AUTOMATIC LICENCE PLATE RECOGNITION FOR CAR PARKING

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Introduction

In a world of automations, we still follows an old fashion car parking system which takes a lot of time, for manual generation of bills having calculated timing details of parking and also to note down the licence plate number. We look forward to provide a solution for this addressed user case.

Business Requirement

An efficient system powered by Artificial Intelligence which would detect and identify the Licence plate number automatically. The system would have the facilities to pre-assign the parking slots for already booked users. Automatic bill generation based on the duration of parking is another highlight. The system needs a Motion Detector to identify the moment when a cars comes, an Object Detector to recognize cars, an Automatic Licence Plate Extraction algorithm to detect and extract the Vehicle Licence Plate number, a Dedicated Database to record the Vehicle number, Incoming time, Outgoing time, pictures of incoming and outgoing instances, and also to mark the details of already booked users. This system offers a fully automated car parking scenario where the need of a human resource is absolutely undue.
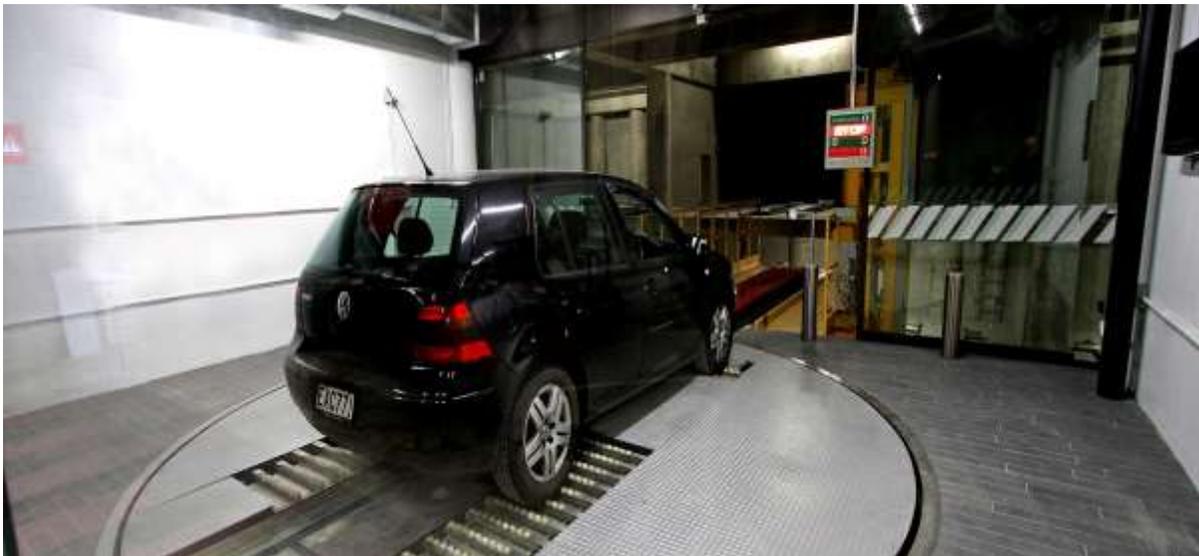
Current System

Currently a human resource does the role of manually noting down the Licence plate numbers and generates the bill for the vehicles arriving to park. In some cases Licence plate numbers are not even noted, and instead they would just handover a manually generated bill with the time of arrival in it, and receives it back while departure to calculate the amount for payment.


Proposed System

We aim to provide a solution which can be implemented in any car parking area, which would enhance the customer service and minimize the time lag customer's experience. Our solution works through various stages;

1. Frame by frame execution: Each live frame is extracted, preprocessed and fed to the system for the further detection methods.
2. Motion Detection: A motion detector to identify the instances when a car comes. Movements are identified by tracking contour differences in adjacent planes.
3. Object Detection: Cars are detected with Object Detection methods using Single Shot Detector (SSD) models. When the system identifies the arrival of a car, it would send the frames for further analysis.
4. EAST Text Extraction: East Text Extraction models are used to localise the area having maximum probability to include texts. This is used based on the assumption that our model would localise the Number plate as well.

5. Number Plate Extraction: Among the localised text area by EAST Text Extractor, we would apply Optical Character Recognition (OCR) methods using Tesseract-ocr and pytesseract modules. And from the extracted texts we would go for further extraction procedures with Regular Expressions to differentiate the Licence Number from other texts and noise elements.

6. Integration with Database: Details of the cars coming to the car parking area are recorded simultaneously to a PostgreSQL database. If the Licence plate number matches with any of the booked customers in database, pre-allocated slot will be provided.

