CovidVision:Advanced COVID-19 Detection from Lung X-rays With Machine Learning or Deep Learnings

A PROJRCT

Submitted by

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Project Report Format

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ODIR: Seeing The Big Picture For Eye Health

1. INTRODUCTION

1.1 Project Overview

Eye health refers to the overall health and well-being of the eyes and the visual system. It includes the prevention, diagnosis, and treatment of eye conditions and diseases that affect vision, such as refractive errors, cataracts, glaucoma, and agerelated macular degeneration (AMD).Eye health is the maintenance of good visual function, prevention of eye diseases, and treatment of eye disorders or conditions that may affect the eyes' ability to function properly. The eyes are complex organs that allow us to see the world around us, and maintaining good eye health is essential for maintaining quality of life. In this project we are classifying various types of Eye Diseases that people get due to various reasons like age, diabetes, etc. These diseases are majorly classified into 4 categories namely Normal, cataract, Diabetic Retinopathy & Glaucoma. Deep-learning (DL) methods in artificial intelligence (AI) play a dominant role as high-performance classifiers in the detection of the Eye Diseases using images. Transfer learning has become one of the most common techniques that has achieved better performance in many areas, especially in image analysis and classification. We used Transfer Learning techniques like Inception V3, VGG19, Xception V3 that are more widely used as a transfer learning method in image analysis and they are highly effective.

1.2 Purpose

- Preprocessing the images.
- Applying Transfer learning algorithms on the dataset.
- How deep neural networks detect the disease.
- You will be able to know how to find the accuracy of the model.
- You will be able to Build web applications using the Flask framework.

2. IDEATION & PROPOSED SOLUTION

2.1 Problem Statement Definition

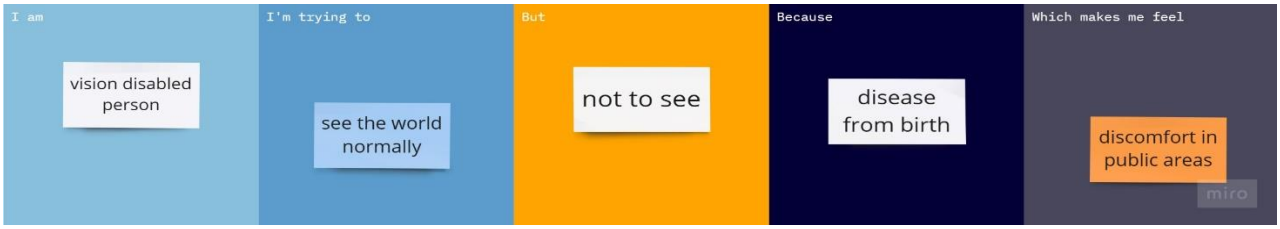
Customer Problem Statement Template:

Most people have eye problems at one time or another. Some are minor and will go away on their own, or are easy to treat at home. Others need a specialist's care.

Whether your vision isn't what it used to be, or never was that great, there are things you can do to get your eye health back on track.

See if any of these common problems sound familiar. And always check with a doctor if your symptoms are really bad or don't clear up within a few days

I am	Describe customer with 3-4 key characteristics - *who are they?*	Describe the customer and their attributes here
I'm trying to	*List their outcome or "job" the care about - what are they trying to achieve?*	List the thing they are trying to achieve here
but	Describe what problems or barriers stand in the way – *what bothers them most?*	Describe the problems or barriers that get in the way here
because	Enter the "root cause" of why the problem or barrier exists – *what needs to be solved?*	Describe the reason the problems or barriers exist
which makes me feel	Describe the emotions from the customer's point of view – *how does it impact them emotionally?*	Describe the emotions the result from experiencing the problems or barriers



