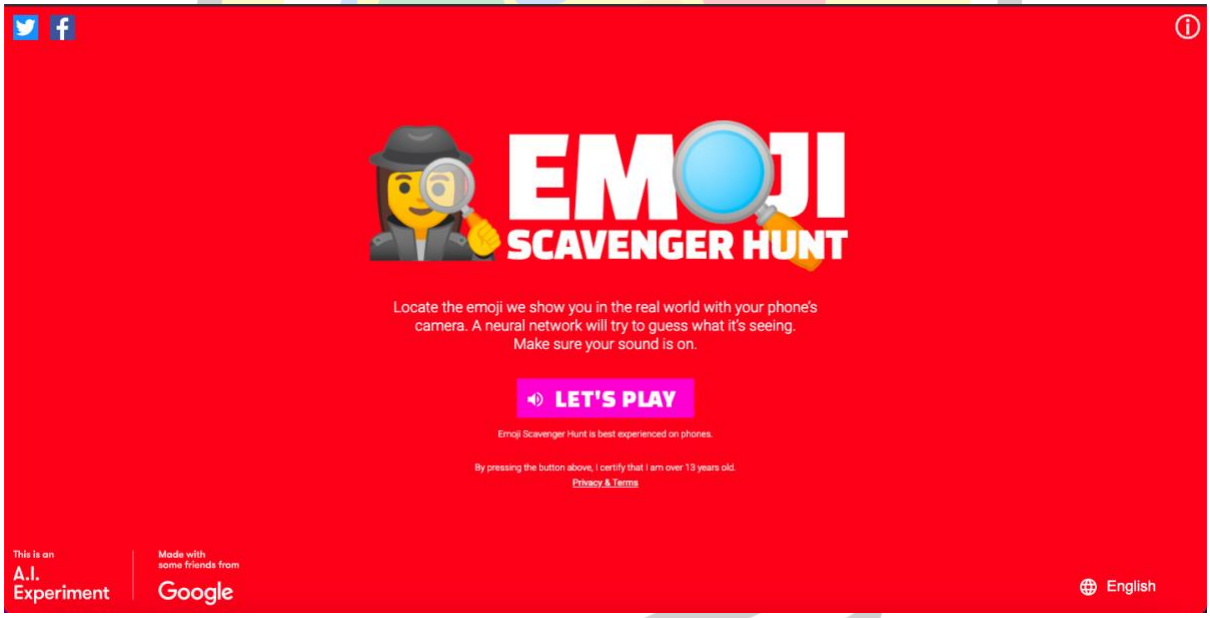
COMPUTER VISION

• COMPUTER VISION INTRODUCTION

As we all know, artificial intelligence is a technique that enables computers to mimic human intelligence. As humans we can see things, analyse it and then do the required action on the basis of what we see. But can machines do the same? Can machines have the eyes that humans have? If you answered Yes, then you are absolutely right. The Computer Vision domain of Artificial Intelligence, enables machines to see through images or visual data, process and analyse them on the basis of algorithms and methods in order to analyse actual phenomena with images. Now before we get into the concepts of Computer Vision, let us experience this domain with the help of the following game:
Emoji Scavenger Hunt : https://emojiscavengerhunt.withgoogle.com/

