# Helmet and License Plate Detection

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# Content

# Objectives

- Detect Helmets
- Detect license plates
- Automatic extraction of  license plates in those without helmet

## Task completed before

- Data Collection
- Data Annotation and pre-processing
- Character Segmentation
- OCR model using CNN

Task completed before

# Data Collection

- Around 100 recordings of CCTV footage was obtained from Jawalakhel Police Department.

Task completed before

# Data annotation and processing

- Extracting frames from videos
- Annotation with bounding boxes using roboflow
- Data augmentation
- 2,827 images and  annotations were done for the license plate class

# Dataset Pre-Processing

Task completed before

# Character Segmentation

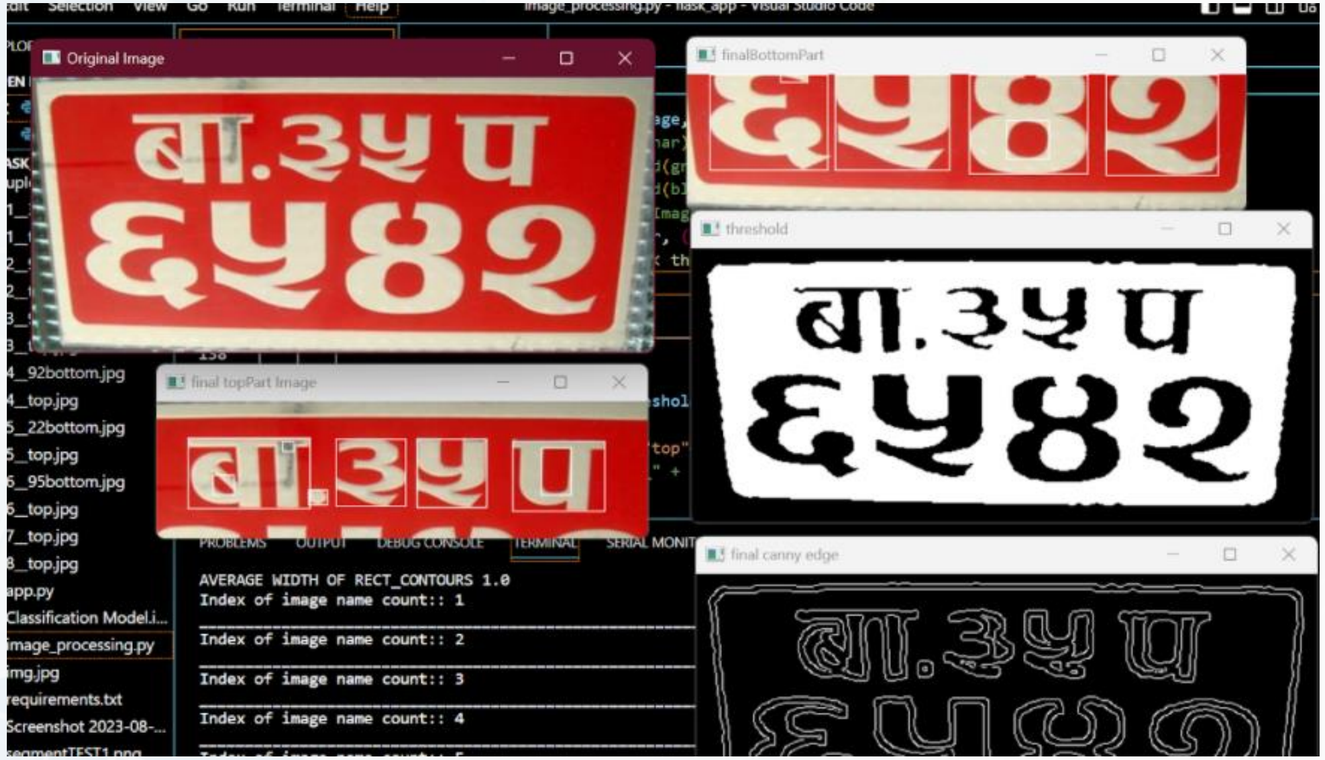
# Done using OpenCV

Task completed before

# License plate character recognition(OCR)

- Dataset includes 2033 images labeled from 0 to pa.
- Done using CNN (Classification model)

