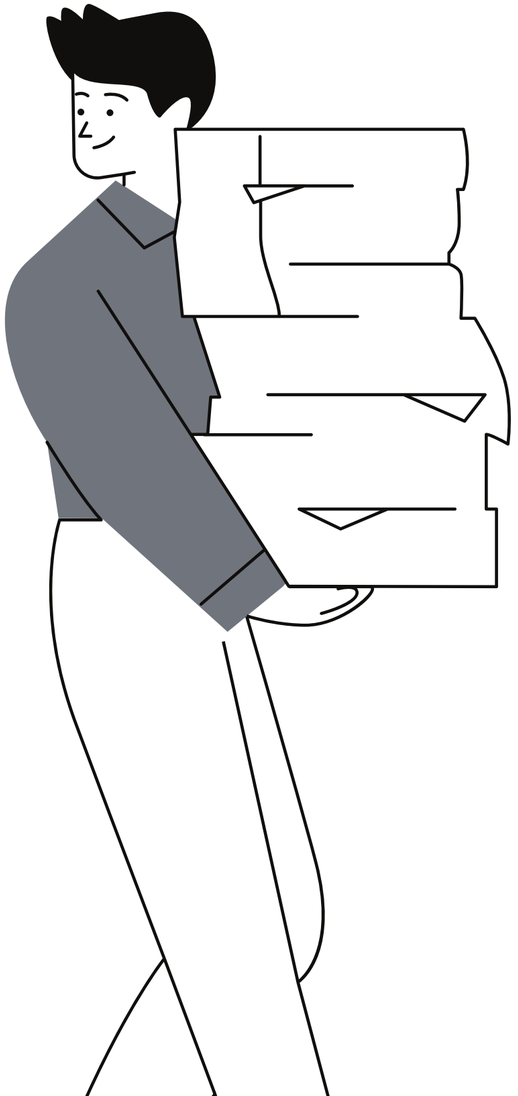
August 25, 2022

# Team Gryffindorz

Automation of mechanism for **Image and Scene Capturing, Processing, Standardization, Detection, Segmentation and Evaluation,** leading to better decision-making results for various programs using **Deep Learning, Deep Learning and Computer Vision**



# Today's Agenda

1. Introduction
2. Our Solution
3. Glimpse of our product
4. Show Stopper
5. Summary and Action Items

# Introduction

## Team Introduction

**Ministry Name** : Ministry of Rural Development

**Institute Name** : Thapar Institute Of Engineering and Technology

**Institute Code** : U-0385

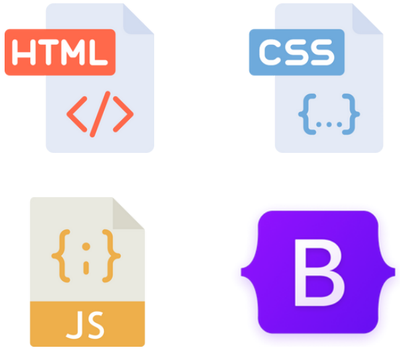
**Team Members** : Pranava Seth,
Karan Singh Pathania,
Sakshi Vats,
Martin Kaushal,
Gaurav Bansal,
Ambika Garg

# Tech Stack

Combination of technology we used to build the project.

