Keeping you on track

AUTO SENSE

The Hanuman Horde

PROBLEM STATEMENT

The challenge of automatically identifying categorizing road types

APPROACH

OBJECT DECTECTION

Object detection is the process of finding instances of objects in images

SEMANTIC SEGMENTATION

Semantic segmentation is a deep learning algorithm that associates a label or category with every pixel in an image.

IDEATION

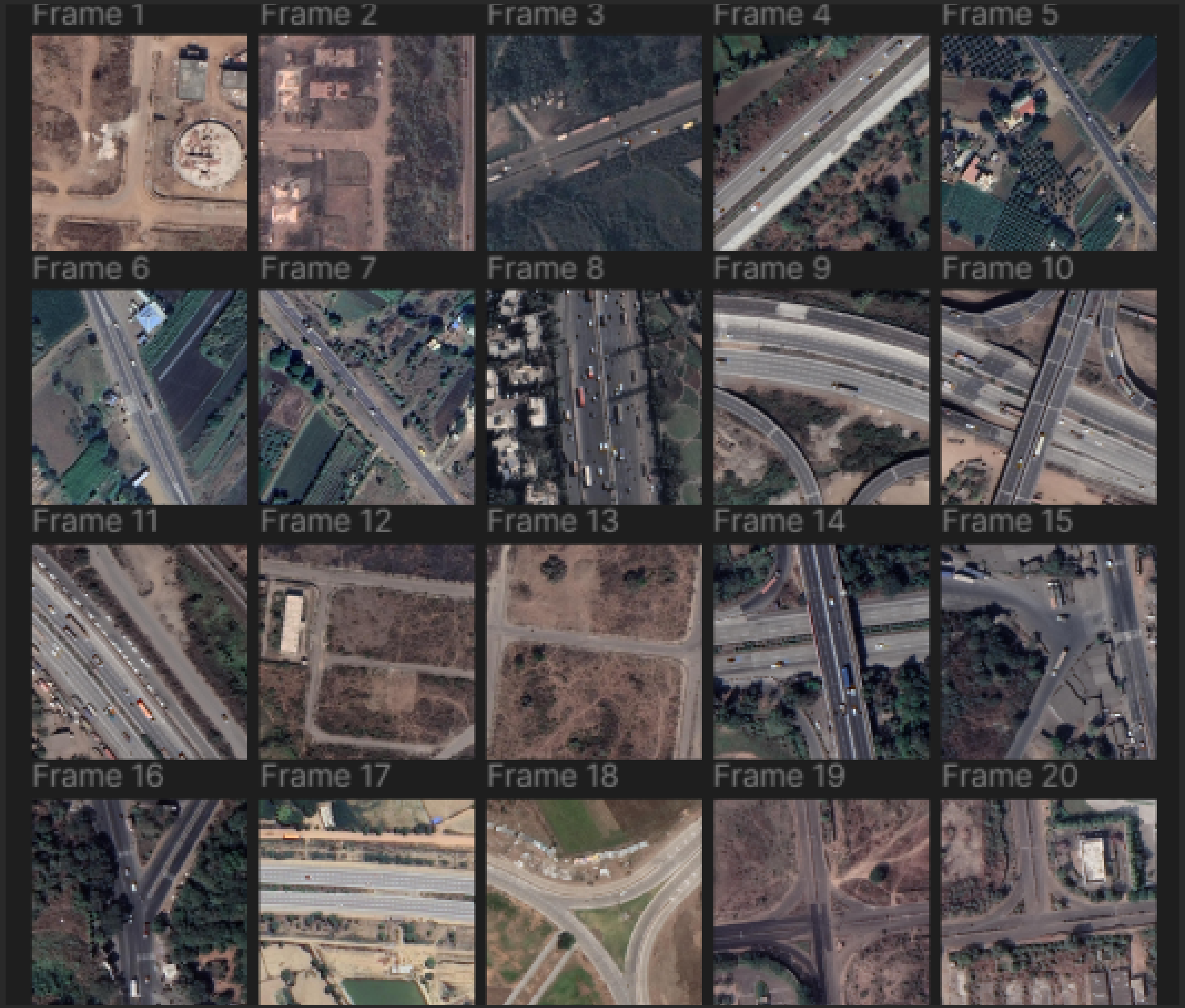
Creation of dataset

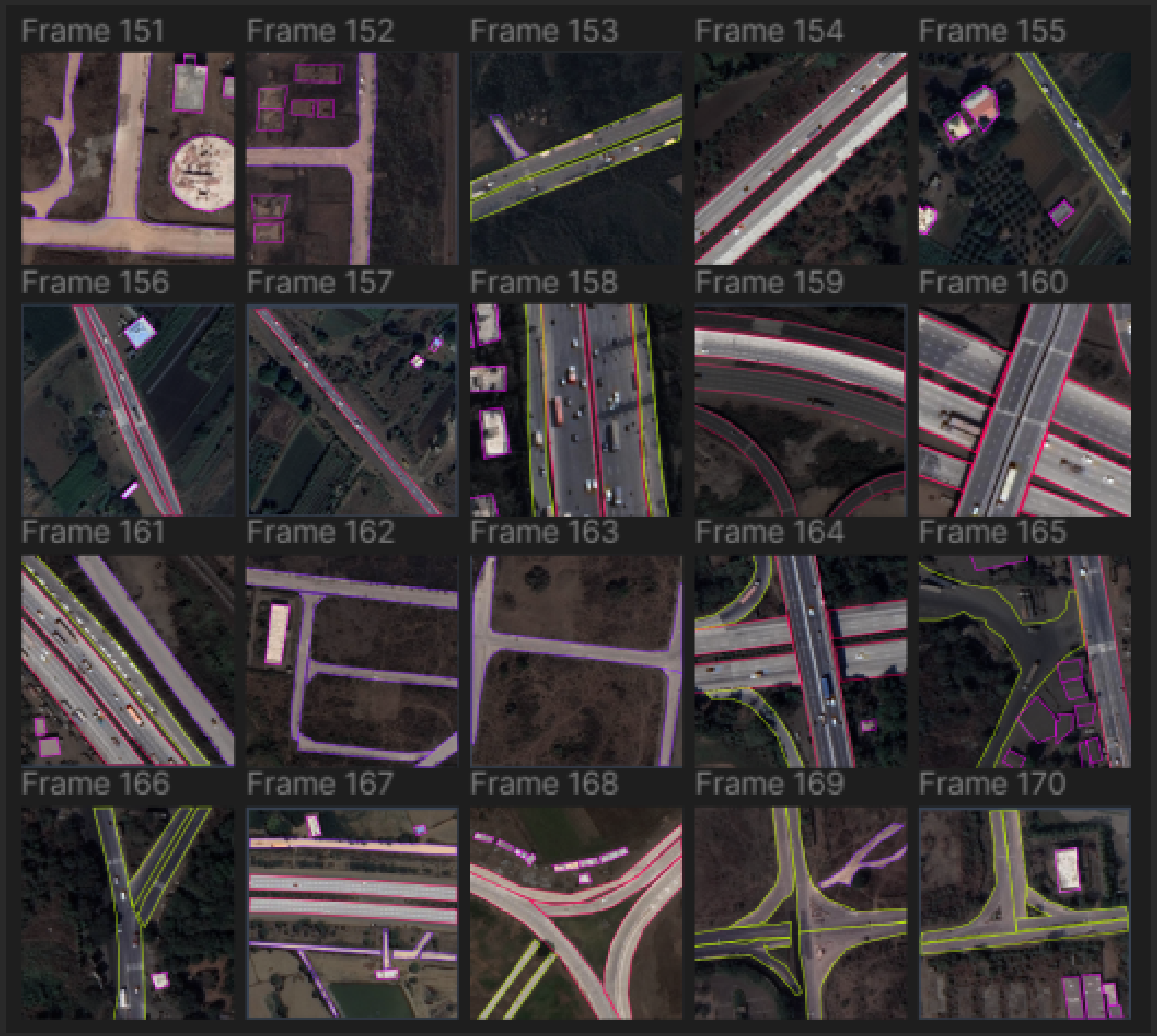
Creation of model

Conversion to genetic API

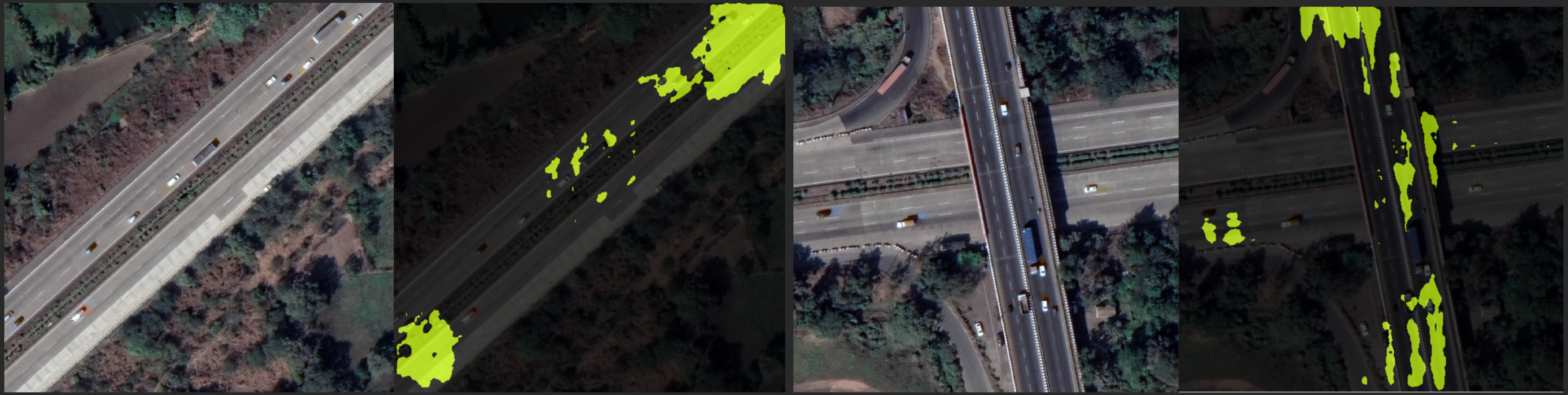
Implementation on Web App

DATASET FOR THE ROAD DETECTION SYSTEM

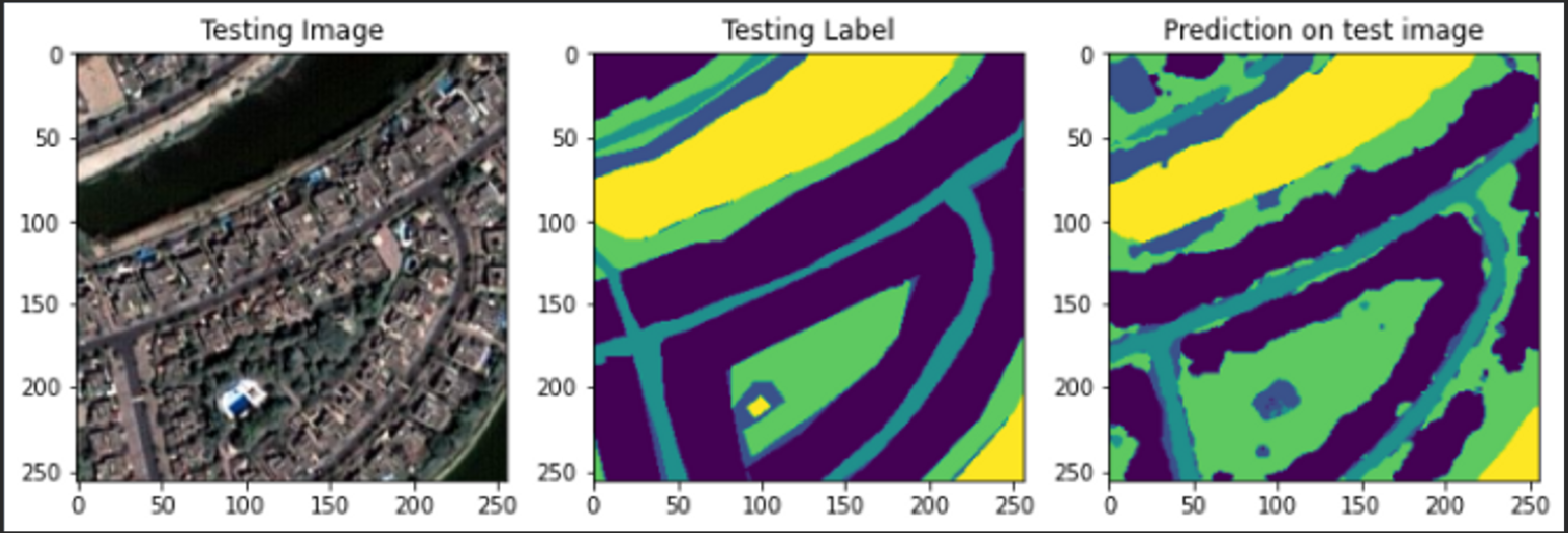




First Outcome from Collected Dataset



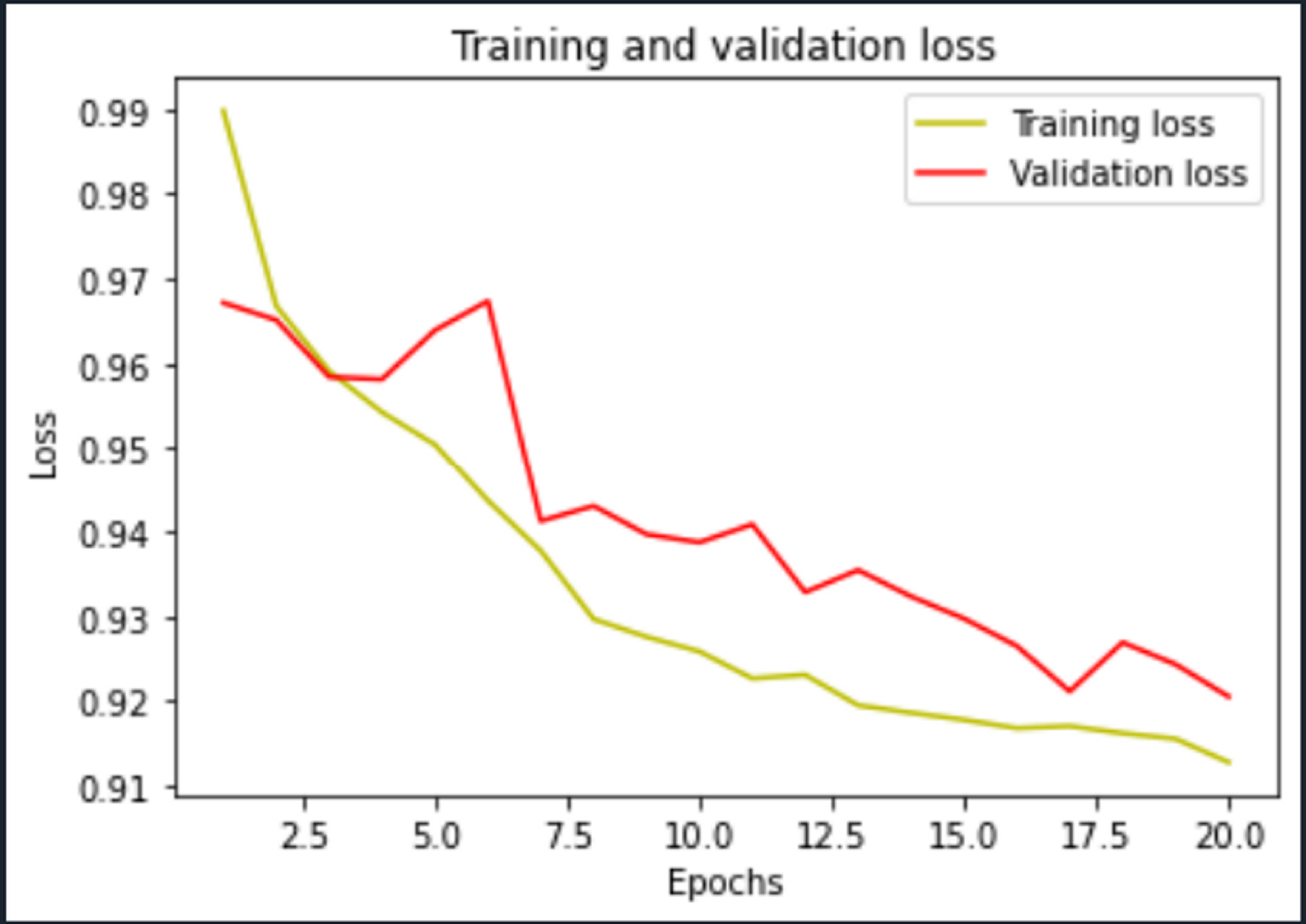
Outcome on Test for U-net Model

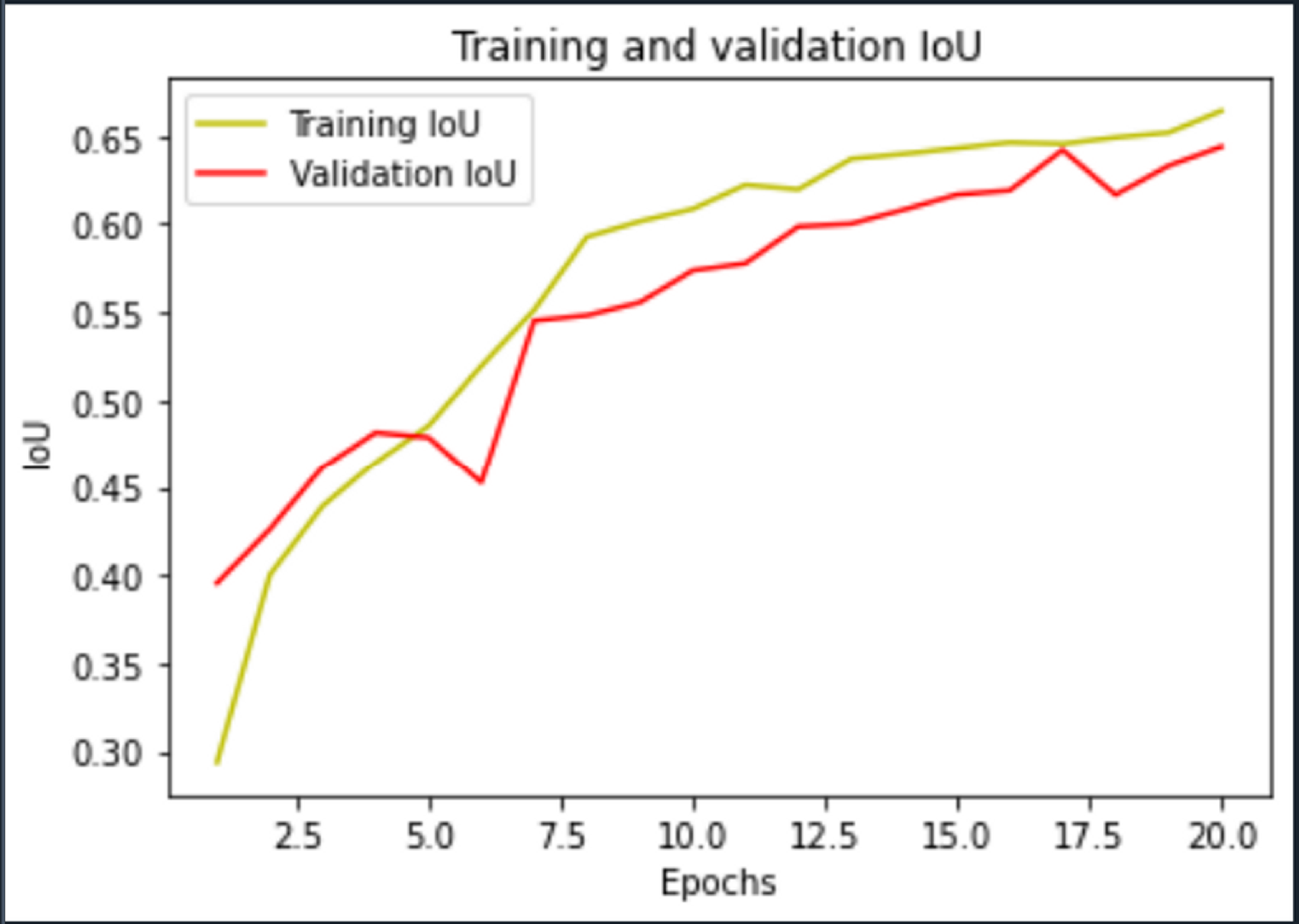