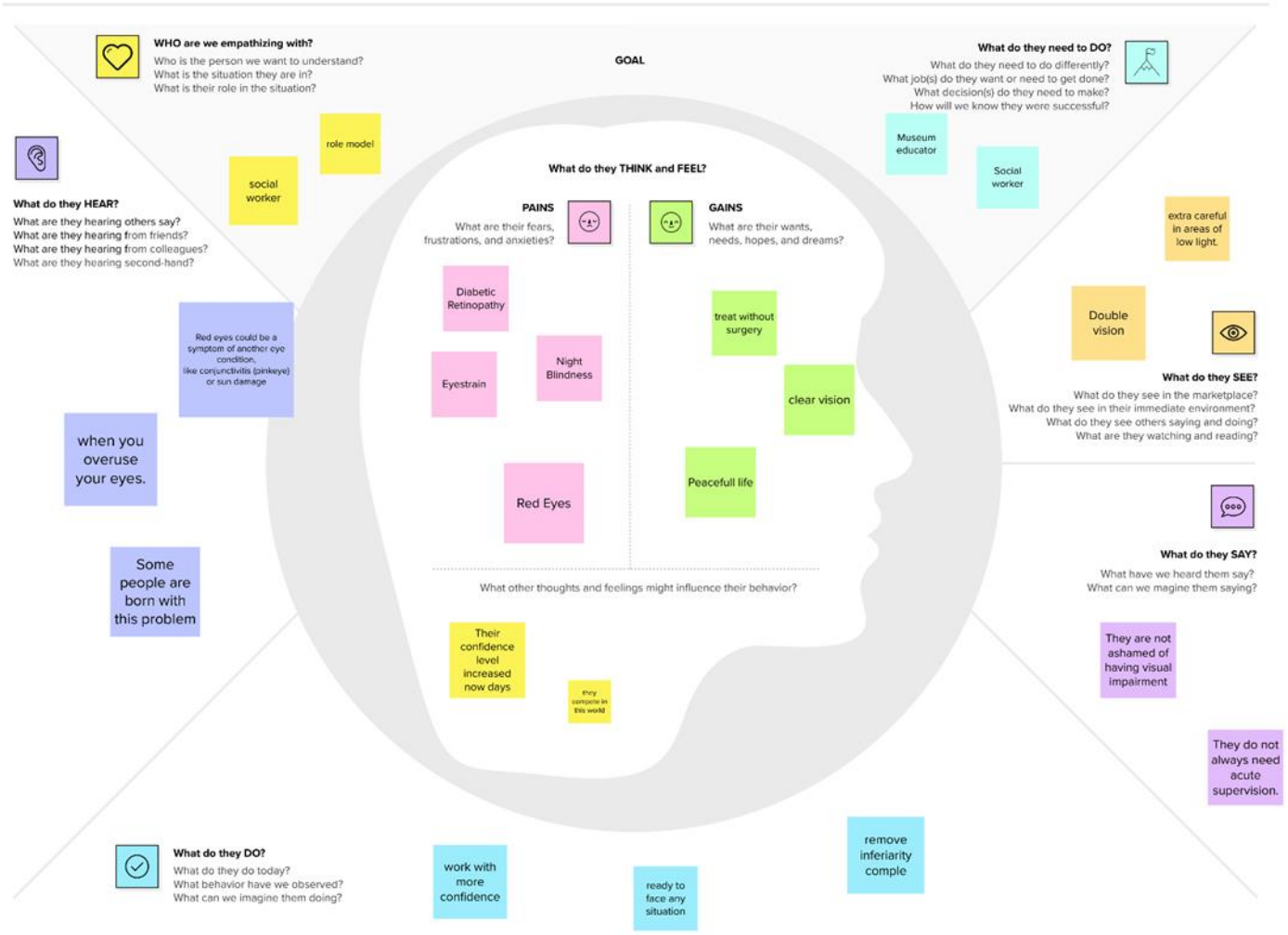
Problem Statement (PS)	**I am (Customer)**	**I'm trying to**	**But**	**Because**	**Which makes me feel**
PS-1	Person-1	Live like normal human	Surrounding	Inferiority complex	Disable person
PS-2	Person-2	Great racer	Vision problem	Basic need in racing	To forget my ambition
PS-3	Person-3	Police	Vision disability	Physical requirement	I cannot be a save people
PS-4	Person-4	driver	Improper vision	Can't drive a vehicle	I not a proper driver
PS-5	Person-5	student	Blind by birth	Gene problem	I am not fell like normal

2.2 Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

It is a useful tool to helps teams better understand their users.

Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



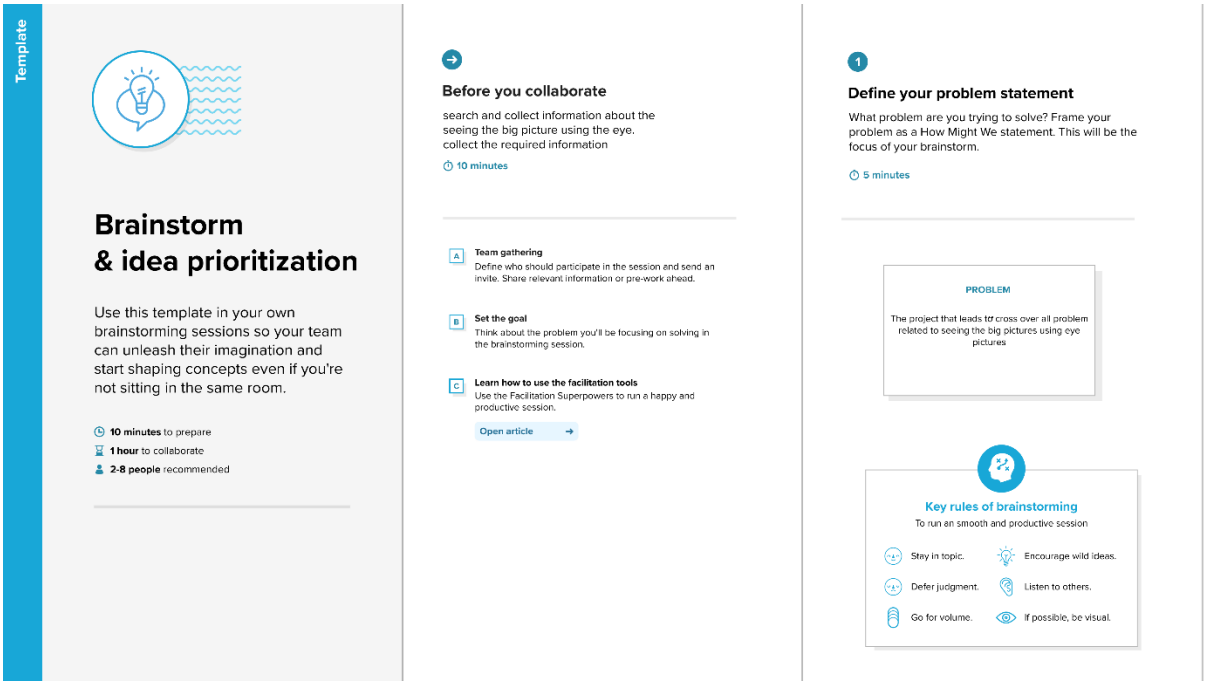
2.3 Ideation & Brainstorming

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built

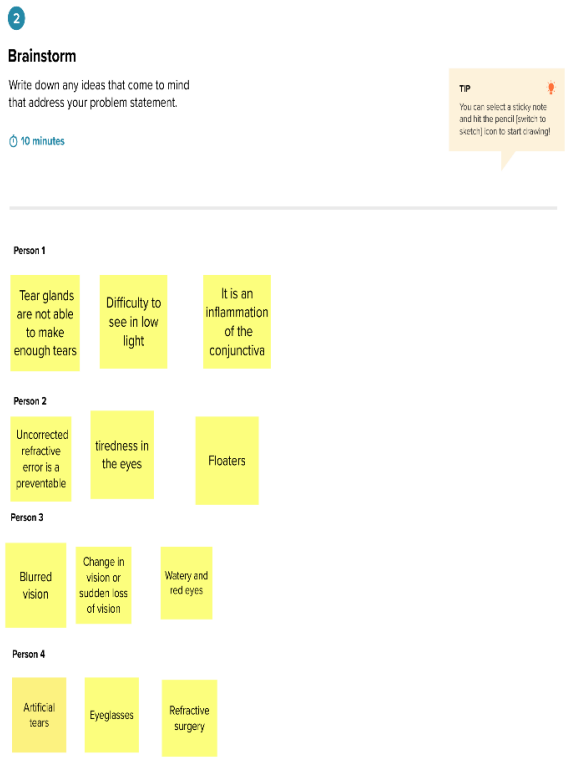
upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

