Traffic Police Assistant

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Abstract : Traffic control and vehicle owner identification has become major problem. Sometimes it becomes difficult to identify vehicle owner who violates traffic rules and wrong parking. Object Number Plate Detection has long been a traditional problem and is already widely applicable in police forces. This is very helpful for traffic police to find the details of a car violating the traffic rules. In this report, solutions towards real-time object number plate detection has been searched, implemented and compared. Though traditional methods such as contour- based and SVM-based number plate detection. Object Detection Processing by machine learning. In the project that we present number plate characters are easily identifiable from the machine learning algorithms do satisfy the real-time constraint. And fill fine to save in local database.

IndexTerms - Traffic Police, Assistant, Scan, Object-Detect, Core ML, Swift, Xcode, Database.

I. INTRODUCTION

With the growth of economy vehicle has become a necessity in our daily life making the number of vehicles increase dramatically. Vehicles bring convenience to people, yet parking causes serious problems because of no sufficient place for so many vehicles to park and therefore we see at metro-cities vehicles parked anywhere even at restricted area.

It is beyond the reach of traffic police to handle problem throughout the city resulting in increased problems.

But in today's digital era it is not big issue to solve such situation. A wireless communication is best way to solve this problem. We can directly complaint traffic police and help them in catching the culprit.

1. Quick Detection image processing
2. To detect correct number plates
3. Easy fill fine

II. APP DETAILS

The various sections of the application are as follows:

1) Scan Image: Real Object Detection
2) Result: Object Detection Processing by machine learning.
3) Details: Quick Number Plate detail
4) Fine: Fill fine to save in local database
5) Search: Search number plate information from local store

III. SAMPLE IMAGE:



FIGURE 1: OBJECT DETECTION – NUMBER PLATE

IV. FLOW DIAGRAM

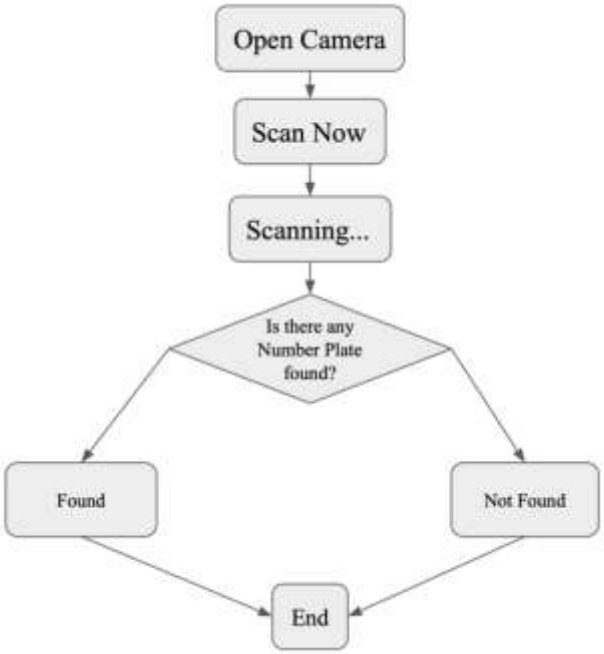


FIGURE 2: FLOW CHART

V. SUPPORT VECTOR MACHINE

In machine learning, support-vector machines (SVMs, also support-vector networks) are supervised learning models with associated learning algorithms that analyse data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier (although methods such as Platt scaling exist to use SVM in a probabilistic classification setting). An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on the side of the gap on which they fall.

In addition to performing linear classification, SVMs can efficiently perform a non-linear classification using what is called the kernel trick, implicitly mapping their inputs into high-dimensional feature spaces.

When data are unlabelled, supervised learning is not possible, and an unsupervised learning approach is required, which attempts to find natural clustering of the data to groups, and then map new data to these formed groups. The support-vector clustering algorithm, created by Hava Siegelmann and Vladimir Vapnik, applies the statistics of support vectors, developed in the support vector machines algorithm, to categorize unlabeled data, and is one of the most widely used clustering algorithms in industrial applications.

