Advanced Programming
Idea Proposal: Automatic Number Plate Recognition

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Problem or idea description
 Number Plate Recognition (NPR), also known by various other names, is a technological approach employing optical character recognition on images to interpret vehicle registration plates. We will create a web application with NPR using Python.
The primary objective is to extract information from license plates, enabling the generation of data related to the location of vehicles. It can be used for detecting violations such as speeding, running a red light, improper parking, crime prevention, and improving the transport situation.

Background information
Number Plate Recognition (NPR) systems are crucial for diverse applications such as traffic management, law enforcement, and parking operations. NPR enhances traffic management by optimizing flow and reducing congestion. The technology's real-time vehicle tracking capabilities are valuable in logistics, transportation, and fleet management.
In Kazakhstan, there is currently a significant tender for the implementation of license plate recognition systems. This indicates a growing demand for advanced technology solutions in the region, particularly in the field of automatic number plate recognition.

Available solutions with links
● 	Developers used OpenCV.js and JavaScript for their solution. Their solution includes steps: preprocessing the image, license plate localization and segmentation, using thresholding and morphological operations.
https://javascript.plainenglish.io/building-a-robust-license-plate-detection-and-recognition-system-using-javascript-8c64b314eec2
● 	The model identifying license plates on both cars and bikes has been developed. This system is compatible with video data sourced from CCTV cameras. The training and testing of this model involved utilizing the YOLOv5s model, implementing transfer learning, and conducting the training process on Google Colab.
wasdac9/automatic-number-plate-recognition: Automatic Number Plate Recognition with YOLOv5 and PyTorch (github.com)

How to get the data?
We will use datasets from MJ Synthetic Word Dataset, COCO-Text , SynthText (ST), Roboflow.

Brief description of your solution
Firstly, our app detects the number plate in the picture. We will use different filters, for example grayscale from OpenCV, which is needed to get rid of unnecessary color. After this, we will utilize most likely Canny Edges Detection to find the contours of each rectangle, thus our program can find where the car number is located.
We will crop a the part of image. Then, our program will perform Optical Character Recognition (OCR) on images to extract text using Pytesseract, which is Python wrapper for Google's Tesseract-OCR Engine. Afterwards, we will store the information in the MongoDB database.

Tech stack that will be used
We will use Python, Tensorflow, FastApi, Angular, TypeScript.