YOLOv8 Object Detection for Parking Lot Occupancy

Advanced AI model to detect empty and occupied parking spaces

Setup and Data Preparation

1 **Import Libraries**

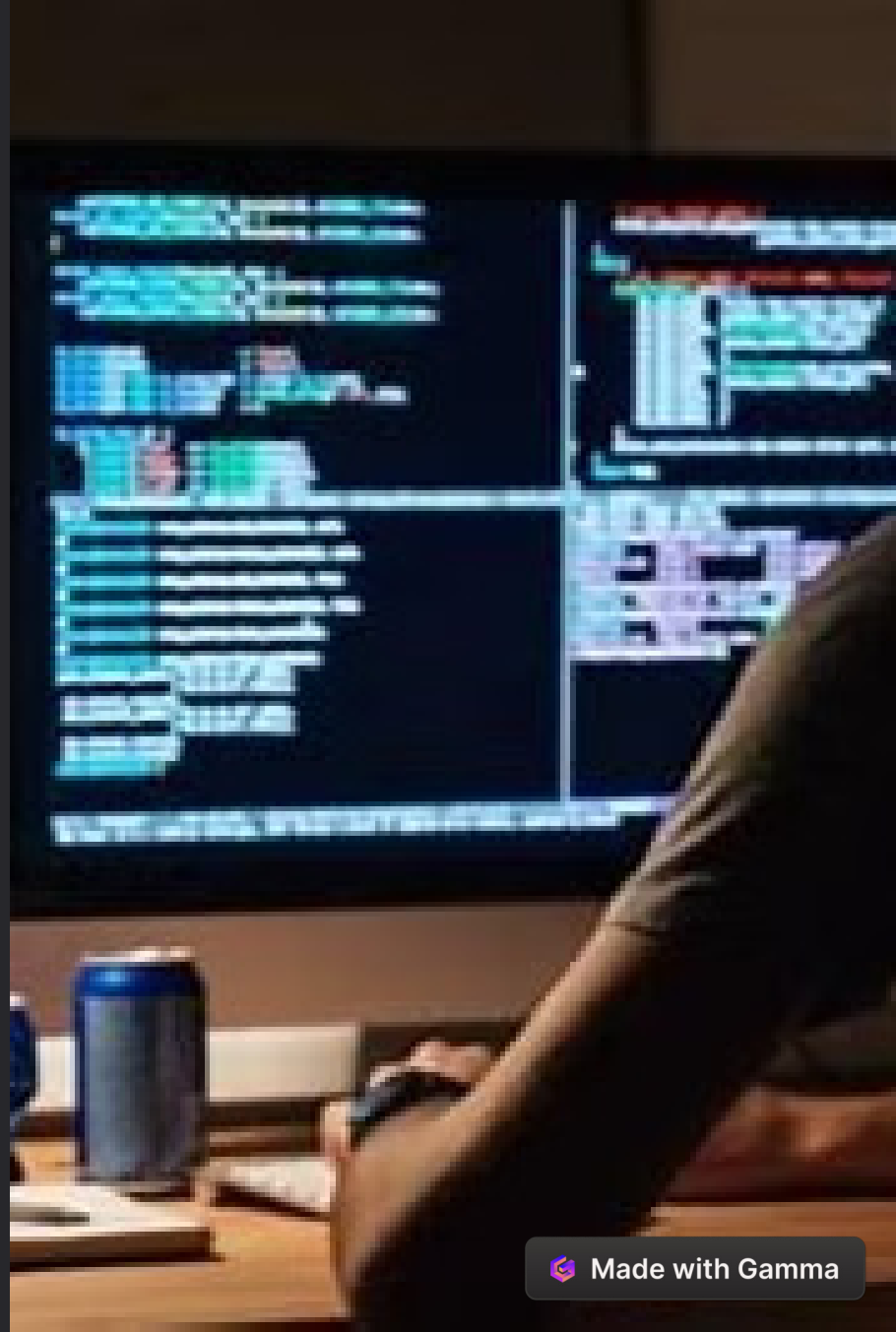
Install required packages

2 **Load Dataset**

Mount Google Drive, unzip data

3 **Visualize Samples**

Display random images from dataset



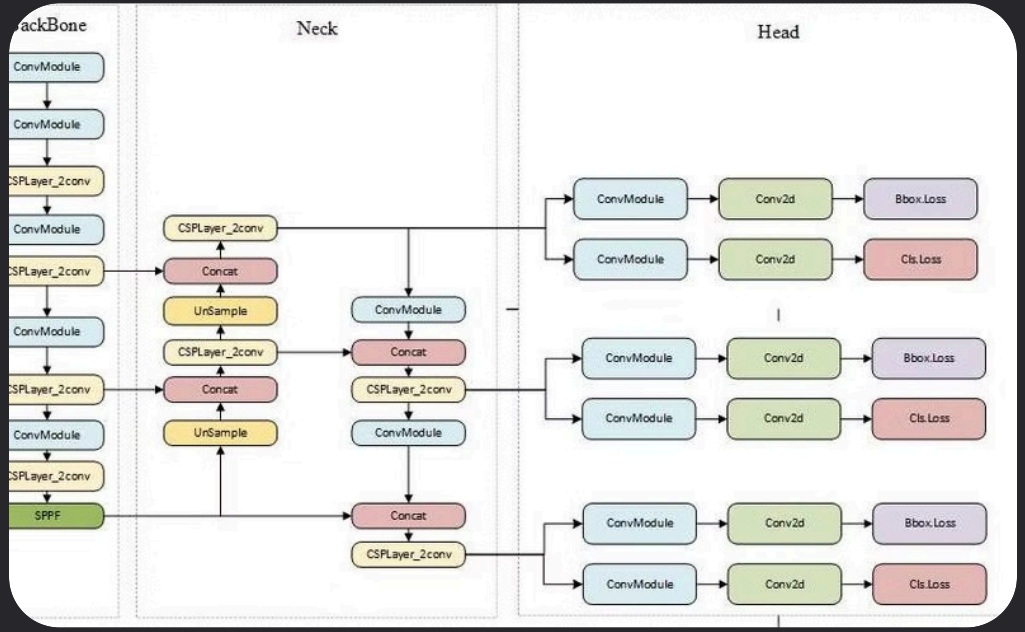
Configuration

config.yaml

Define train/val/test paths, classes

yolov8.yaml

Custom network architecture