## Frontend

**HTML, CSS, Javascript, BootStrap**




## Backend

**Django, SQlite**

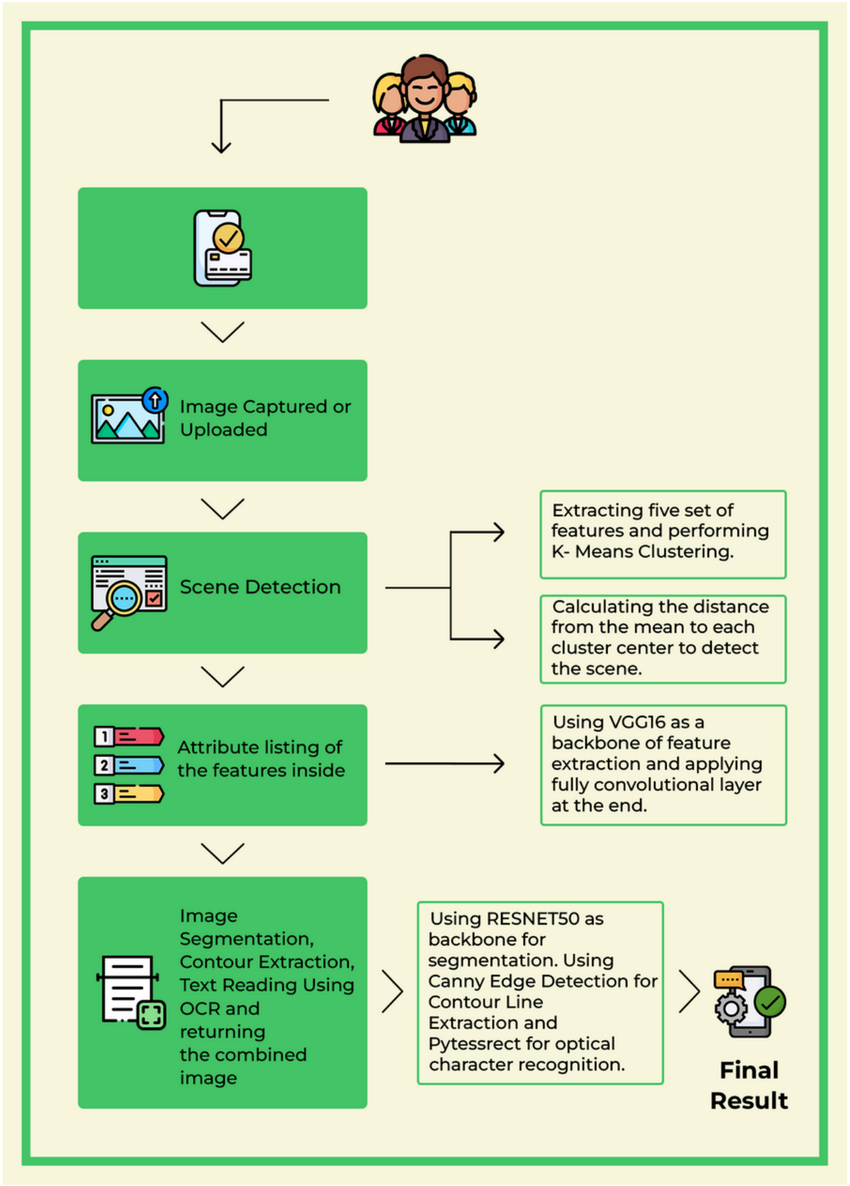
## ML Model

**Python, Pytorch, Pytesstect, Keras, TensorFlow, pixellib, OpenCV**

# Let's Start!

# Our Solution

1. SCENE DETECTION
2. SEGMENTATION
3. FEATURE EXTRACTION



# Scene Detection

1

Taking a set of **Training Images**

2

Performing **Feature Extraction**

3

Extracting five features that include **Color Moments, Tamura Features, Saturation and Hue Channels, Gabor Feature and Edge Features**

4

Performing **K Means Clustering** by making fifteen clusters of the features

5

Passing the **Inference Image** and calculating the distance with the magnitude of the extracted features to each cluster center

6

Designating the **Scene Cluster**, having the minimum distance

Gryffindorz

August 25, 2022

# Scene Detection Description

1. **Color Moments –** Moments in a general manner are the information about the entity. It can be of a signal or an image. There are several moments that include Mean, Standard Deviation, Skewness, Kurtosis, etc. Here we are using the first three moments that are acting on one of the main features of the scene detection.

2. **Tamura Features –** Tamura are the texture features of the image. Here we are including three of them Contrast, Dissimilarity and Homogeneity.

