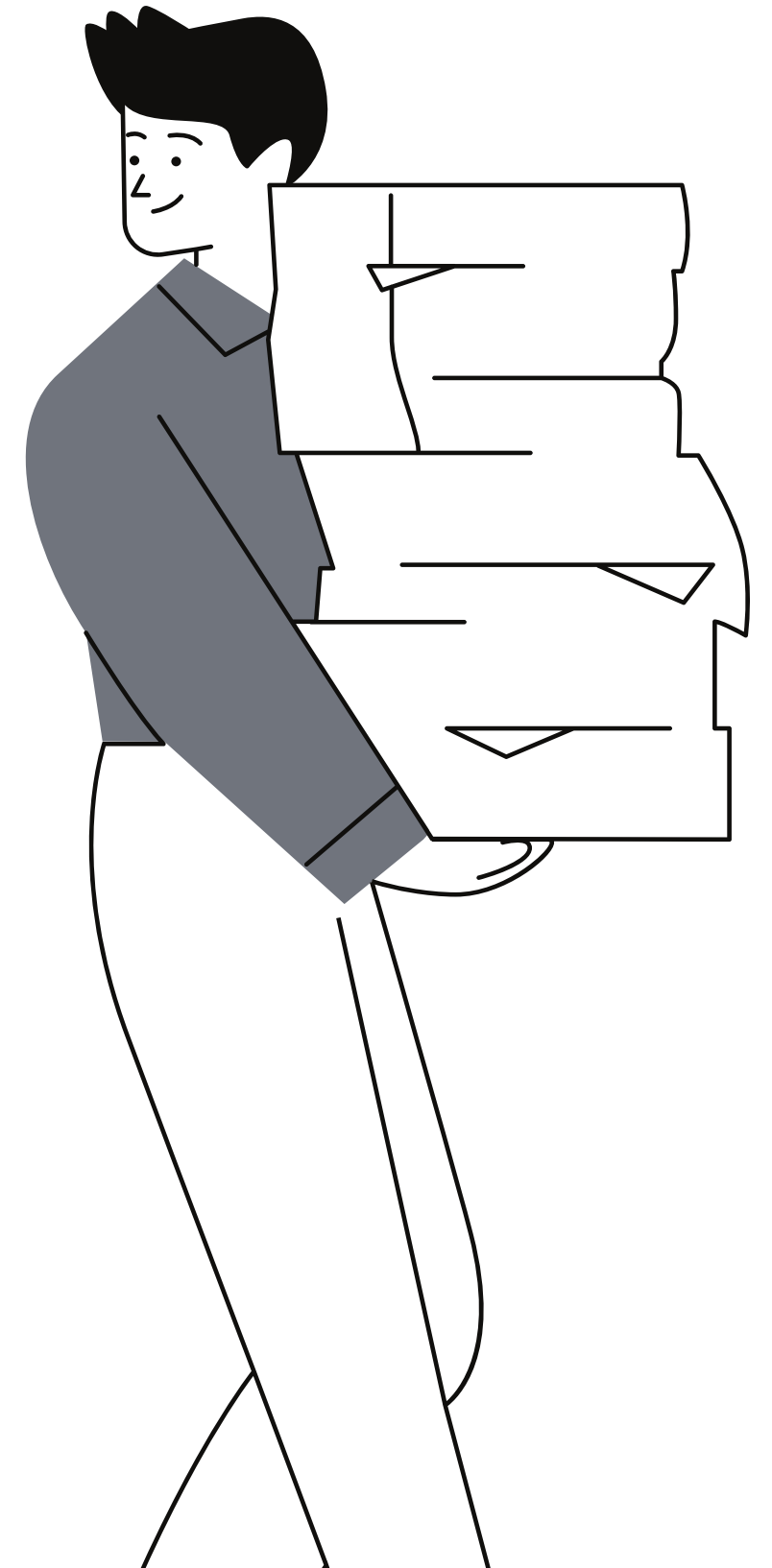


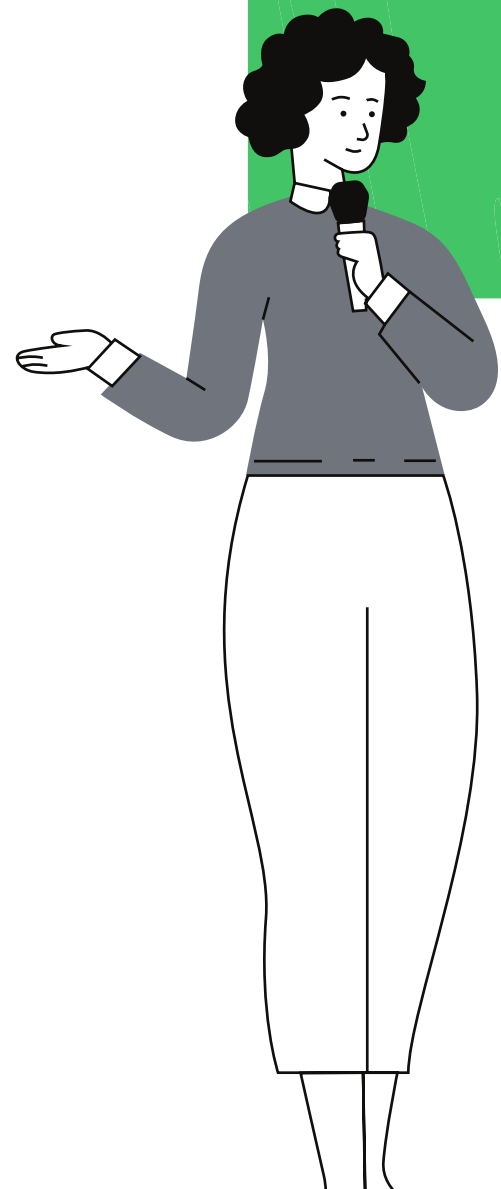
August 25, 2022

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

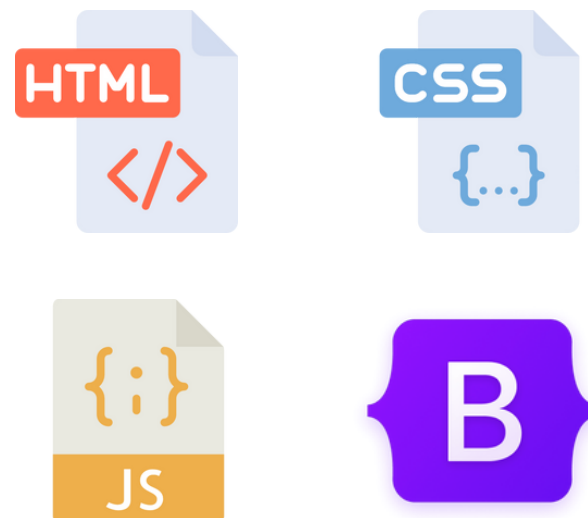
Team Members : Pranava Seth,
Karan Singh Pathania,
Sakshi Vats,
Martin Kaushal,
Gaurav Bansal,