Epoch Training Results

```
                    shuffle=False)
Epoch 1/20
66/66 [==============================] - 327s 5s/step - loss: 0.9898 - accuracy: 0.5693 - jacard_coef: 0.2937
- val_loss: 0.9672 - val_accuracy: 0.6688 - val_jacard_coef: 0.3954
Epoch 2/20
66/66 [==============================] - 332s 5s/step - loss: 0.9668 - accuracy: 0.6658 - jacard_coef: 0.4001
- val_loss: 0.9651 - val_accuracy: 0.6755 - val_jacard_coef: 0.4260
Epoch 3/20
66/66 [==============================] - 338s 5s/step - loss: 0.9591 - accuracy: 0.6988 - jacard_coef: 0.4392
- val_loss: 0.9584 - val_accuracy: 0.7082 - val_jacard_coef: 0.4616
Epoch 4/20
66/66 [==============================] - 325s 5s/step - loss: 0.9543 - accuracy: 0.7167 - jacard_coef: 0.4644
- val_loss: 0.9582 - val_accuracy: 0.7200 - val_jacard_coef: 0.4817
Epoch 5/20
66/66 [==============================] - 360s 5s/step - loss: 0.9505 - accuracy: 0.7328 - jacard_coef: 0.4854
- val_loss: 0.9639 - val_accuracy: 0.7014 - val_jacard_coef: 0.4789
Epoch 6/20
66/66 [==============================] - 335s 5s/step - loss: 0.9436 - accuracy: 0.7542 - jacard_coef: 0.5196
- val_loss: 0.9674 - val_accuracy: 0.6823 - val_jacard_coef: 0.4526
Epoch 7/20
66/66 [==============================] - 329s 5s/step - loss: 0.9377 - accuracy: 0.7734 - jacard_coef: 0.5513
- val_loss: 0.9412 - val_accuracy: 0.7611 - val_jacard_coef: 0.5452
Epoch 8/20
66/66 [==============================] - 337s 5s/step - loss: 0.9297 - accuracy: 0.7993 - jacard_coef: 0.5928
- val_loss: 0.9430 - val_accuracy: 0.7560 - val_jacard_coef: 0.5482
Epoch 9/20
66/66 [==============================] - 320s 5s/step - loss: 0.9276 - accuracy: 0.8043 - jacard_coef: 0.6015