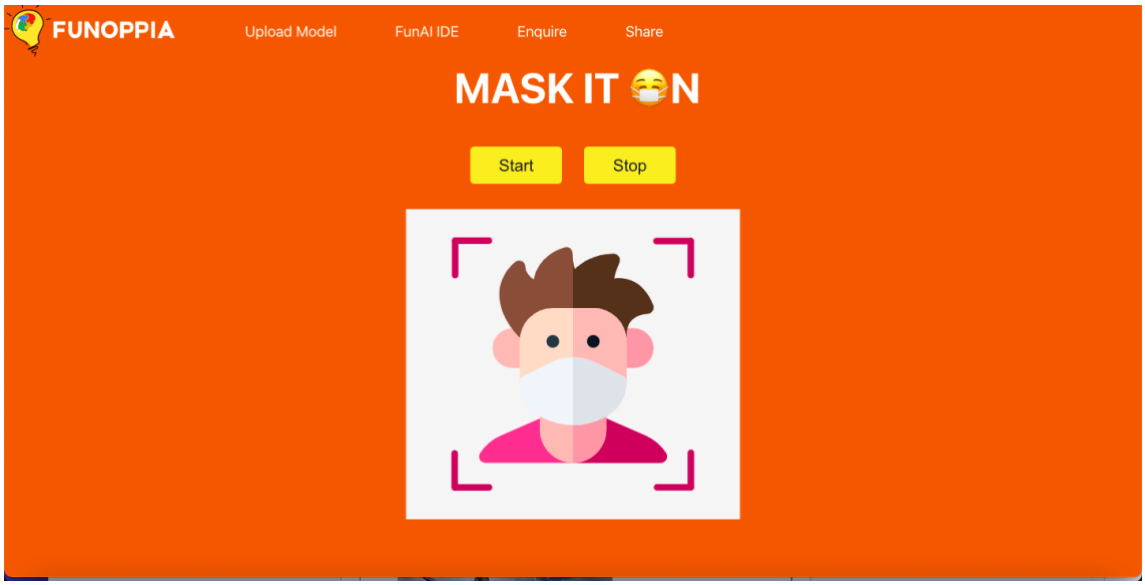


Go to the link and try to play the game of Emoji Scavenger Hunt. The challenge here is to find 8 items within the time limit to pass.

• APPLICATIONS OF CV

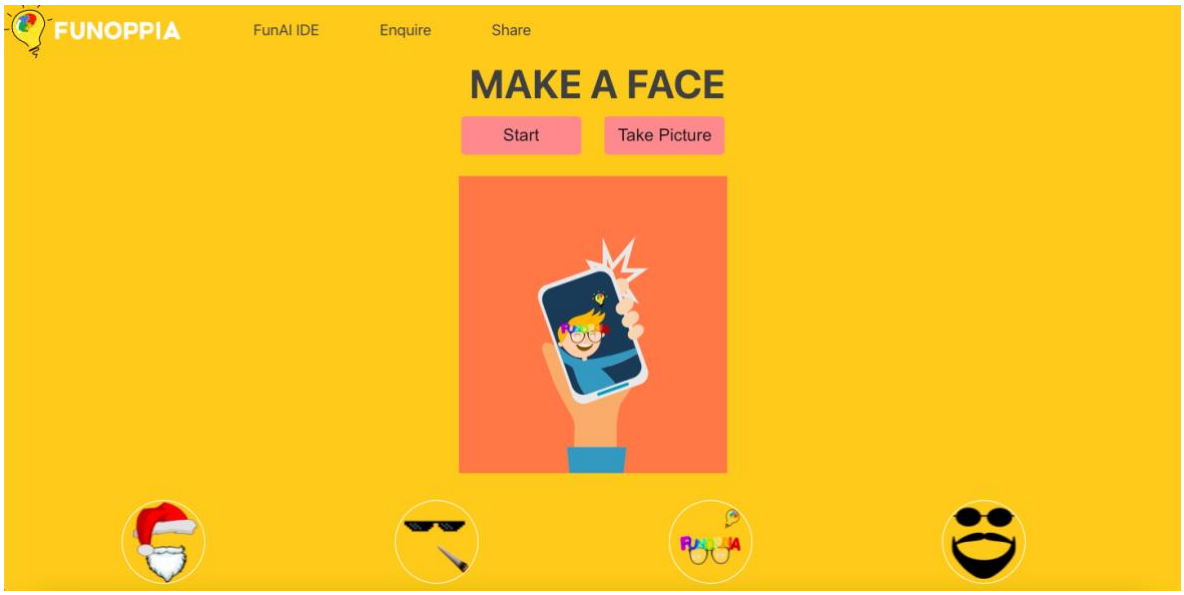
1. Face Mask Recognition Software –

This project checks whether the person using it is wearing a mask or not, go try and check it out on - https://projects.funoppia.com/mask/



