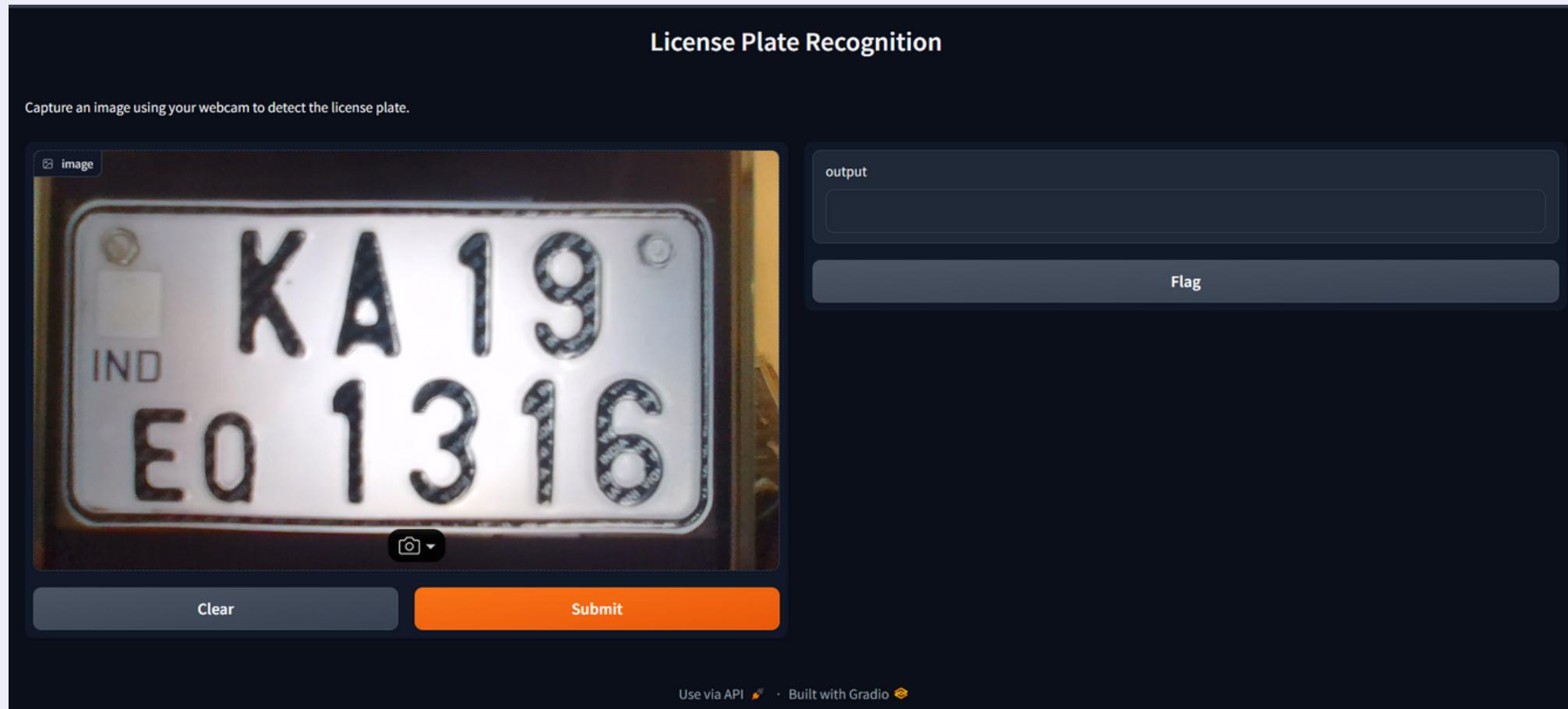
1. First, you will need to run all the cells starting from the top. I advise you to use hardware acceleration for this as the models used here benefit a lot from GPUs.
2. When you reach this cell where I have mentioned that we need to load the weights for the model (as training takes about 5-6 hours), copy the checkpoint files to the directory mentioned in the notebook. I have written the detailed instructions in the notebook itself.
3. Now you need to run the code segment that opens up the webcam. Run that cell and click a picture of a license plate by pressing ‘capture’. Now, run the cell just below it to get the predictions.

I advise you to use this approach as working with image data in Gradio produces a lot of errors and is not guaranteed to work (Sometimes Gradio won't even install and you will have to create a new notebook and copy over all the code written in this notebook)

WITH GRADIO

The process is exactly the same as mentioned previously. However, for this, instead of running the code segment under the ‘without Gradio’ heading, run the cells under the ‘with Gradio’ heading. I must remind you that it is entirely possible that Gradio does not install and throws some error. in such a case, create a new notebook and copy over all this code to that new notebook

GUI SCREENSHOTS



THANK YOU