- val_loss: 0.9397 - val_accuracy: 0.7654 - val_jacard_coef: 0.5556
Epoch 10/20
66/66 [==============================] - 332s 5s/step - loss: 0.9259 - accuracy: 0.8084 - jacard_coef: 0.6086
- val_loss: 0.9387 - val_accuracy: 0.7691 - val_jacard_coef: 0.5737
Epoch 11/20
66/66 [==============================] - 332s 5s/step - loss: 0.9227 - accuracy: 0.8160 - jacard_coef: 0.6223
- val_loss: 0.9408 - val_accuracy: 0.7661 - val_jacard_coef: 0.5778
Epoch 12/20
66/66 [==============================] - 320s 5s/step - loss: 0.9231 - accuracy: 0.8146 - jacard_coef: 0.6197
- val_loss: 0.9328 - val_accuracy: 0.7863 - val_jacard_coef: 0.5986
Epoch 13/20
66/66 [==============================] - 331s 5s/step - loss: 0.9195 - accuracy: 0.8247 - jacard_coef: 0.6370
- val_loss: 0.9354 - val_accuracy: 0.7851 - val_jacard_coef: 0.6002
Epoch 14/20
66/66 [==============================] - 322s 5s/step - loss: 0.9186 - accuracy: 0.8264 - jacard_coef: 0.6399
- val_loss: 0.9323 - val_accuracy: 0.7912 - val_jacard_coef: 0.6082
Epoch 15/20
66/66 [==============================] - 327s 5s/step - loss: 0.9178 - accuracy: 0.8279 - jacard_coef: 0.6430
```

Training and Validation Loss and IoU Curves





MODEL USED FOR ROAD DETECTION SYSTEM

The main idea is to supplement a usual contracting network by successive layers, where pooling operations are replaced by upsampling operators. Hence these layers increase the resolution of the output. A successive convolutional layer can then learn to assemble a precise output based on this information.
One important modification in U-Net is that there are a large number of feature channels in the upsampling part, which allow the network to propagate context information to higher resolution layers. As a consequence, the expansive path is more or less symmetric to the contracting part, and yields a u-shaped architecture.

IMPLEMENTATION ON WEB APP

BUSINESS PROSPECTIVE

Autonomous vehicles:

A road detection system can help self-driving cars navigate roads safely and efficiently by identifying lane markings, road signs, and other important features of the road

Transportation and logistics

It can also be used to optimize transportation and logistics operations, such as route planning, delivery scheduling, and fleet management.

Infrastructure maintenance:

can also be used for infrastructure maintenance, such as identifying potholes, cracks, and other damage to roads.

TEAM

Swastik Attavar

Yash Shah

Harshit Nigam

Siddhartha Trivedi

Rishit Choudhury

THANK YOU