2. Make a Face (Filters) -

This is a project which puts filters on your face to try on. Try the project on - https://projects.funoppia.com/filter/

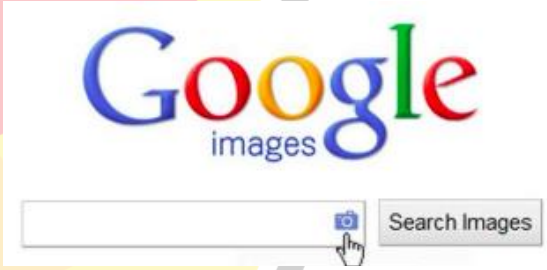


3. Self Driving Cars –

Computer Vision is the fundamental technology behind developing autonomous vehicles. Most leading car manufacturers in the world are reaping the benefits of investing in artificial intelligence for developing on-road versions of hands-free technology. This involves the process of identifying the objects, getting navigational routes and also at the same time environment monitoring.

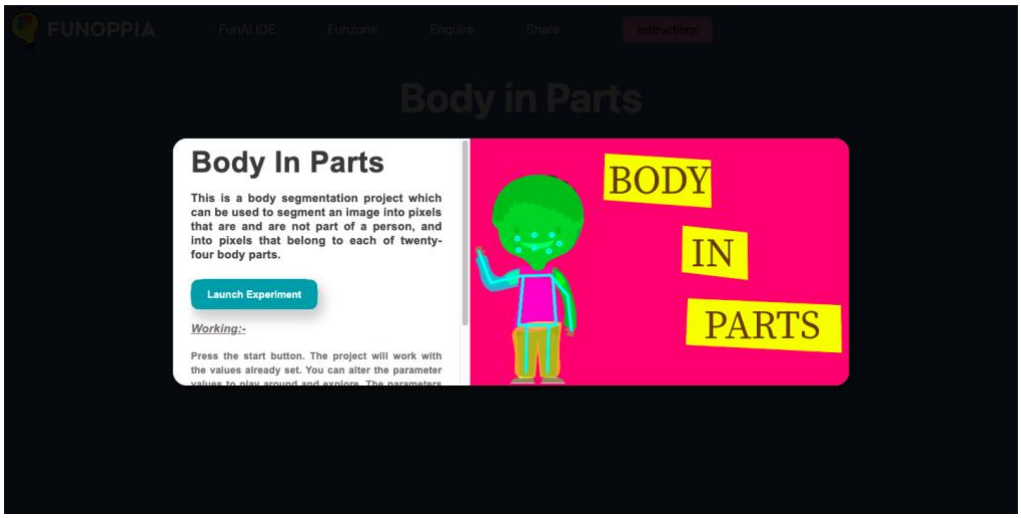
4. Google's Search by Image -

The maximum amount of searching for data on Google's search engine comes from textual data, but at the same time it has an interesting feature of getting search results through an image. This uses Computer Vision as it compares different features of the input image to the database of images and give us the search result while at the same time analysing various features of the image