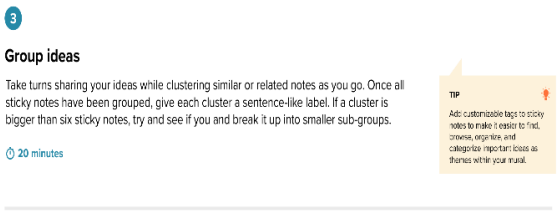
Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Step-1: Team Gathering, Collaboration and Select the Problem Statement

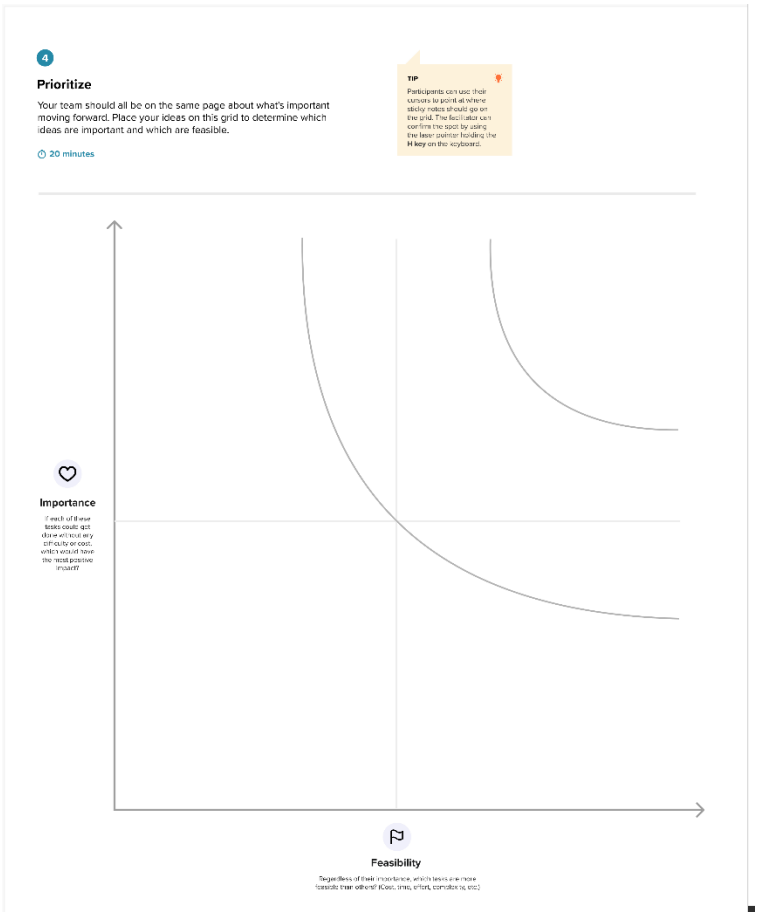


Step-2: Brainstorm, Idea Listing and Grouping





Step-3: Idea Prioritization



2.4 Proposed Solution

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Your retina transforms light into signals your brain can process. Diabetes can swell the retina and make blood vessels leak or grow,

		causing blurring, flashes, floaters, pain and pressure.
2.	Idea / Solution description	To detect the eye problems using deep learning. The disease easily detected at the initial stage.
3.	Novelty / Uniqueness	The disease can be detected at any stage
4.	Social Impact / Customer Satisfaction	Every time go to labs for checking stage of the eye disease.
5.	Business Model (Revenue Model)	That the tool created as app. The photos of eye to be uploaded and that tool detect the stage of the disease.
6.	Scalability of the Solution	The app get free services for first two picture detections

3. REQUIREMENT ANALYSIS

3.1 Functional Requirement

Following are the functional requirements of the proposed solution.

