06/01/22

Project description [HANDWRITTEN RECOGNITION USING CNN]

This project aims at developing a cost-effective web-based Handwriting recognition application, Medicine Box, using neural network. It is commonly known that doctors have illegible handwriting. Doctors use Latin abbreviations and medical terminologies on prescriptions that are not understandable by the common people. Medicine Box application can easily be used by both medicine field & common people. So this project tries to develop an application where we can upload a prescription note from which we extract medicine name. The project aims at handwriting recognition of doctors prescription based on deep learning algorithms.

Here we used a deep machine learning approach through Tensorflow

Tensorflow is a free software library used for providing immense Peformance in the computation of numerical data.

Tensorflow is used to build a Convolutional Neural Network with the help of collection of dataset. In addition, CNN is used to peform intelligent calculating network for recognizing doctor's prescription. To build a CNN model a handwritten dataset is going to use.

" The most challenging part of this system is pattern recognition and

classification. In the classification part, the characters are extracted from each word image. Then it classified each character independently to reconstruct a word. To accomplish this task, it has to analyze a match between the features extracted from the given characters image and the library of various image models which has proposed to identify or recognize the handwritten characters and it would give the output of digital text. The main aim of this project is to effectively recognize a doctors prescription of the format using the convolutional Neural network.

* The proposed system can be divided into five main steps.

1. preprocessing
2. Segmentation
3. Feature Extraction
4. Training
5. Testing and detection

* Data Flow Diagram

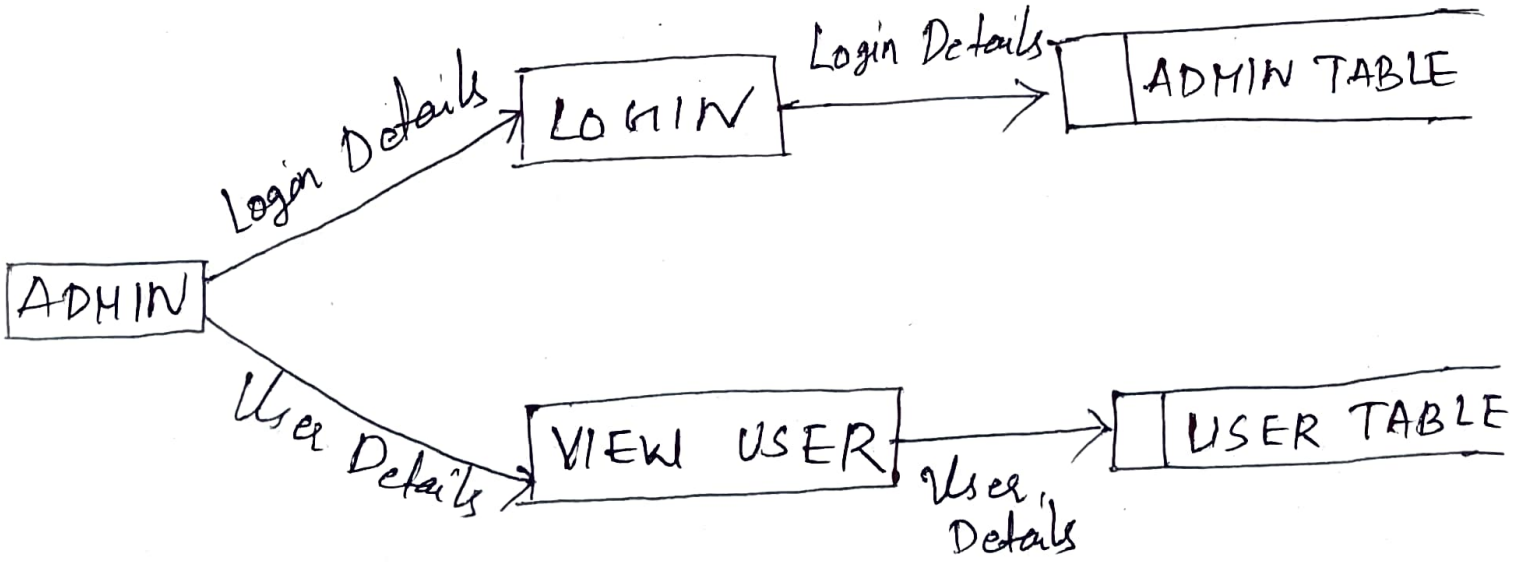
A DFD shows the flow of data through a system. Data flow diagrams are the central tool and the basis from which other components are developed. It shows the movements of data through the different processes in the system.