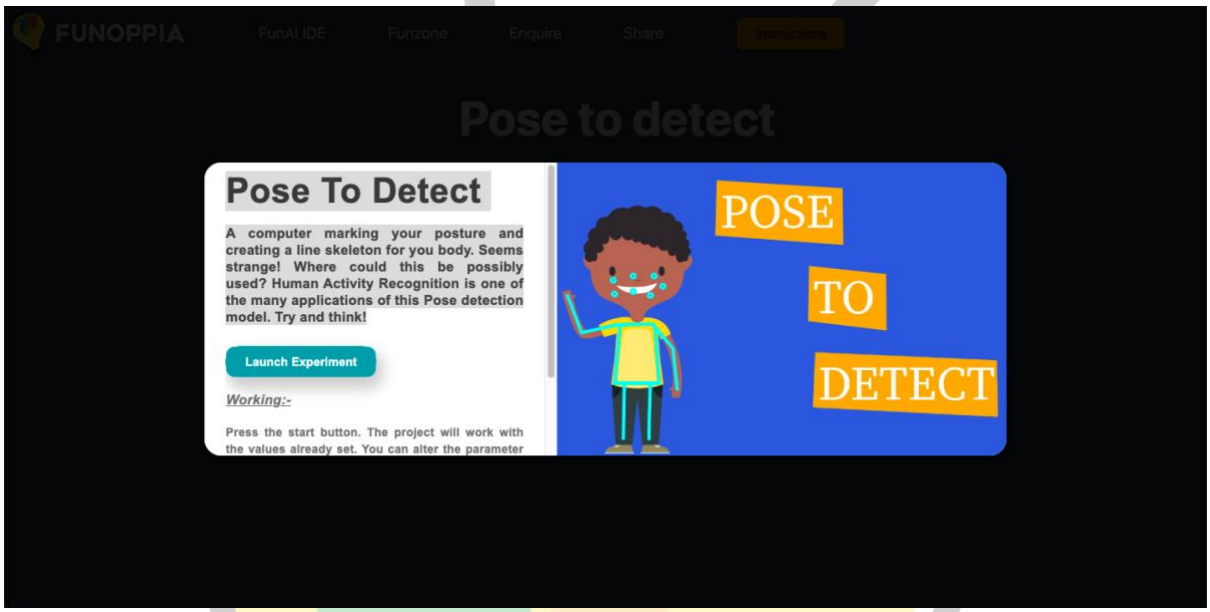
5. Body In Parts

This is a body segmentation project which can be used to segment an image into pixels that are and are not part of a person, and into pixels that belong to each of twenty-four body parts. - https://projects.funoppia.com/body/

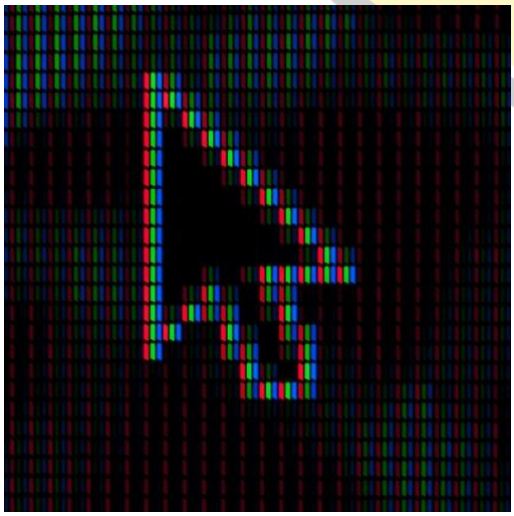


6. Pose To Detect

A computer marking your posture and creating a line skeleton for you body. Seems strange! Where could this be possibly used? Human Activity Recognition is one of the many applications of this Pose detection model. Try and think! https://projects.funoppia.com/pose/