3. **Saturation and Hue Channels –** Saturation and Hue Channels are the first two channels of the HSV image. Saturation is the purity and intensity of the colour, and Hue is the three primary colours Red, Blue and Yellow and three secondary colours Orange, Yellow and Violet.

4. **Gabor Feature –** A Gabor filter can be viewed as a sinusoidal signal of a particular frequency and orientation and modulated by a Gaussian wave. It returns a complex number and a function. Main parameters include wavelength, orientation, phase offset sigma and spatial aspect ratio.

5. **Edge Features –** Maximum response over a set of the edge filter kernels

6. **K Means Clustering –** After extraction of features, we cluster the features in fifteen clusters of the normalised feature value and find the centre of each. While inferencing we measure the distance(similarity) of the features of the test image with each cluster centre. The minimum distance is designated as the target cluster.

# Segmentation

Segmentation + OCR + Edge Detection(Contour)

1

User Passes an **Image**

2

Images passes through a **Ressnet50 Backed Segmentation Network.**

3

After the segmentation edges get **extracted** using **OpenCV Canny Edge Detection.**

4

The **text in the image** gets displayed using **Optical Character Recognition** by the **library pytessrect.**

5

The user gets a combined result that includes **Segmented images, Contour lines and Characters.**

# Feature Extraction

Extracting features as a list, objects present inside the scene.

1

User inputs the **Images**

2

Initialised a base model, **VGG16 backed.**

3

Defined a **feature extraction class** and **inherit** the **features using Super** from the parent class.

4

**Optimised the model** by applying **average pooling and flatten.**

5

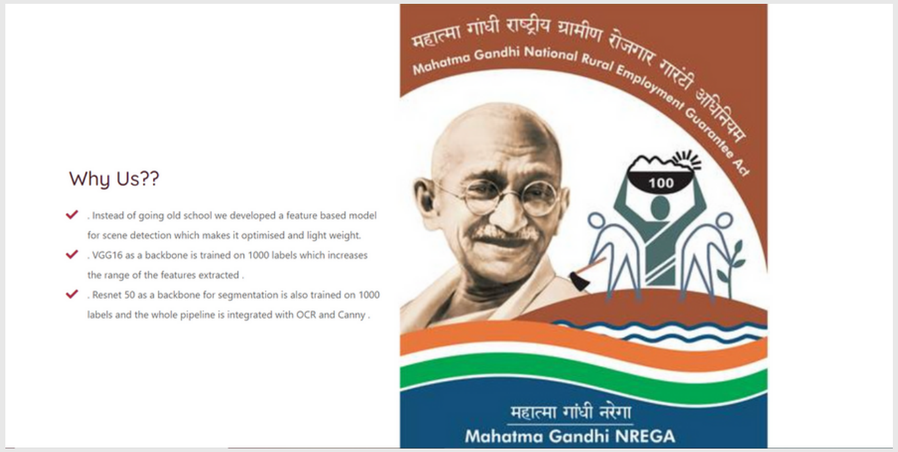
Deployed a fully **convolutional layer** that extracted the features, Keeping **VGG16 as a base.**

6

The user gets its **features in the form of tensors.**

# Glimpse of our Product

## Frontend



### Our Approach

We have three pipelines :- **Scene Detection , Feature Extraction and Segmentation** of the objects inside the scene.