FR No.	**Functional Requirement (Epic)**	**Sub Requirement (Story / Sub-Task)**
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN Registration through Facebook
FR-2	User Confirmation	Confirmation via Email

		Confirmation via OTP Confirmation via Call
FR-3	Completion the profile	Fill the Name Fil the Age Fil the Gender Fill the Eye problem
FR-4	Continue with	10 Image Detection free trial Continue with membership
FR-5	Upload the Images of Affected Eye	Upload the affected eye images in our app
FR-6	Image Processing	AI is detect and identify the eye problem wait for few minutes
FR-7	Report generation	Free version of report- Disease name Details about disease

3.2 Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

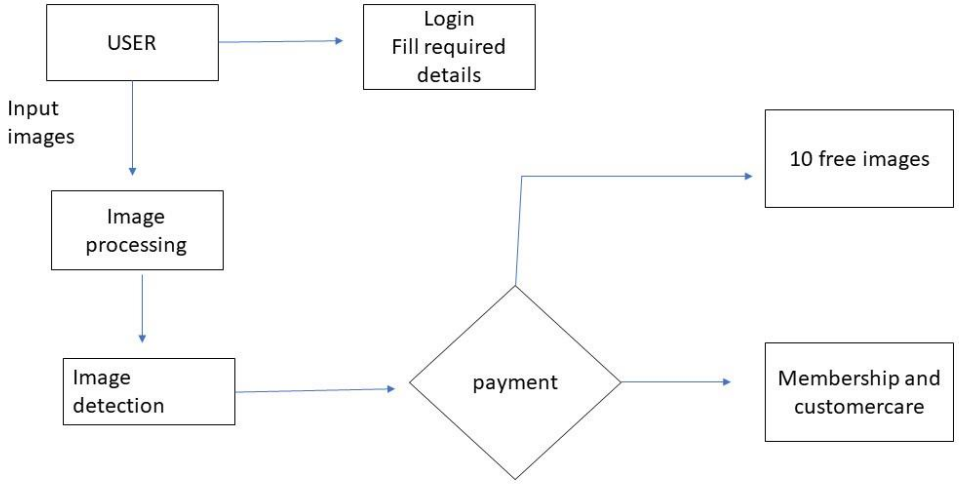
FR No.	**Non-Functional Requirement**	**Description**
NFR-1	**Usability**	Available in all languages around in India
NFR-2	**Security**	User data bases are encrypted in our own data centre
NFR-3	**Reliability**	Frequently gives update to resolve the bug in our App

NFR-4	**Performance**	Users can access the App whenever internet speed is low
NFR-5	**Availability**	We can fulfil the requirements of user experience
NFR-6	**Scalability**	Our App traffic limit must be 500000 users at a time

4. PROJECT DESIGN

4.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

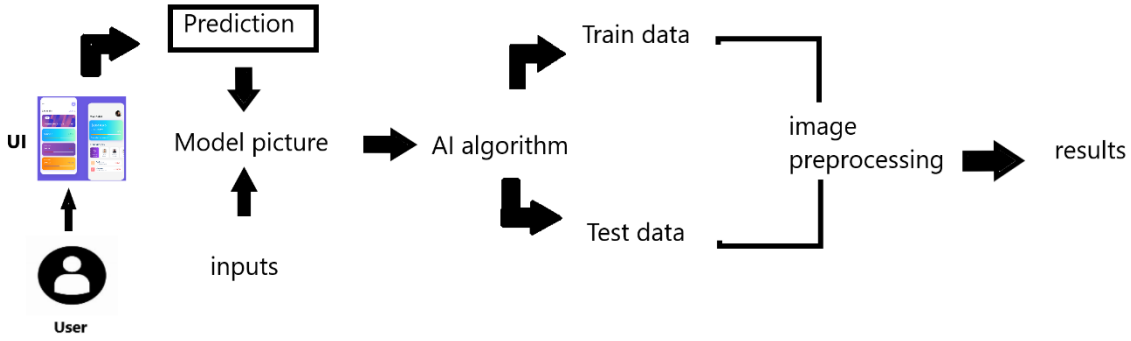


4.2 Solution & Technical Architecture

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Solution Architecture Diagram:



4.3 User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashbo

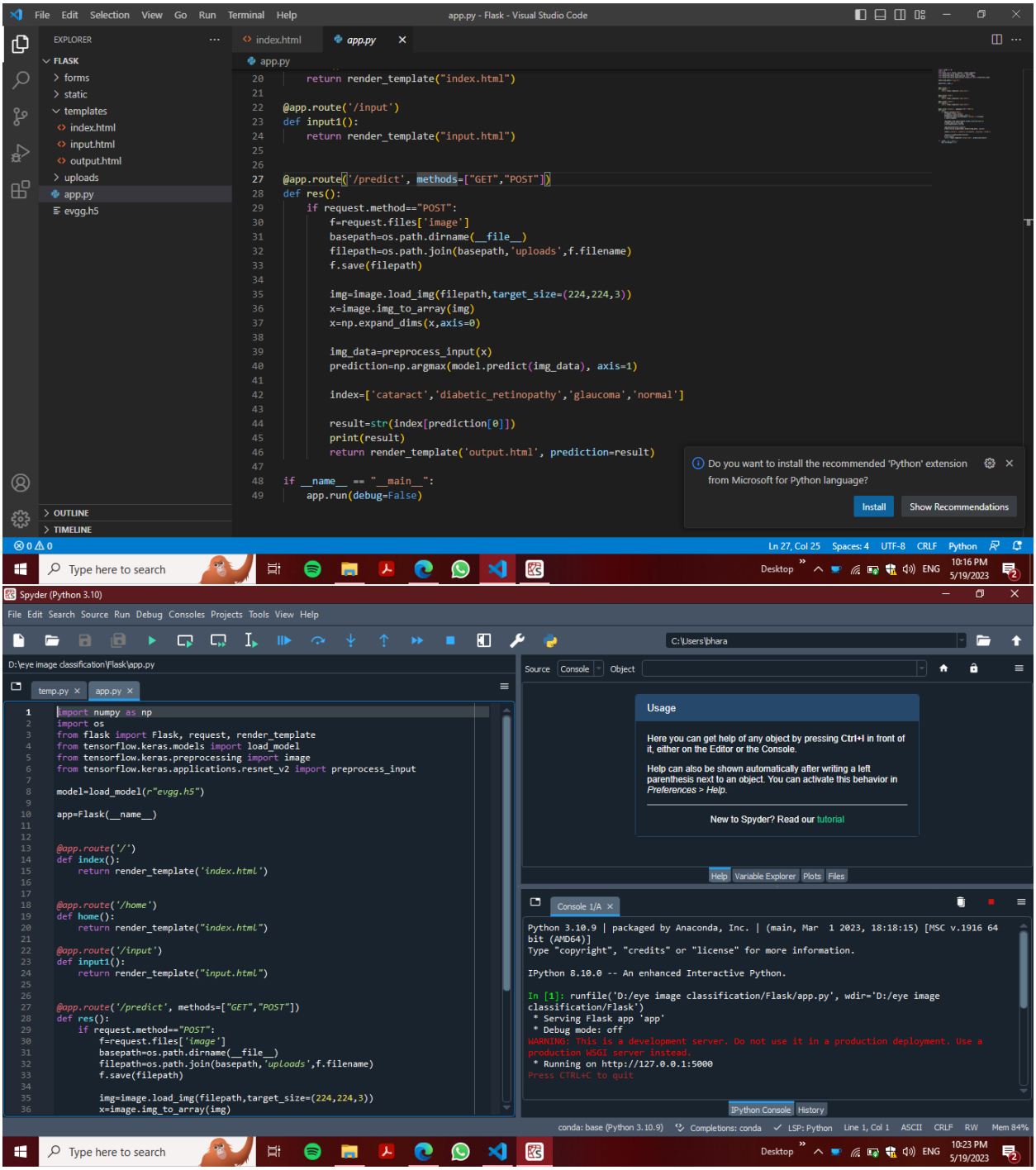
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email click confirm
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashb with Facebook Login
		USN-4	As a user, I can register for the application through Gmail	I can register through gmail
	Login	USN-5	As a user, I can log into the application by entering email & password	Give login using otp
	Dashboard	USn-6	I cannot download result	I need history option in my dash

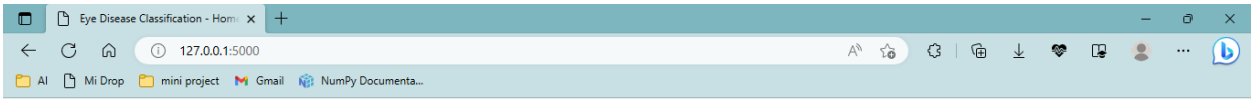
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria
			after image processed.	
Customer (Web user)	login	USN-7	As a user I login every time in browser	Give the keep me signed in optio
	Multiple login	USN-8	Need multiple device login option	I need this option for download r result.
	Doctor recommendation	USN-9	Give doctor recommendation	Give perfect doctor
Customer Care Executive	Need importance	USN-10	Give importance for both customer	Improve in customer care
Administrator	advertisement	USN-11	Make advertisement	Spend in advertisement