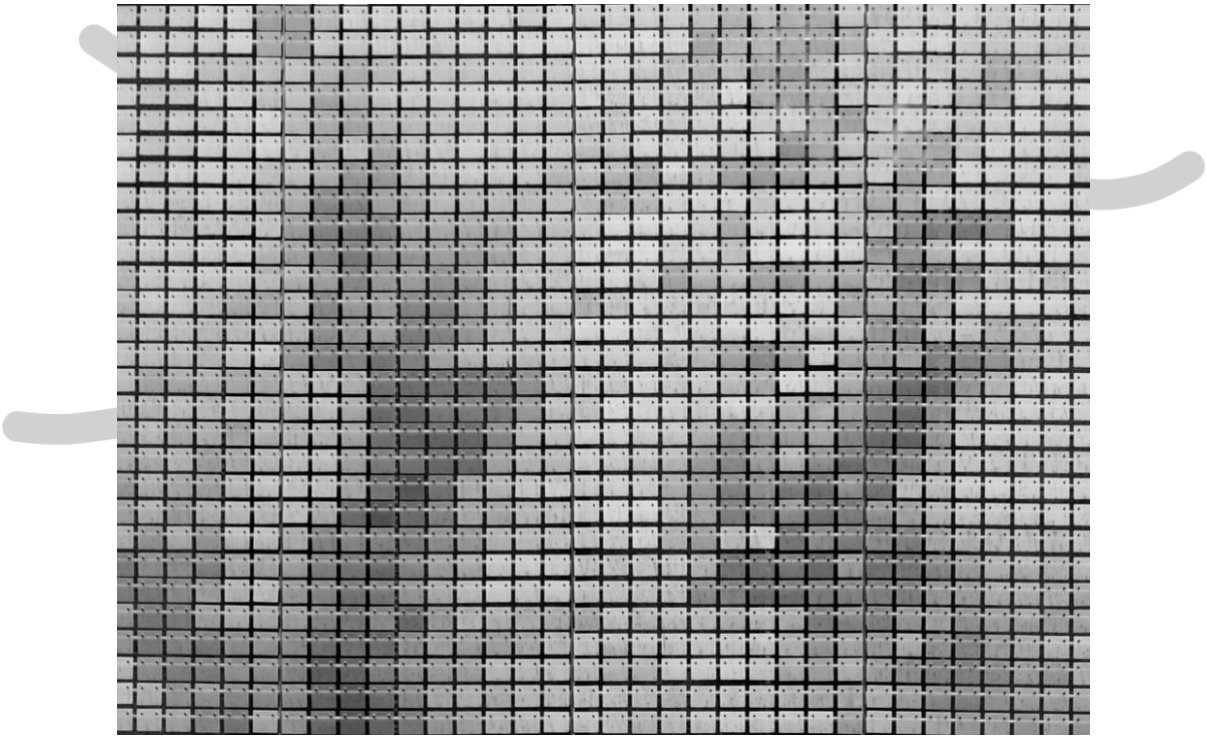
- **PIXEL**



A pixel, or picture element, in the context of computer vision, is the numerical value of the scalar (gray scale or index) or vector (color or multispectral) information at one point in a picture, or image. An image is typically represented as an array of pixels. View different pixels here by zooming in and zooming out of the image https://csfieldguide.org.nz/en/interactives/pixel-viewer/

• HOW DO COMPUTERS SEE IMAGES?

How does our brain work? If our goal is to emulate human vision, CV should be achieved in a manner similar to how our brain enables vision. Of course, we do not yet fully understand how our brain works.
How do we achieve it? A computer sees an image as series of pixels with it transforms to and array. The image below shows a simplified example of the process.



In this example, each pixel is represented by a number from 0-255 (RGB color code). For a 12×16 image size, we end up with an array of 12 x 16 8-bit integer values. If instead of black and white, the image was in full color for each pixel, we would have three values.

• IMAGE FEATURES FOR CLASSIFICATION

Classification problems in image and signal analysis require, on the algorithmic side, to take into account complex information embedded in the data. Images might contain many thousands of pixel values in several colour channels; their correlation and relationship characterizes the class and enables drawing a separation criteria from other classes. It is generally non-feasible to integrate all this information in reasonable running time for classification problems. Therefore, image and signal features are extracted as a representatives of each object and its class.

• INTRODUCTION TO OPENCV

OpenCV or Open Source Computer Vision Library is that tool which helps a computer extract these features from the images. It is used for all kinds of images and video processing and analysis. It is capable of processing images and videos to identify objects, faces, or even handwriting. In this chapter we will use OpenCV for basic image processing operations on images such as resizing, cropping and many more. To install OpenCV library, open command prompt and then write the following command:

pip install opencv-python