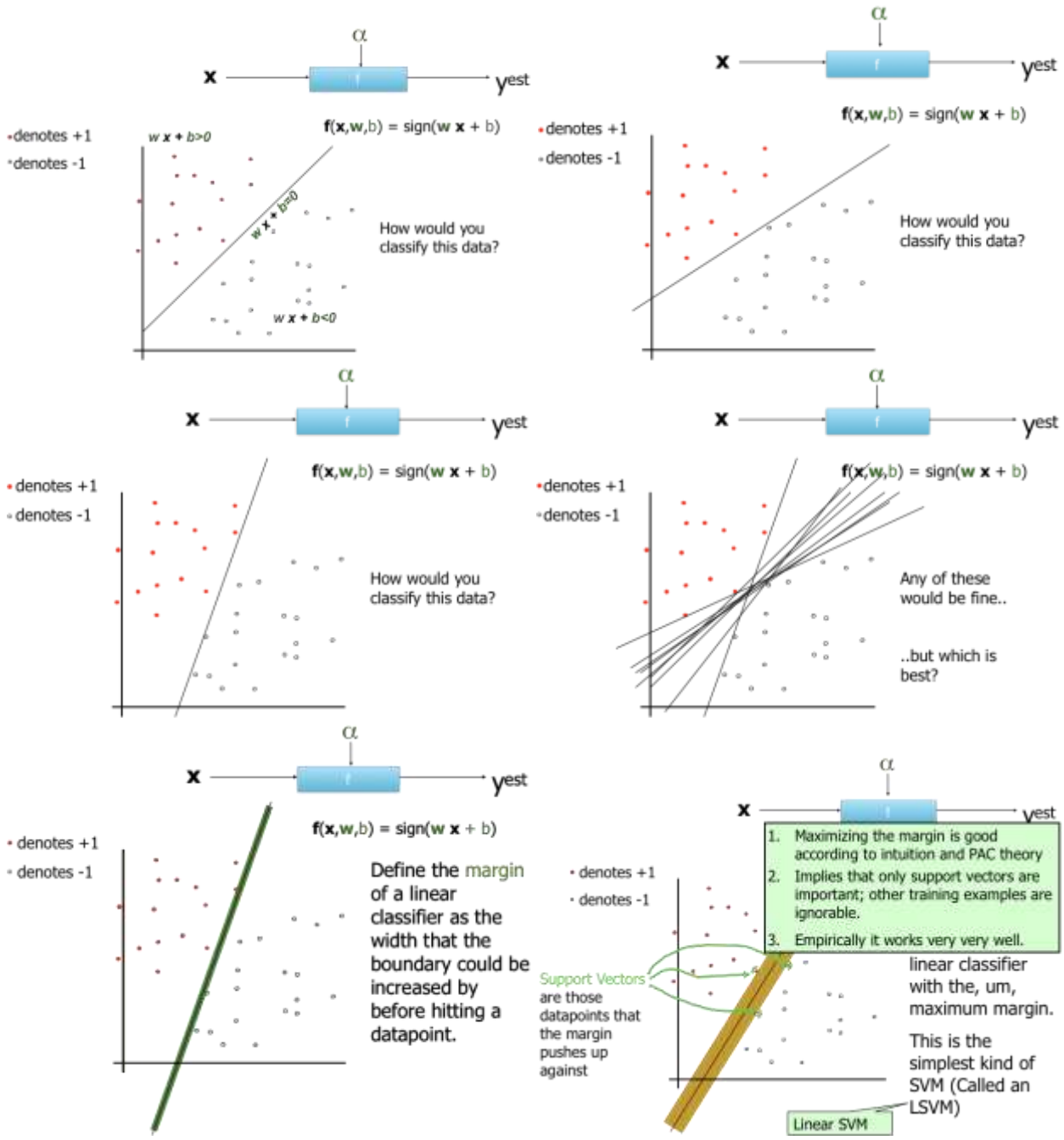


FIGURE 3: SUPPORT VECTOR MACHINE

OBJECT DETECTION ALGORITHM

The YOLO (You Only Look Once) Algorithm

A better algorithm that tackles the issue of predicting accurate bounding boxes while using the convolutional sliding window technique is the YOLO algorithm. YOLO stands for *you only look once* and was developed in 2015 by Joseph Redmon, Santosh Divvala, Ross Girshick, and Ali Farhadi. It's popular because it achieves high accuracy while running in real time. This algorithm is called so because it requires only *one forward propagation pass* through the network to make the predictions.
The algorithm divides the image into grids and runs the image classification and localization algorithm (discussed under object localization) on each of the grid cells. For example, we have an input image of size **256 × 256**. We place a **3 × 3** grid on the image.

Next, we apply the image classification and localization algorithm on each grid cell. For each grid cell, the target variable is defined as $y_{i,j}=[p_c\ b_x\ b_y\ b_h\ b_w\ c_1\ c_2\ c_3\ c_4]^T$ (6)
Do everything once with the convolution sliding window. Since the shape of the target variable for each grid cell is **1 × 9** and there are 9 (**3 × 3**) grid cells, the final output of the model will be:

$$Final\ Output = \underbrace{3 \times 3}_{\text{Number of grid cells}} \times \underbrace{9}_{\text{Output label for each grid cell}}$$

The advantages of the YOLO algorithm is that it is very fast and predicts much more accurate bounding boxes. Also, in practice to get more accurate predictions, we use a much finer grid, say **19 × 19**, in which case the target output is of the shape **19 × 19 × 9**.

IMAGE PROCESSING WITH COMPUTER VISION

Object Detection means to detect an instance of objects within an image or a set of images. It is a computer technology related to computer vision and image processing that deals with detecting instances of semantic objects of a certain class (such as humans, buildings, cars, balls, pen, and many more) in digital images and videos. Well-researched domains of object detection include facial detection.