Model Initialization

1

Load Config

Use modified YOLO config

2

Create Model

Initialize YOLO object

3

Load Weights

Apply pre-trained weights

Training Process

1

Set Parameters

Epochs, image size, learning rate

2

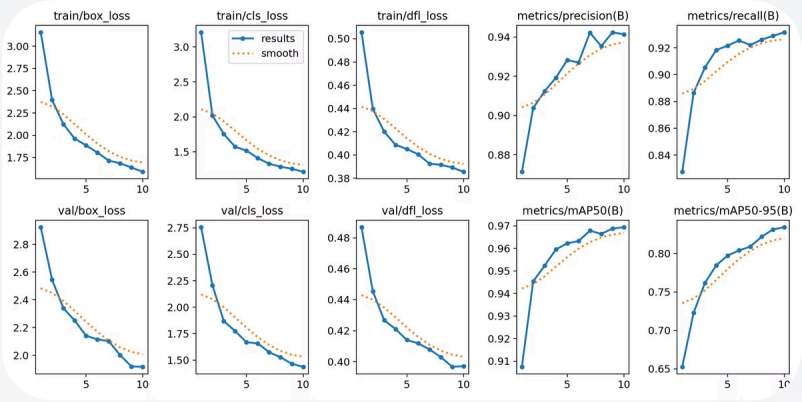
Execute Training

Run YOLO detect train command

3

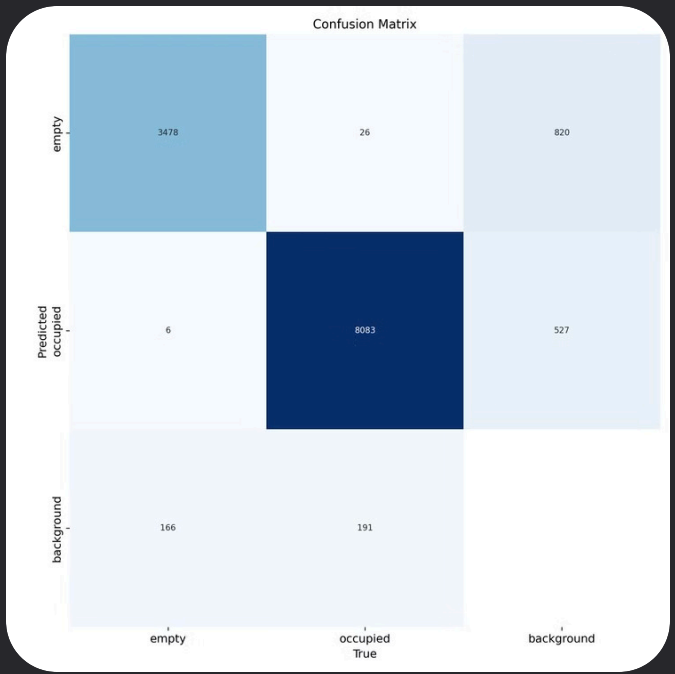
Monitor Progress

Track metrics during training

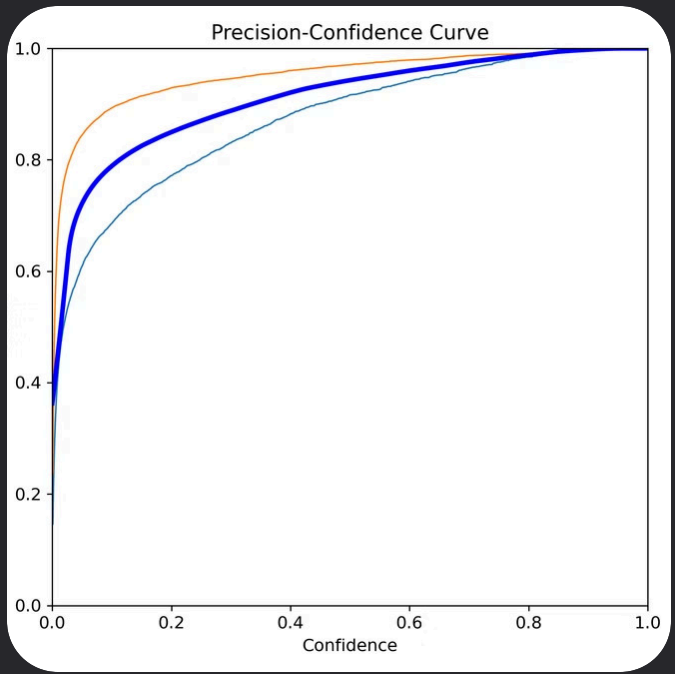


Evaluation Metrics

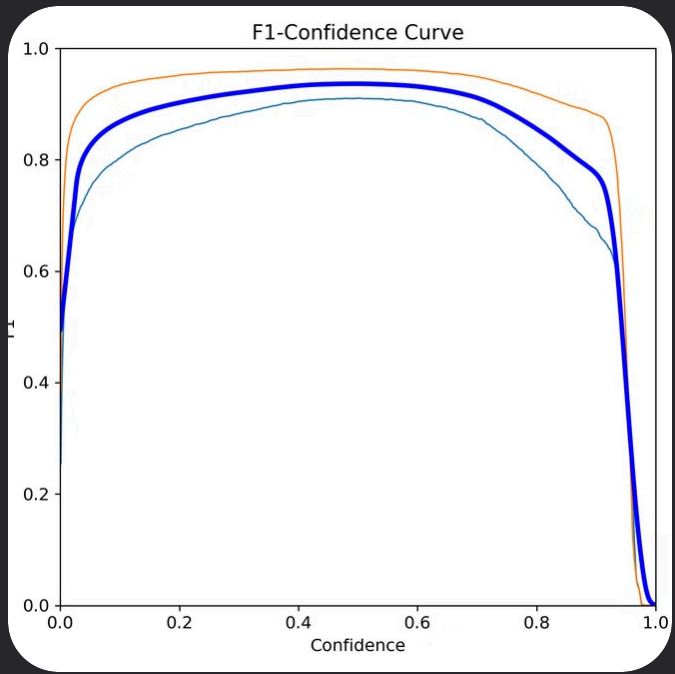
