SYNOPSIS

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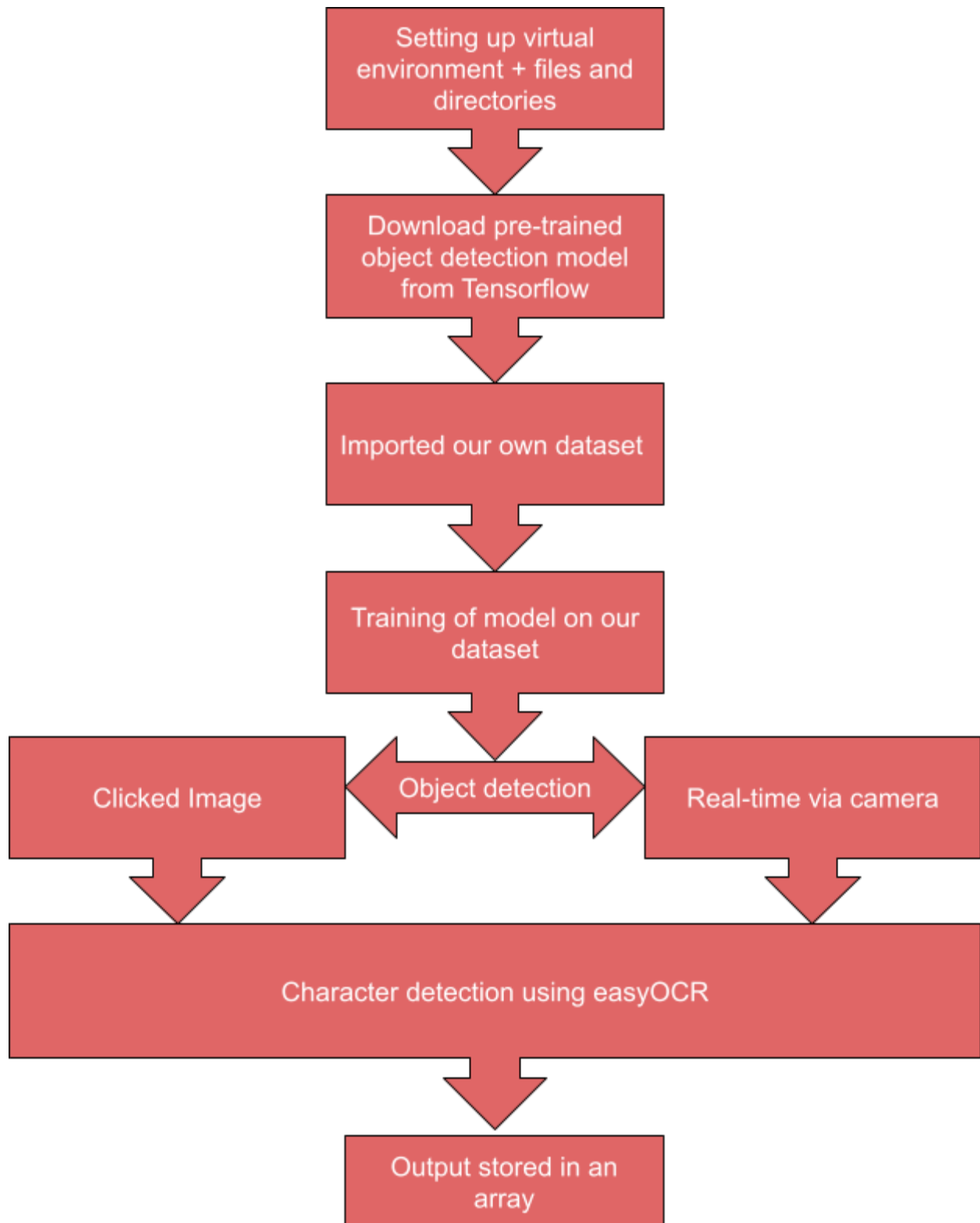Agam Goel - BT19GCS157
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Automatic number plate recognition is an image processing technology which uses a number (license) plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. The system can be implemented in different places like malls, public parkings, EV charge stations etc. The developed system first detects the number plate and then reads the characters on the plate using a repository called the easyOCR. Vehicle number plate region is extracted using the image segmentation in an image. The resulting data is then used to compare with the records on a database so as to come up with the specific information like the vehicle's owner, place of registration, address, etc.The system is implemented and simulated in Jupyter Notebook, and its performance is tested on real images as well as in real-time scenario. It is observed from the experiment that the developed system successfully detects and recognizes the vehicle number plate on real image and in real-time scenario.

In the project we have used a pre-trained model form tensorflow for objection detection. Then we have trained the same model on our dataset which we managed to gather from kaggle.com and on our own. After training the model, we have managed to do object detection via image as well as live camera.

Next comes character detection. For character detection we have used an open source repository called easyOCR. While going through various number plates the main problem we faced was that the number plates in India had many things written on it like govt, police etc. To resolve this issue we wrote an algorithm in which we calculated the size of every region of text and then filtered out the text which covers the maximum area.

```
┌─────────────────────────┐
│   Setting up virtual    │
│  environment + files and│
│       directories       │
└─────────────────────────┘
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             ▼
┌─────────────────────────┐
│  Download pre-trained   │
│  object detection model │
│     from Tensorflow     │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│  Imported our own dataset│
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   Training of model on  │
│         our dataset     │
└─────────────────────────┘
             │
             ▼
┌──────────────┐ ◄── Object detection ──► ┌──────────────────────┐
│ Clicked Image│                          │ Real-time via camera │
└──────────────┘                          └──────────────────────┘
       │                                            │
       ▼                                            ▼
┌───────────────────────────────────────────────────────────────┐
│           Character detection using easyOCR                   │
└───────────────────────────────────────────────────────────────┘
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                ┌─────────────────────┐
                │  Output stored in an│
                │        array        │
                └─────────────────────┘
```

The model we have trained is very amature since it took us almost 8 hours to train 10,000 levels. To make this software more efficient we will need to train it almost 10L times so that It becomes easy for the model to grasp the number plate. Since we do not have that much computational power, We will need a university computer to train the model further.

As we know that real time images while launching the product in the testing phase can be blurred, we can clear and sharpen the image which will help easyOCR to detect the character much faster and better.

To gather information about the owner, place of registration etc. we will be using the 'vehicle registration' API from www.apisetu.gov.in and then store it in our local database.

Once we have the integration ready, there will be no limits of height we can achieve from this project.

PPt Link:
https://docs.google.com/presentation/d/1sICY5WpgGtjV_5KEHwOP6I2Upu19IKTO5LXAQS7Flxk/edit?usp=sharing