# Task completed before




## Task completed now

- Improvised Dataset (manual collection)
- License plate detection  (yolov8)
- Helmet detection (yolov8)
- Improvised character segmentation(yolov8)
- Improvised Character recognition(yolov8 labels)
- Integration of detection,segmentation and recognition

Task completed

# Improvised Dataset (manual collection)

using only CCTV footage did not add versitality in the dataset so manual collection was done throughout kathmandu valley using Canon DSLR camera

Task completed

# License plate detection (yolov8)

License plate Dataset was fed into  yolov8 for detection

train set 1983 images

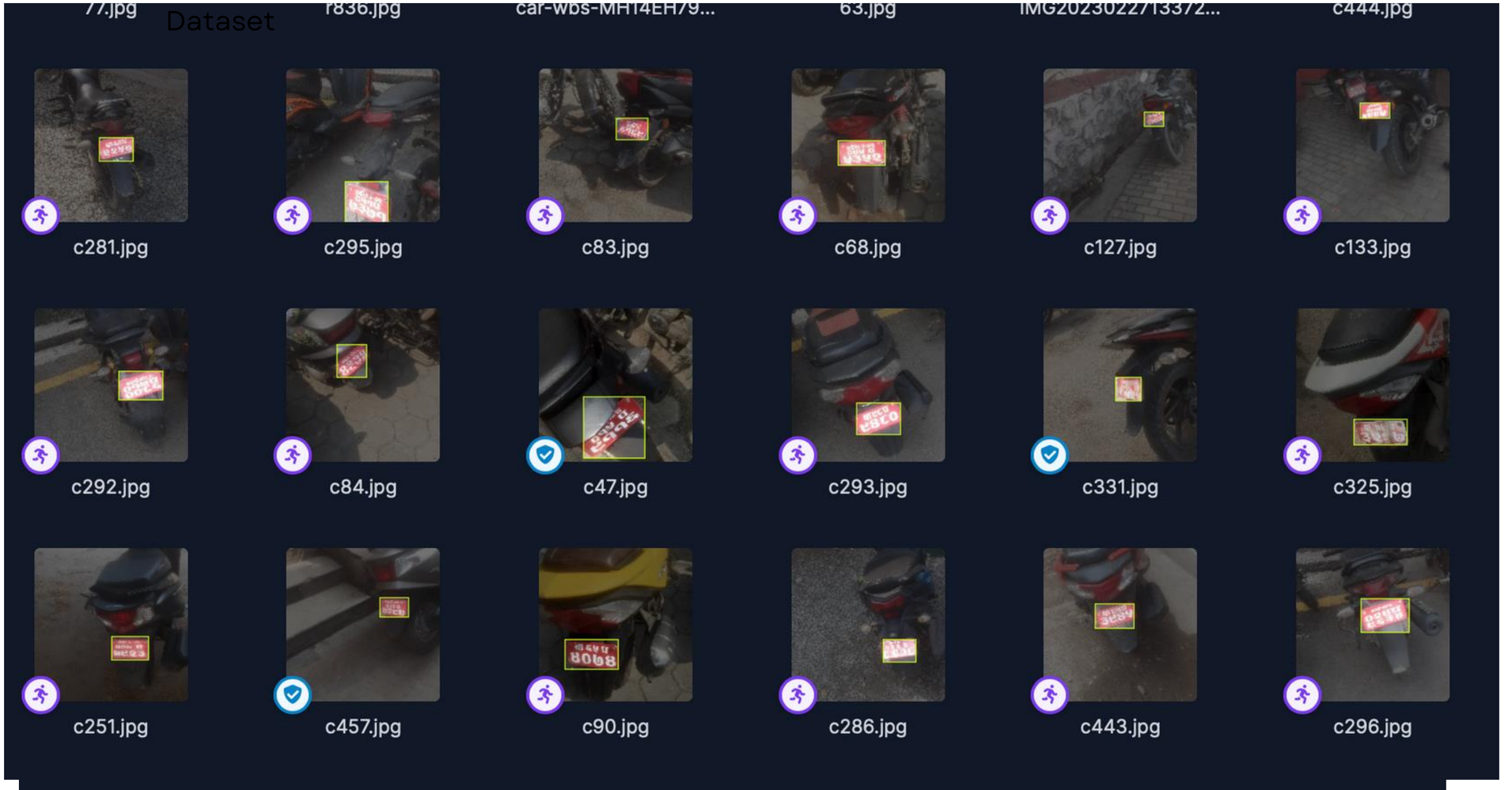