5. CODING & SOLUTIONING (Explain the features added in the project along with code)

6 RESULTS

6.1 PERFORMANCE METRICES





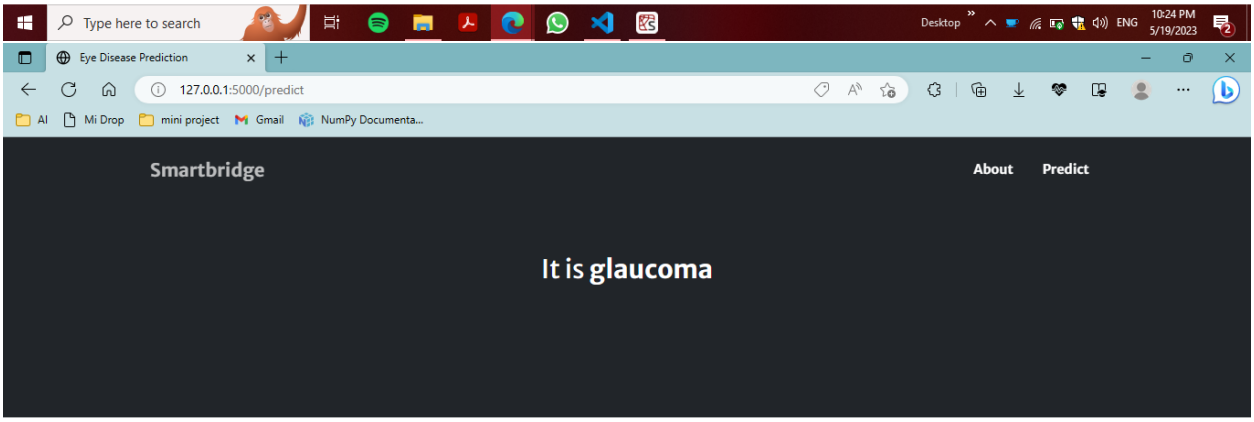
Smartbridge.

- Home
  Predict

Eye Disease Prediction

Through this project we will be able to classify the type of Eye Disease. This project is build by using Transfer Learning.Transfer learning is a research problem in machine learning (ML) that focuses on storing knowledge gained while solving one problem and applying it to a different but related problem.

Predict
hero



7 ADVANTAGES AND DISADVANTAGES

7.1 ADVANTAGES

1. Reduction in Human Error

One of the biggest advantages of Artificial Intelligence is that it can significantly reduce errors and increase accuracy and precision. The decisions taken by AI in every step is decided by information previously gathered and a certain set of algorithms. When programmed properly, these errors can be reduced to null.

Example:

An example of the reduction in human error through AI is the use of robotic surgery systems, which can perform complex procedures with precision and accuracy, reducing the risk of human error and improving patient safety in healthcare.

2. Zero Risks

Another big advantage of AI is that humans can overcome many risks by letting AI robots do them for us. Whether it be defusing a bomb, going to space, exploring the deepest parts of oceans, machines with metal bodies are resistant in nature and can survive unfriendly atmospheres. Moreover, they can provide accurate work with greater responsibility and not wear out easily.

Example:

One example of zero risks is a fully automated production line in a manufacturing facility. Robots perform all tasks, eliminating the risk of human error and injury in hazardous environments.

3. 24x7 Availability

There are many studies that show humans are productive only about 3 to 4 hours in a day. Humans also need breaks and time offs to balance their work life and personal life. But AI can work endlessly without breaks. They think much faster than humans and perform multiple tasks at a time with accurate results. They can even handle tedious repetitive jobs easily with the help of AI algorithms.

Example:

An example of this is online customer support chatbots, which can provide instant assistance to customers anytime, anywhere. Using AI and natural language processing, chatbots can answer common questions, resolve issues, and escalate complex problems to human agents, ensuring seamless customer service around the clock.