Class	Images	Instances	Box(P	R	mAP50	mAP50-95):
all	558	11950	0.942	0.932	0.969	0.834
empty	503	3650	0.913	0.907	0.956	0.784
occupied	484	8300	0.97	0.956	0.983	0.885



Confusion Matrix



PR Curve



F1 Score

Validation and Testing

Validation

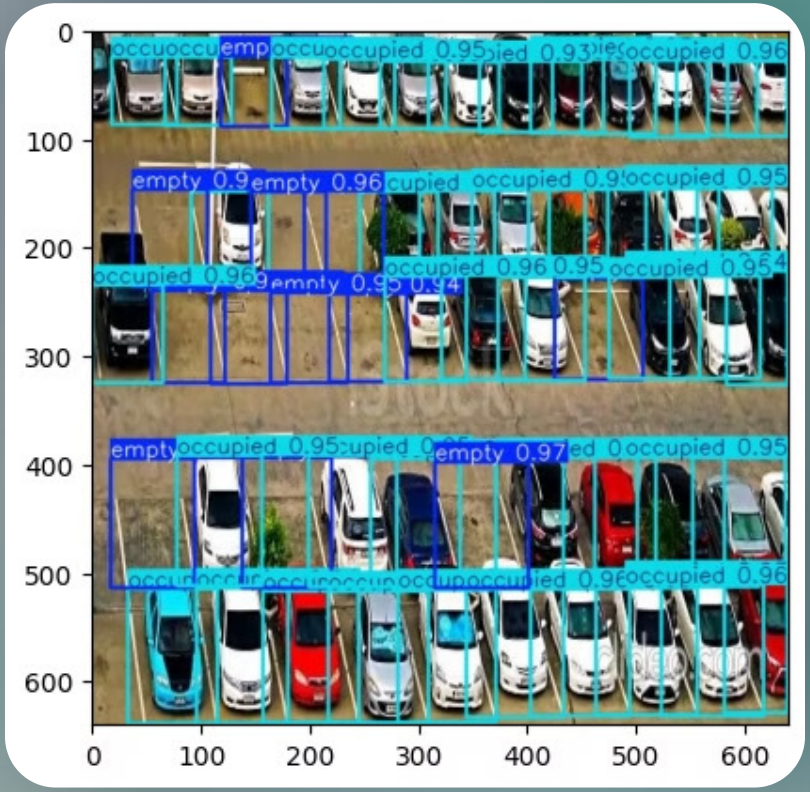
Run YOLO detect val command

Testing

Predict on test images

Visualization

Display detection results



Next Steps

Fine-tune

Adjust hyperparameters

Scale

Increase dataset size

Deploy

Implement in real-world system