Modules

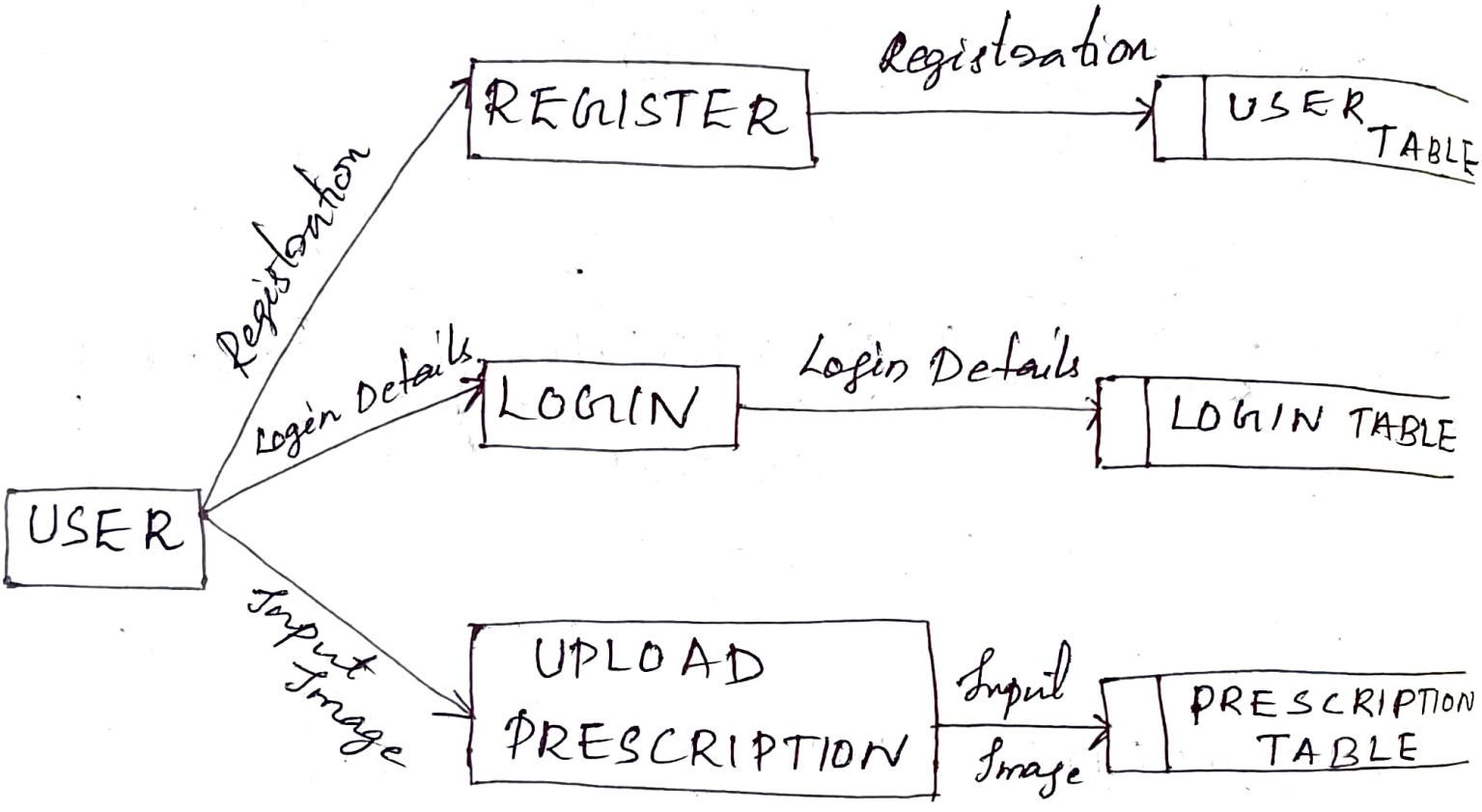
1. Admin
2. User

Context Diagram / Level 0

Level 1DFD : ADMIN



level 1 DFD: USER



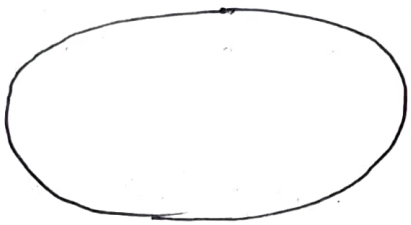
*Use Case Diagram

The purpose of use case diagram is to capture the dynamic aspect of a system.
The purpose of use case diagrams are:

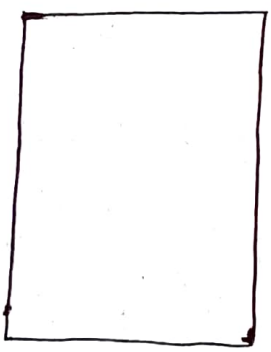
1. Used to gather requirements of a system
2. Used to get an outside view of a system