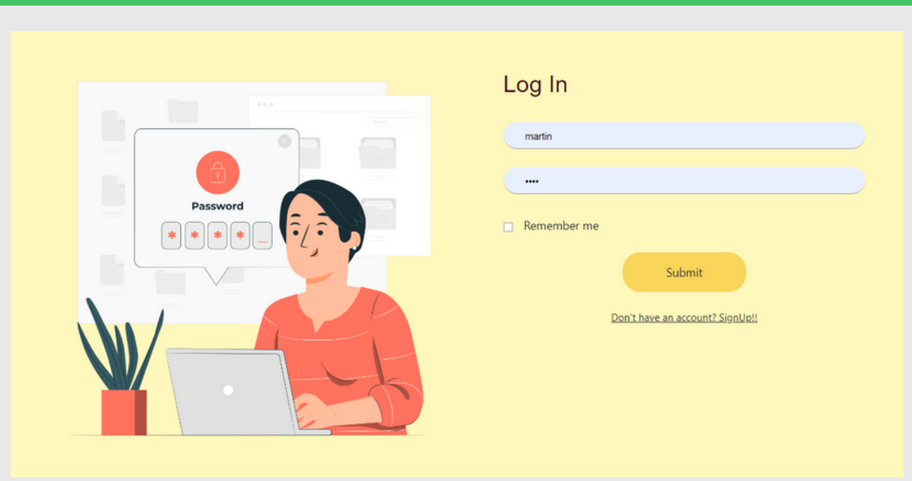
-> For **scene detection** we have extracted **five feature sets and clustered** them in as many categories as our dataset contains.For infrencing we **measure the distance of the features of the test image with each cluster centre.**

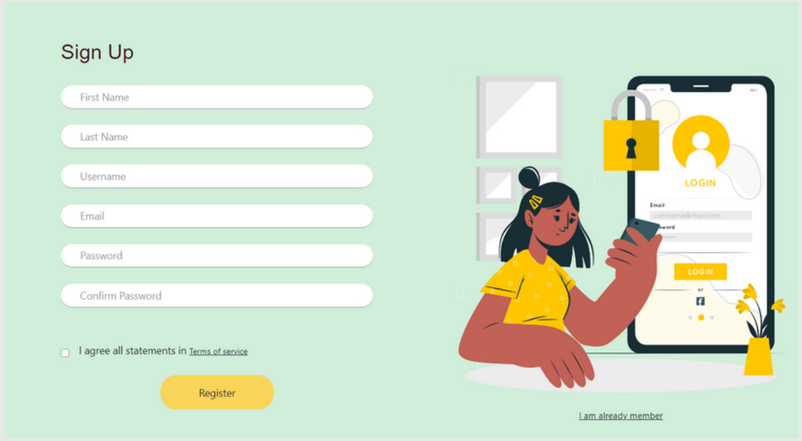
-> For **feature extraction** we used **VGG 16** as our backbone and extracted the features using the **fully convolutional layer and used super on inheriting** the extracted features from parent class to the child class.

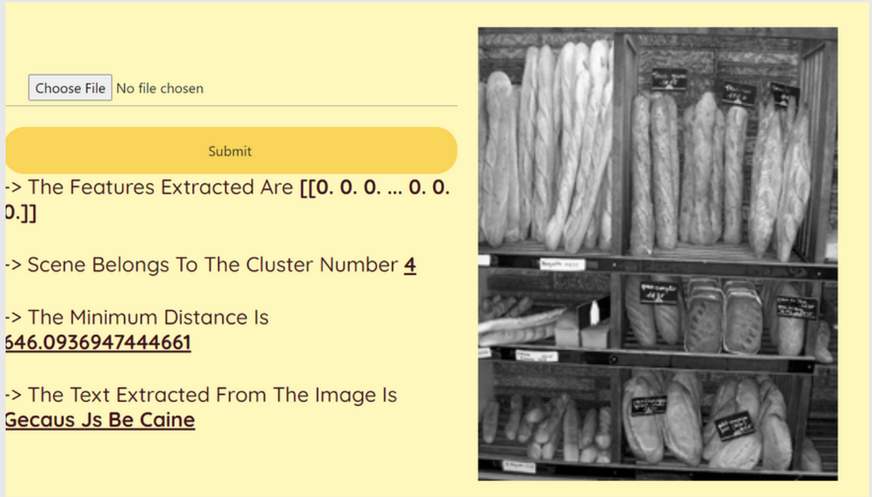
-> For the **segmentation** part we are using **Resnet 50** as backbone which is having around **1000 classes , integrated with Canny Edge Detection for Contour line Extraction and OCR for text extraction.**

