Smart License Plate Detection Using Deep Learning

1. Introduction

This project implements a smart license plate detection system using deep learning. It uses a CNN to detect and localize license plates from vehicle images. OCR (Optical Character Recognition) is used to extract the text from the plate region.

2. Objective

To develop a deployable system that detects and extracts vehicle license plates from images using CNNs and OCR, suitable for mobile and web environments.

3. Tools and Technologies

- Python
- TensorFlow / Keras
- OpenCV
- Tesseract OCR
- Flask
- Google Colab
- Pydroid 3

4. Workflow

1. Upload vehicle image
2. Predict bounding box using trained model
3. Extract text using OCR
4. Return results and annotated image via web

5. Sample Code

```
img = cv2.imread('input.jpg')
img_resized = cv2.resize(img, (224, 224)) / 255.0
coords = model.predict(img_resized[np.newaxis])[0]
plate_crop = img[y1:y2, x1:x2]
plate_number = pytesseract.image_to_string(plate_crop)
```

6. Output

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7. Deployment

The app runs on Flask and supports mobile execution via Pydroid 3. It accepts image uploads and returns predictions in real-time.

8. Files

- app.py: Flask app
- model.h5: CNN model
- static/output.jpg: Result image
- plate_number.txt: Output text
- index.html: Upload UI
- requirements.txt: Dependencies

9. Conclusion

This project demonstrates a real-world solution for vehicle plate detection and recognition, with an efficient deployment pipeline on both mobile and web environments.