Ambika Garg

Tech Stack

Combination of technology we used to build the project.

Frontend

HTML, CSS,
Javascript, BootStrap



Backend

Django, SQLite



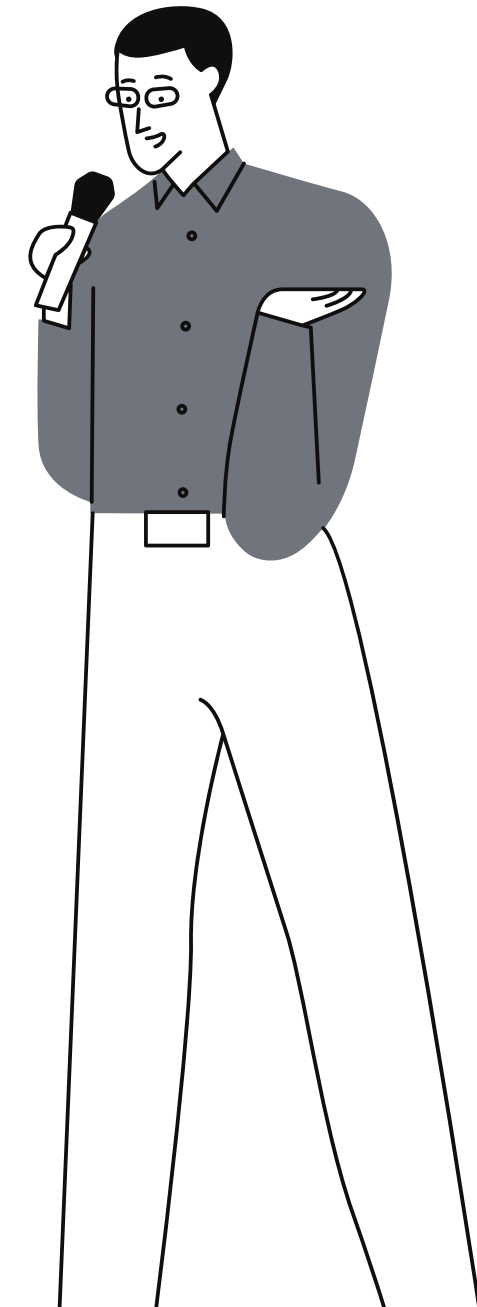
ML Model

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



Are you ready?

Let's Start!