# Glimpse of our Product

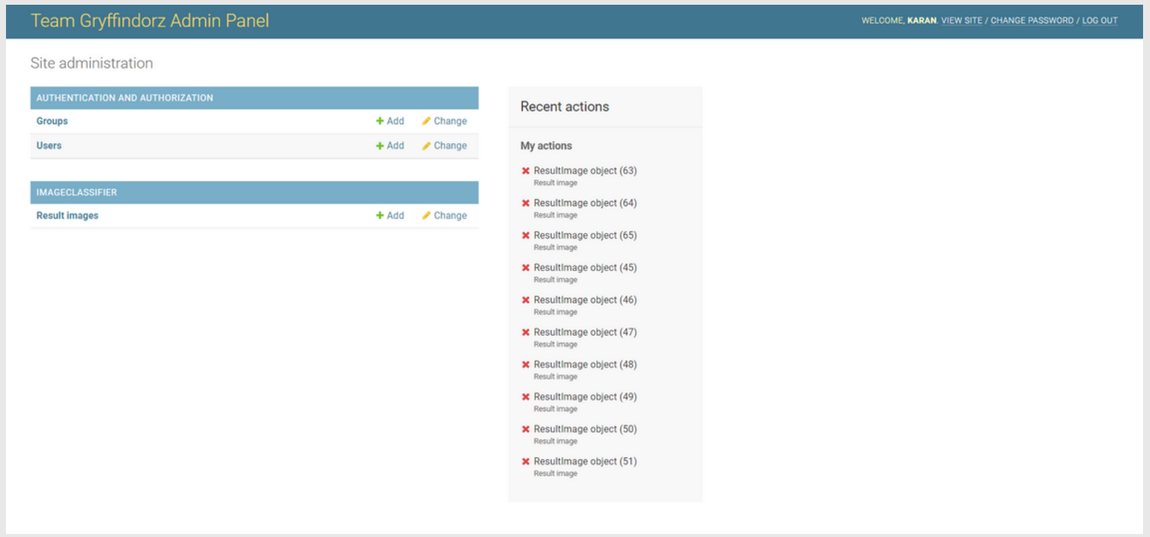
## Frontend



# Glimpse of our Product




## Database

## Team

Pranava Seth

Sakshi Vats

Martin Kaushal

# Show Stopper

August 25, 2022

**A user-friendly system** that performs **Categorisation, Detection, Segmentation and OCR simultaneously.**

**Lightweight, Optimized** and can **perform multiple tasks** at once

Can be easily deployed on **low-end devices**. For time being it is deployed on a website.

Gryffindorz

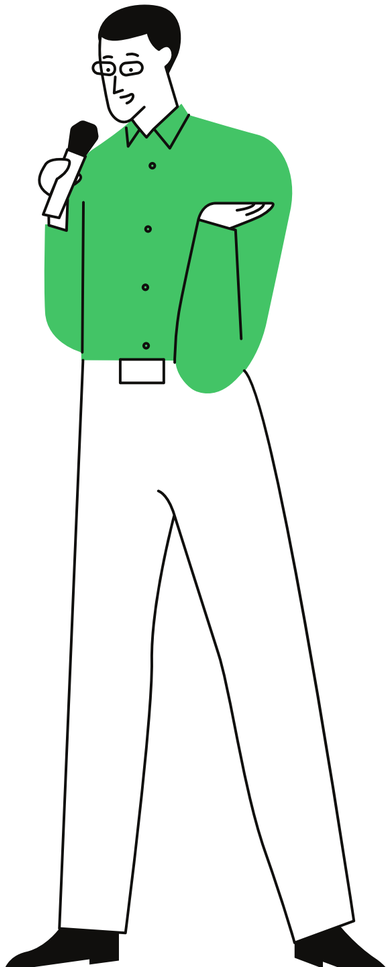
# Future Aspect

Things we can introduce in future for expanding this project.

Deploying of system on a **Mobile Application**

Make the system **more user-friendly**

Can convert the output given by the system into **Regional Languages for better reachability**



Gryffindorz

# We're done!

Thank You!!!
Have a great day ahead