valid set 588 images

test set 286 images

trained for 100 epochs

training was stopped when no further decrease in loss was observed

License plate Dataset




**Dataset Split**

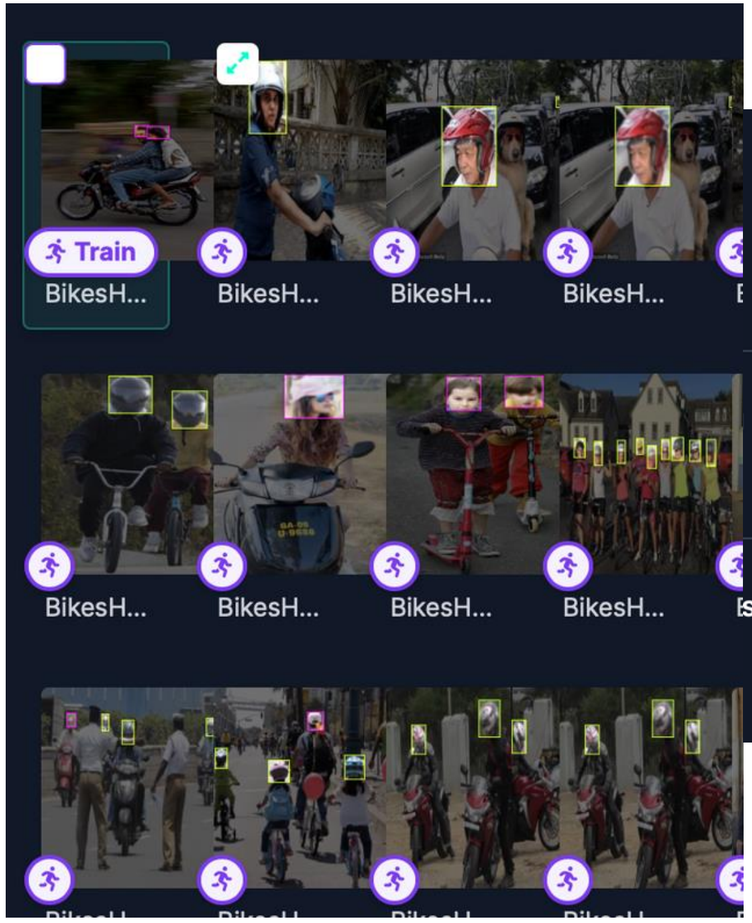
| TRAIN SET | VALID SET | TEST SET |
|---|---|---|
| 70% | 20% | 10% |
| 1983 Images | 558 Images | 286 Images |

Task completed

# Helmet detection

Helmet detection (yolov8)
Helmet Dataset was fed into yolov8 for detection

train set 1722 images
valid set 125 images
test set 125 images
trained for 110 epochs
auto-orient and horizontal flip were applied




| TRAIN SET | VALID SET | TEST SET |
|---|---|---|
| 87% | 6% | 6% |
| **1722** Images | **125** Images | **125** Images |