Our Solution

1

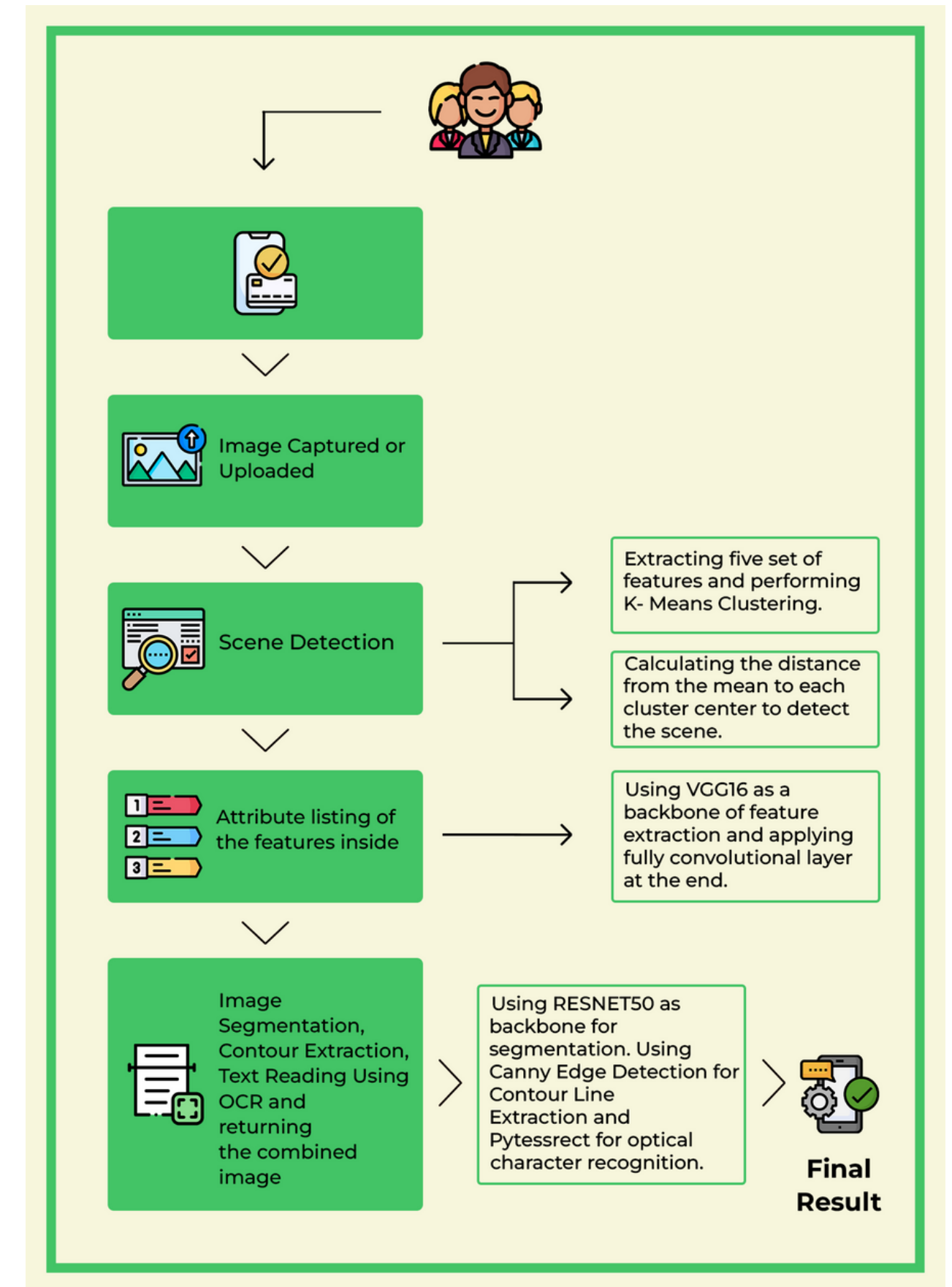
SCENE DETECTION

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

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
**Resnet50 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 **pytesseract.**

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



[Home](#) [Our Solution](#) [Our Team](#) [MNREGA](#) [Log In](#) [Sign Up](#)