VI. SCREENSHOT



FIGURE 4: TRAFFIC POLICE ASSISTANT ON IPHONE

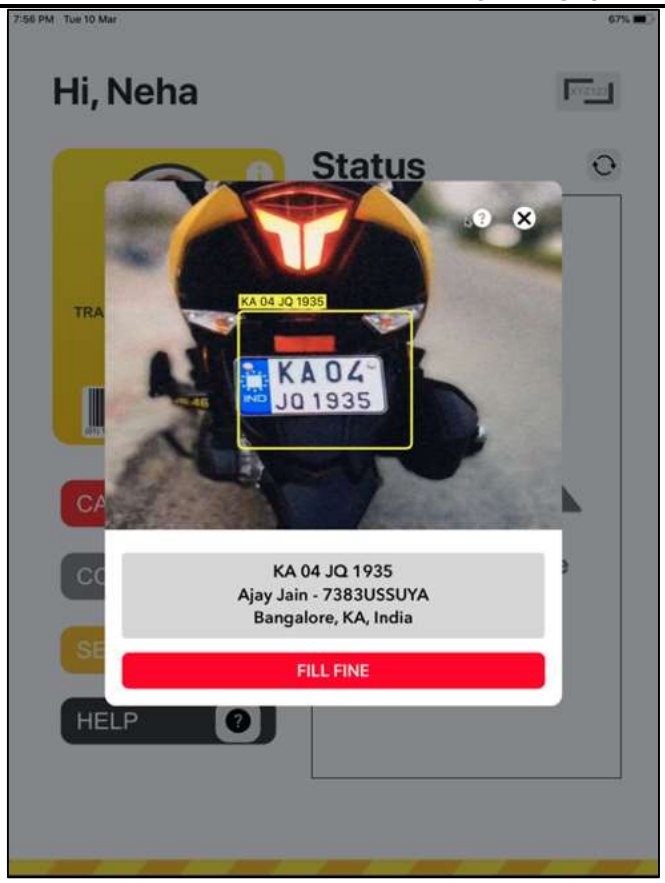


FIGURE 5: TRAFFIC POLICE ASSISTANT ON IPAD

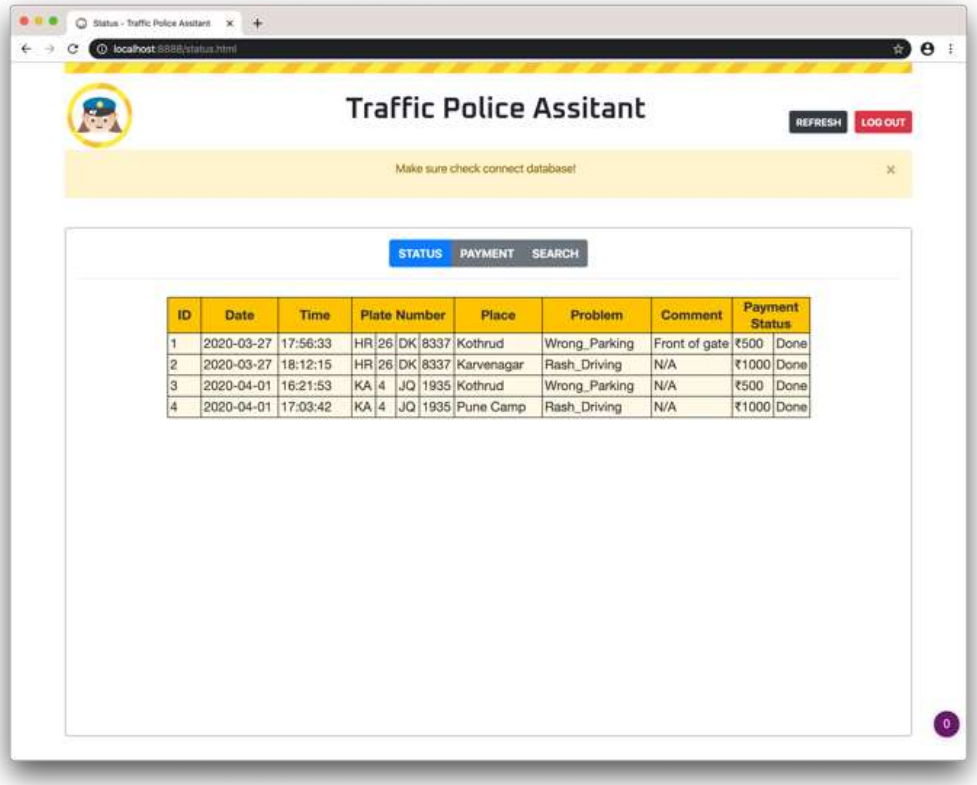


FIGURE 6: TRAFFIC POLICE ASSISTANT ON WEBSITE(DATABASE)

VII. RESULT

The experimental results achieved 96.51% accuracy, 94.2% specificity, and 97.72 sensitivity, demonstrating the effectiveness of the proposed technique for identifying found from Number plate Images.

III. CONCLUSION

In this report, major methods in object detection have been implemented and evaluated on the task of number plate detection. I used, SVM Algorithm. As it turns out, is fast enough for the real-time constraint but not as accurate, neither as fast nor as accurate; has performed best in both achieving a high accuracy and also satisfying the time constraint. Besides, the best performance when transferred to a completely new dataset after training, validating and testing.

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