3. Show the interactions among the requirements and actors.

Actor: Actor in a use case diagram is any entity that performs a role in one given system. This could be a person, organization or an external system & usually drawn like skeleton.

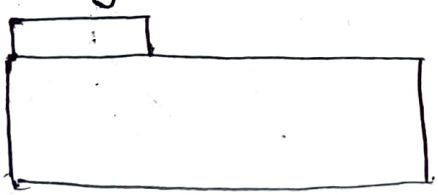
Use Case:- A use case represents a function or an action within the system.



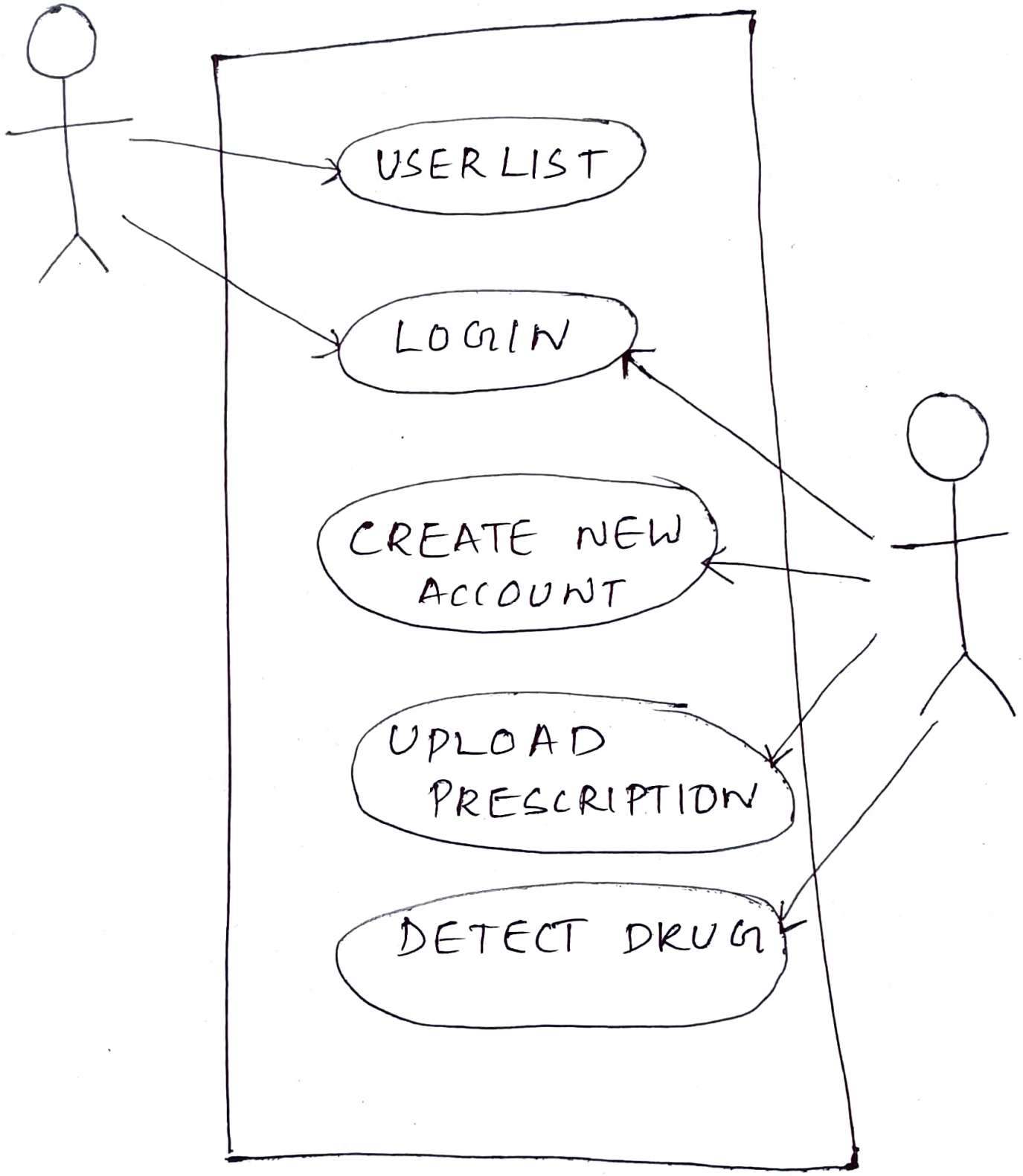
System:- System is used to define the scope of the usecase