**Auto-Orient:** Applied
**Resize:** Stretch to 640x640

Outputs per training example: 3
**Flip:** Horizontal

data.yaml

```
names:
- With Helmet
- Without Helmet
```

Task completed

# Improvised character segmentation(yolov8)

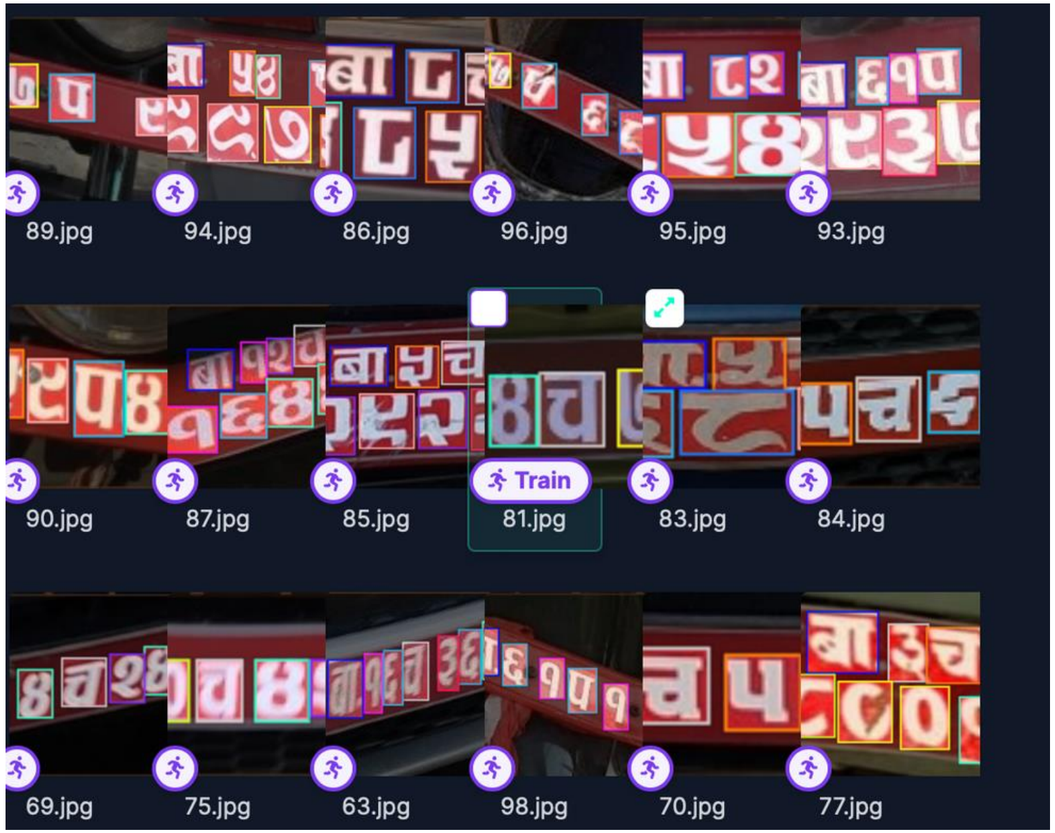
Segmented character dataset was fed into yolov8 for detection

train set 876 images
valid set 40 images
test set 20 images
trained for 105 epochs
crop, auto-orient,rotation, shear, hue, adjust brightness and exposure steps were applied

Task completed

## Improvised Character recognition(yolov8 labels)

The class labels from the character segmentation model were used to recognize the individual characters.




| TRAIN SET 94% | VALID SET 4% | TEST SET 2% |
|---|---|---|
| **876** Images | **40** Images | **20** Images |