7. Automatic Bill Generation while leaving: All the processes to extract Licence plate Number are repeated for outgoing cars and the bills would be generated after calculating the duration of parking.
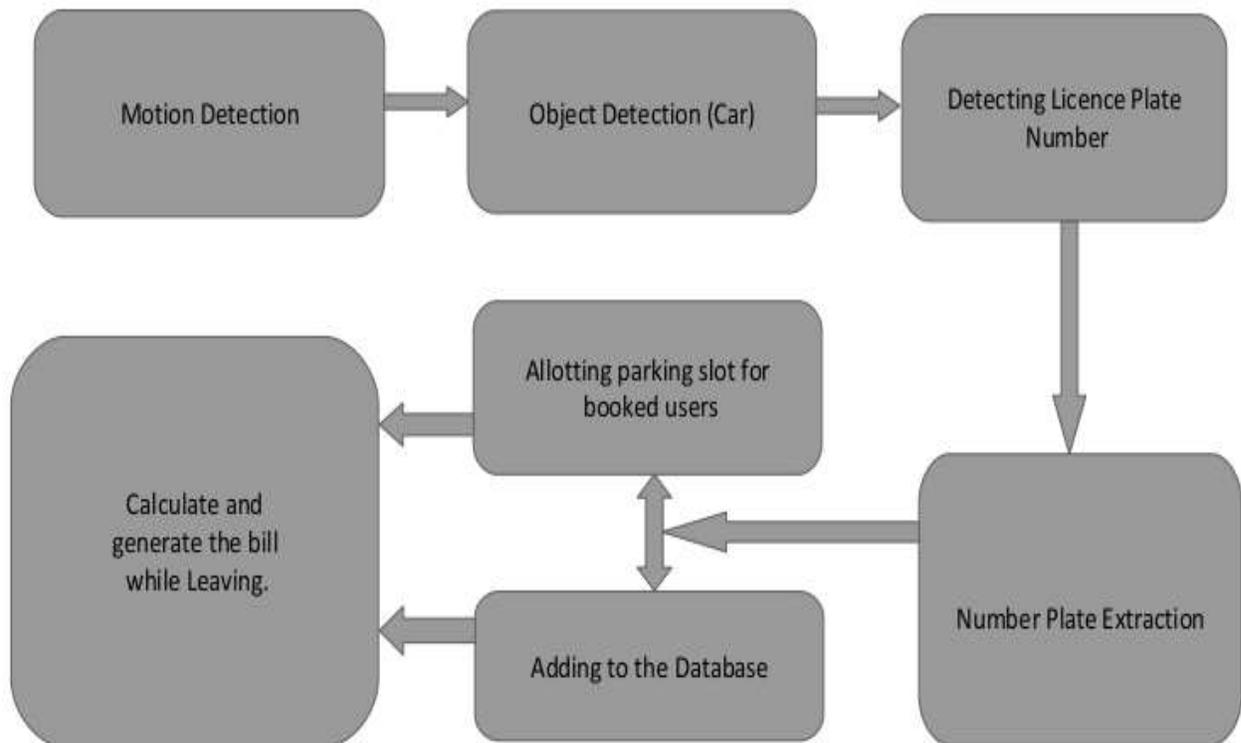
Technologies Used

- Python
- Computer Vision (Open CV)
- Deep learning
- Yolo V2 Darkflow
- Tesseract-OCR, Pytesseract
- East Text Extractor
- Single Shot Detector (SSD)
- Motion Detector

Risks and Challenges

Below are the risk identified for implementing proposed system;

1. Real-time implementation is the major challenge encountered during the processing
2. Quality of the video feed affects the accuracy of the output
3. Localising licence plate
4. Different patterns of licence number
5. Excluding Noise and unwanted characters

Results/ Output
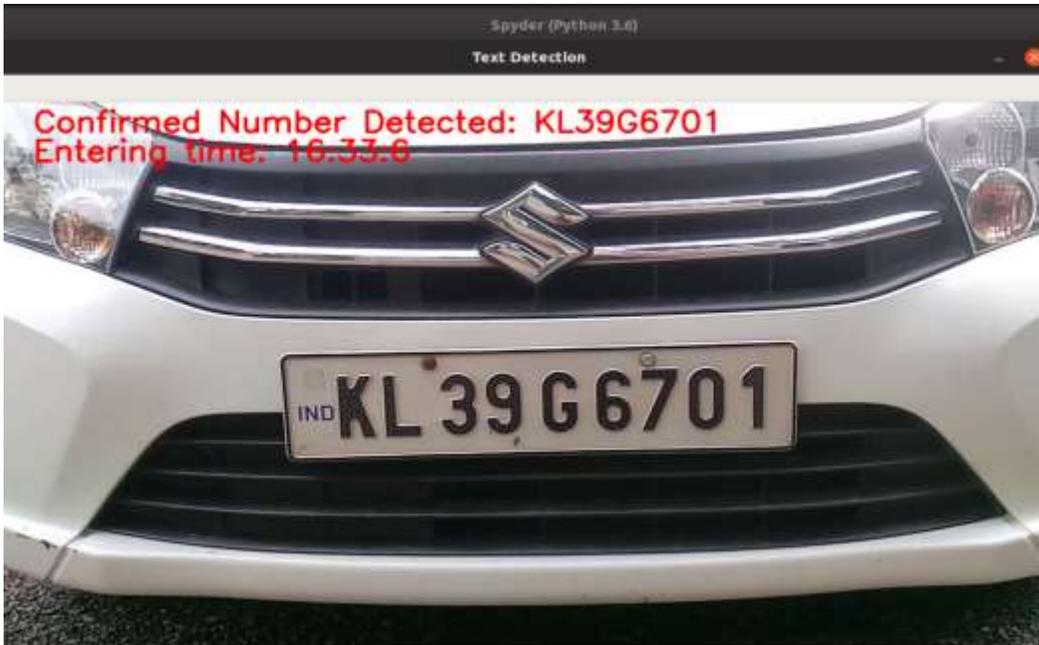
Figure 1: Vehicle Registration number detection

Figure 2: Vehicle Registration Number Detection

Conclusion

Automation of Car Parking Basements could be implemented. This system significantly reduce the workload of human. Computerized automatic licence plate detection and bill generation will reduce the time lag customer's experiences and makes them more comfortable. It can replace human resources for generating bills.

Future Enhancements

More types of object detectors can be incorporated to localise number plate. Custom object detectors can be made to detect texts with more accuracy and thereby to avoid noises more effectively.