

**LICENSE PLATE RECOGNITION**

**Report 1 – Project Introduction**

– Hanoi, Oct 2021 –

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# I. Project Introduction

## 1. Overview

### 1.1 Project Information

* Project name: LICENSE PLATE RECOGNITION
* Group name: IDK

### 1.2 Project Team

| **Full Name** | **Email** | **Mobile** | **Role** |
| --- | --- | --- | --- |
| Lê Hoàng Phúc | phuclhhe151452@fpt.edu.vn | 0704022690 | Leader |
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## 2. Problem & Motivation

* Autonomic license number plate recognition (ALPR/ANPR) has become a topic which is developed and applied successfully in the Traffic management system. This application plays an important role in detecting and tracking vehicles.
* There are many ways to solve this problem. Many efforts have been made to improve ALPR's reliability and accuracy. In order to know which approach is better, we will implement and compare those methods. Further, we will try to combine some methods to find a better approach.
* Our project is to detect and recognize the license plate. First, we will work on researched solutions, find out how to implement them from easy level to hard level, then we compare and connect (if we can) some methods to come up with a final approach.

## 

## 3. Literature review

After researching several different papers/articles on ALPR, we have found some notable articles/papers that will help us approach this problem. By using OKM-CNN and Connected Component Analysis [[1](#_heading=h.okmjkqebpj5y)] the result is very impressive in which the mAP score is greater than 0.96, F-score is around 0.97 and overall accuracy is 0.981. In general, this approach gives higher value of evaluation metrics than traditional approaches. However, inductively, this approach can only give high accuracy on straight-view plates, i.e. no deskew step, and it also works on middle to high levels of resolution of images. For low-quality videos, H. Seibel et al [[2](#_heading=h.okmjkqebpj5y)] came up with the idea of combining Geometric KNN, OCRopus, and Otsu binarization to solve this problem. This approach provides preprocessing and reconstruction to improve frame resolution for recognition state. The final accuracy for Seibel’s methods is 80%. Another Deep learning approach was executed by V. Jain et al [[3](#_heading=h.okmjkqebpj5y)], in which both single-line or double-line plates can be detected and recognized with overall accuracy around 93% for single-line and 80% for double-line plates. However, under some circumstances, this approach can work very well but under another, it can not. On the other hand, The model created by Rayson Laroca1 ‘ s team [[4](#_heading=h.okmjkqebpj5y)] Used CR-Net, Yolo. Model overall accuracy is 98.37% and it can detect and recognize multi objects on both image and video stream. To solve problems with both single-row and two-row plates, *Tee Kai Feng* used the East model before CRNN ‘s layer [[5](#_heading=h.okmjkqebpj5y)], This model has higher overall accuracy, shorter average prediction time and smaller architecture size than the Soo‘s CRNN 2017. It has improved much better than the original model created by Soo.

## 4. Objective:

***Our Aims:***

* Creating a model to detect and recognize the license plate.
* Solving challenges:
  + Perspective / viewing angle
  + Color
  + Various circumstances
  + Illumination
  + Frame
  + Low resolution
  + Special character
  + Weird plate
* Solving real-time problems.
* Detecting and recognizing multi objects.

***Our Scope:***

* Solving the problem of one-row plates first and then trying for both single-line and double-line plates.
* Prioritizing to solve single-object problems, and further is multiple plates at once.
* Solving the problem with Vietnamese license plates only.

## 5. References:

1. *Automatic Vehicle License Plate Recognition Using Optimal K-Means With Convolutional Neural Network, IEEE 2020, I. V. Pustokhina et al.  
   for Intelligent Transportation Systems, IEEE 2020, I. V. Pustokhina et al.*
2. *Eyes on the Target: Super-Resolution and License-Plate Recognition  
   in Low-Quality Surveillance Videos, IEEE 2017, H. Seibel et al.*
3. *Deep automatic license plate recognition system, IISC 2016.*
4. *An Efficient and Layout-Independent Automatic License Plate Recognition System Based on the YOLO detector, ARXIV1909.01754.*
5. *LICENSE PLATE RECOGNITION USING CONVOLUTIONAL RECURRENT NEURAL NETWORK, Tee Kai Feng 2019.*
6. *Automated License Plate Recognition: A Survey on Methods and Techniques, IEEE 2021, J. Shashirangana et al.*