**Auto-Orient:** Applied

Outputs per training example: 3

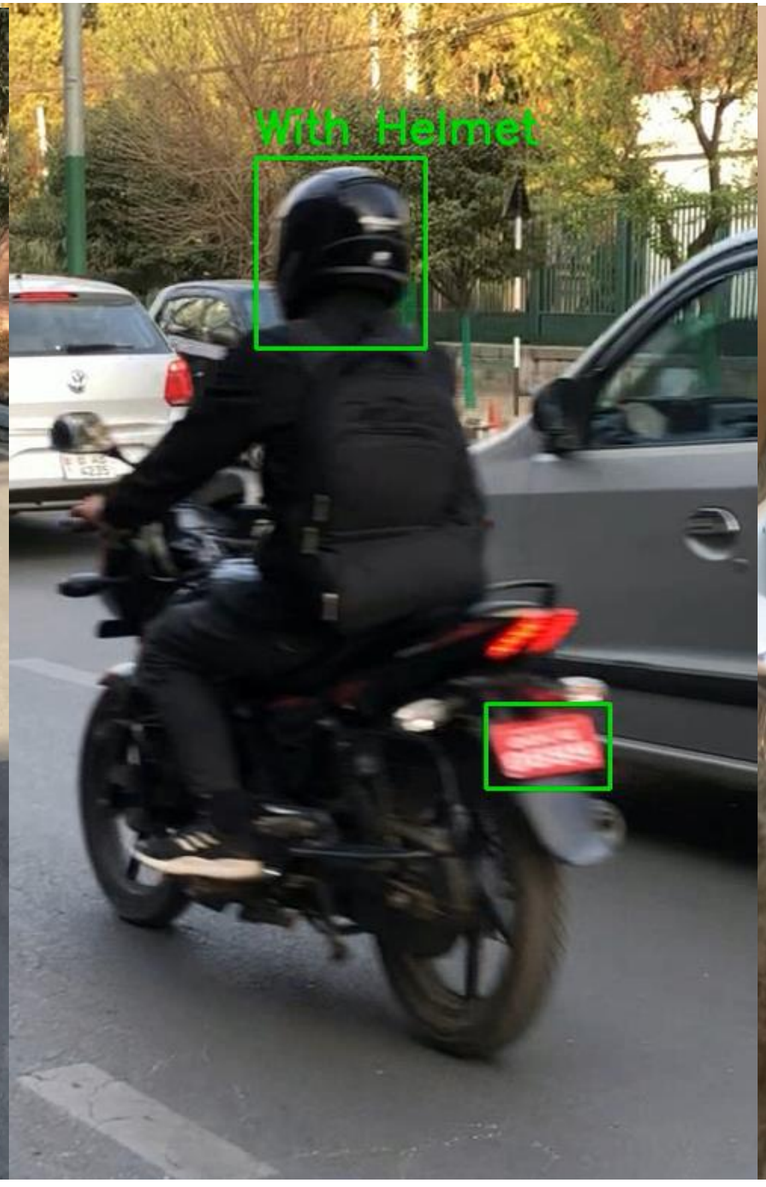
**Crop:** 0% Minimum Zoom, 35% Maximum Zoom
**Rotation:** Between −21° and +21°
**Shear:** ±19° Horizontal, ±11° Vertical
**Hue:** Between −25° and +25°
**Brightness:** Between −25% and +25%
**Exposure:** Between −25% and +25%
**Mosaic:** Applied

data.yaml

```yaml
names:
- '0'
- '1'
- '2'
- '3'
- '4'
- '5'
- '6'
- '7'
- '8'
- '9'
- ba
- cha
- ga
- ja
- jha
- ka
- kha
- lu
- pa
```

# Integration of detection,segmentation and recognition


With Helmet


With Helmet


HONDA

# Task remaining

- Object tracking using deepsort is yet to be done
- Evaluating and improsiving yolo model accuracy is yet to be done
- Web interface is yet to be made
- Automatic extraction of license plates in those without helmet by capturing frame is yet to be done

# Thank You