Team Gryffindorz

Problem Statement : SH996

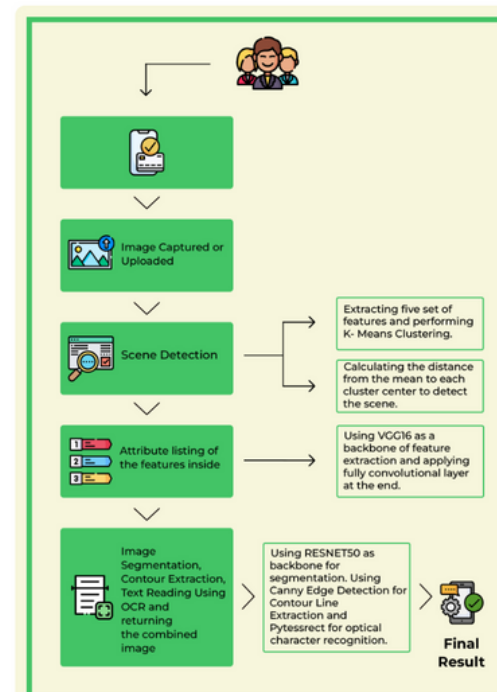
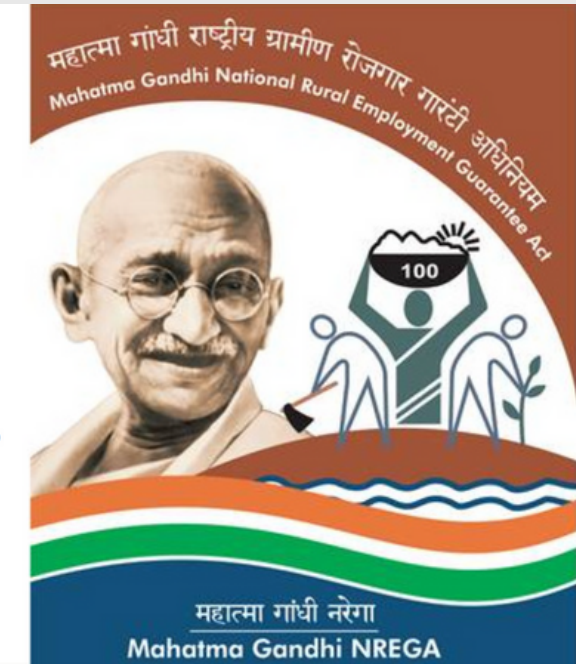
Automation of mechanism for Image Capturing , Processing , Scene Detection , Image Segmentation , Contour line extraction , Feature Extraxtion and Optical Character Recoganition leading to better decision making results for various programs using Machine Learning , Deep Learning and Computer Vision.



SMART INDIA HACKATHON 2022

Why Us??

- ✓ . Instead of going old school we developed a feature based model for scene detection which makes it optimised and light weight.
- ✓ . VGG16 as a backbone is trained on 1000 labels which increases the range of the features extracted .
- ✓ . Resnet 50 as a backbone for segmentation is also trained on 1000 labels and the whole pipeline is integrated with OCR and Canny .



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

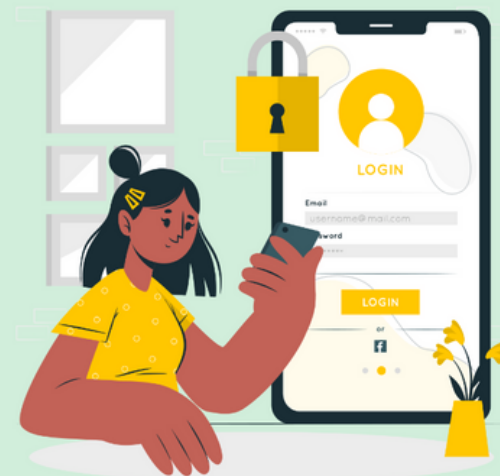
Frontend



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Sign Up

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[I am already member](#)


No file chosen

-> The Features Extracted Are `[[0. 0. 0. ... 0. 0. 0.]]`

-> Scene Belongs To The Cluster Number 4

-> The Minimum Distance Is 646.0936947444661

-> The Text Extracted From The Image Is Gecaus Js Be Caine



Glimpse of our Product

Team Gryffindorz Admin Panel

WELCOME, **KARAN** [VIEW SITE](#) / [CHANGE PASSWORD](#) / [LOG OUT](#)

Site administration

AUTHENTICATION AND AUTHORIZATION

Groups

[+ Add](#) [Change](#)

Users

[+ Add](#) [Change](#)

IMAGECLASSIFIER

Result images

[+ Add](#) [Change](#)

Recent actions

My actions

- ✖ ResultImage object (63)
Result image
- ✖ ResultImage object (64)
Result image
- ✖ ResultImage object (65)
Result image
- ✖ ResultImage object (45)
Result image
- ✖ ResultImage object (46)
Result image
- ✖ ResultImage object (47)
Result image
- ✖ ResultImage object (48)
Result image
- ✖ ResultImage object (49)
Result image
- ✖ ResultImage object (50)
Result image
- ✖ ResultImage object (51)
Result image

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.

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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!

A green speech bubble with a tail pointing downwards and to the left, containing white text.

Thank You!!!
Have a great day ahead