

## 4.Implemantation

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# Step 1: Install & Import
import cv2
import matplotlib.pyplot as plt

# Step 2: Download Haar Cascade (number plate detector)
!wget -q https://raw.githubusercontent.com/opencv/opencv/master/data/haarcascades/haarcascade_russian_plate_number.xml

# Step 3: Load Haar Cascade
plate_cascade = cv2.CascadeClassifier("haarcascade_russian_plate_number.xml")

if plate_cascade.empty():
    print(" Haar Cascade not loaded. Check file.")
else:
    print(" Haar Cascade loaded successfully.")

# Step 4: Load your car image (replace with your file path)
img = cv2.imread("car.jpg") # "car.jpg" to your uploaded file name
if img is None:
    raise FileNotFoundError(" Image not found. Make sure 'car.jpg' is uploaded.")

gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

# Step 5: Detect plates
plates = plate_cascade.detectMultiScale(gray, scaleFactor=1.1, minNeighbors=4, minSize=(25, 25))

print(f"Plates detected: {len(plates)}")

# Step 6: Mask (blur) the number plate regions
for (x, y, w, h) in plates:
    roi = img[y:y+h, x:x+w]
    roi_blur = cv2.GaussianBlur(roi, (51, 51), 30) # heavy blur
    img[y:y+h, x:x+w] = roi_blur
    cv2.rectangle(img, (x, y), (x+w, y+h), (0,255,0), 2) # optional: draw box

# Step 7: Show result
plt.figure(figsize=(10,6))
plt.imshow(cv2.cvtColor(img, cv2.COLOR_BGR2RGB))
plt.axis("off")
plt.show()

# Step 8: Save output
cv2.imwrite("car_masked.jpg", img)
print("Masked image saved as car_masked.jpg")
```

**Input :**



**Output:**

Haar Cascade loaded successfully.  
Plates detected: 1



Masked image saved as car\_masked.jpg