Package:- Package is another optional element that is extremely useful in complex diagrams.



HANDWRITTEN RECOGNITION



6/11/22 Project Usecase diagram.

Methodology and design

Our proposed system could be divided into five main steps.

1. Preprocessing
2. Segmentation
3. Feature Extraction
4. Training
5. Testing and detection

Preprocessing

Preprocessing is required to clean image data for model input.

Algorithm

- Read the picture files
- Decode the JPEG content to RGB grids of pixels with channels.
- Convert these into floating-point tensors for input to neural nets. [matrix math tensor operations]
- Rescale the pixel values (0 & 255) to the [0, 1] interval.

nb: Image is 2D & represented as a matrix with 3 channels.

Segmentation

- Image of input model is decomposed into sub-images of individual medicines
- Preprocessed input image is segmented into isolated medicine name
- In short, cropping of individual drugs according to the Region of Interest (ROI)
- After segmentation CNN algorithm works.

* CNN WORKING

- CONVOLUTION LAYERS
- POOLING LAYERS
- FULLY CONNECTED LAYERS

These are the three main steps through which CNN algorithm works.

1. CONVOLUTION

- The purpose of the convolution is to extract the features of the object on the image
- It's an element-wise multiplication stage.

- Algorithm will scan a part of the image, then multiplies it to a filter
- Filter is also called kernel.
- Output of the element-wise multiplication is called a feature image.
- Steps repeating until the image is scanned fully.
- After convolution, size of the image is reduced into multiple convolutional layers

2. POOLING

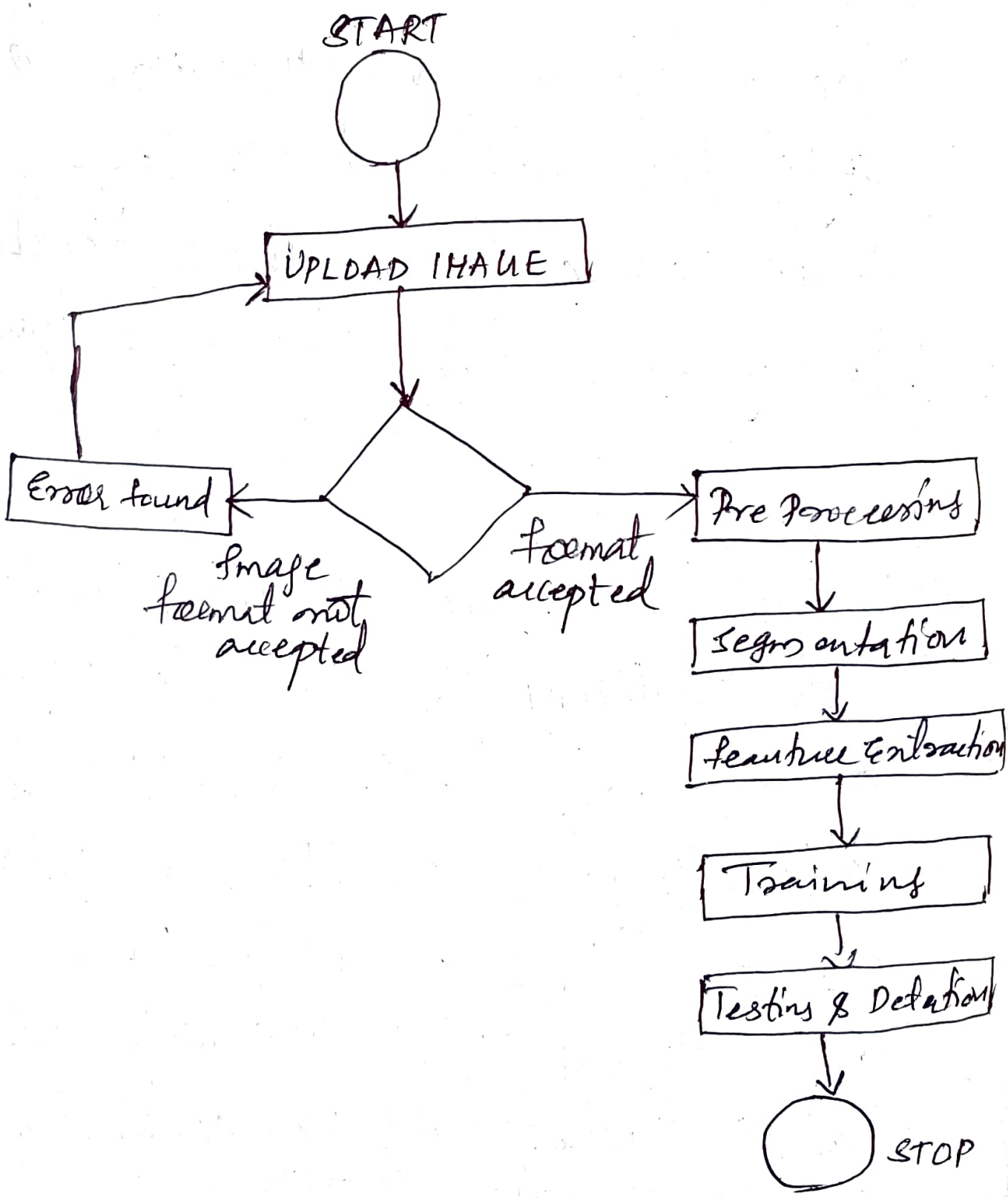
- Purpose of pooling is to reduce the dimensionality of the input image
- Two types of pooling
  1. Max pooling
  2. Average pooling
- Max pooling returns the maximum value from the portion of the feature image
- Average pooling returns the average of all the values from the portion of the feature image.

3. FULLY CONNECTED LAYERS

- CONVOLUTION and POOLING continues multiple times and at last all the neurons from the previous layer fed into network layer called dense layer, there occurs testing and prediction of output.

nb: first convLayer is responsible for capturing the Low-level features such as edges, color etc. With added layers, architecture adapts to the High level features as well, giving us a network which has the wholesome understanding of images in the dataset.

Activity Diagram



System Architecture