4. Digital Assistance

Some of the most technologically advanced companies engage with users using digital assistants, which eliminates the need for human personnel. Many websites utilize digital assistants to deliver user-requested content. We can discuss our search with them in conversation. Some chatbots are built in a way that makes it difficult to tell whether we are conversing with a human or a chatbot.

Example:

We all know that businesses have a customer service crew that must address the doubts and concerns of the patrons. Businesses can create a chatbot or voice bot that can answer all of their clients' questions using AI.

5. New Inventions

In practically every field, AI is the driving force behind numerous innovations that will aid humans in resolving the majority of challenging issues.

For instance, recent advances in AI-based technologies have allowed doctors to detect breast cancer in a woman at an earlier stage.

Example:

Another example of new inventions is self-driving cars, which use a combination of cameras, sensors, and AI algorithms to navigate roads and traffic without human intervention. Self-driving cars have the potential to improve road safety, reduce traffic congestion, and increase accessibility for people with disabilities or limited mobility. They are being developed by various companies, including Tesla, Google, and Uber, and are expected to revolutionize transportation.

7.2 DISADVANTAGES

1. High Costs

The ability to create a machine that can simulate human intelligence is no small feat. It requires plenty of time and resources and can cost a huge deal of money. AI also needs to operate on the latest hardware and software to stay updated and meet the latest requirements, thus making it quite costly.

2. No Creativity

A big disadvantage of AI is that it cannot learn to think outside the box. AI is capable of learning over time with pre-fed data and past experiences, but cannot be creative in its approach. A classic example is the bot Quill who can write Forbes earning reports. These reports only contain data and facts already provided to the bot. Although it is impressive that a bot can write an article on its own, it lacks the human touch present in other Forbes articles.

3. Unemployment

One application of artificial intelligence is a robot, which is displacing occupations and increasing unemployment (in a few cases). Therefore, some claim that there is always a chance of unemployment as a result of chatbots and robots replacing humans.

For instance, robots are frequently utilized to replace human resources in manufacturing businesses in some more technologically advanced nations like Japan. This is not always the case, though, as it creates additional opportunities for humans to work while also replacing humans in order to increase efficiency.

4. Make Humans Lazy

AI applications automate the majority of tedious and repetitive tasks. Since we do not have to memorize things or solve puzzles to get the job done, we tend to use our brains less and less. This addiction to AI can cause problems to future generations.

5. No Ethics

Ethics and morality are important human features that can be difficult to incorporate into an AI. The rapid progress of AI has raised a number of concerns that one day, AI will grow uncontrollably, and eventually wipe out humanity. This moment is referred to as the AI singularity.

8 CONCLUSION

Artificial intelligence has the potential to transform all organizations. The process by which this transformation happens can vary, but the steps will tend to follow the roadmap we have listed in this book. Following all the steps outlined in the previous chapters will enable your organization to implement and excel in the use of AI technology. AI holds the key to unlocking a magnificent future where, driven by data and computers that understand our world, we will all make more informed decisions. These computers of the future will understand not just *how* to turn on the switches but *why* the switches need to be turned on. Even further, they may one day ask us if we need *switches* at all.

Although AI cannot solve all your organization's problems, it has the potential to completely change how business is done. It affects every sector, from manufacturing to finance, bringing about never before seen increases in efficiency. As more industries adopt and start experimenting with this technology, newer applications will be invented. AI will bring a change even more widespread and sweeping than the introduction of computing devices. It will change the way we transact, get diagnosed, perform surgeries, and drive our cars. It is already changing industrial processes, medical imaging, financial modeling, and computer vision. We are well on our way to tapping into this enormous potential, and as a result, the future holds better decision-making potential and faster, ...

9 FUTURE SCOPE

The future of Artificial Intelligence is bright in India, with many organizations opting for AI automation. It is essential to understand the recent developments in AI to find suitable job roles based on your competencies.

The scope of Artificial Intelligence is limited to domestic and commercial purposes as the medical and aviation sectors are also using AI to improve their services. If AI is outperforming human efforts, then opting for AI automation will reduce costs in the long run for a business.

Automation in operational vehicles has created a buzz in the logistics industry as it is expected that automated **trucks/vehicles** may soon be used.

Due to the bright scope of Artificial Intelligence in the future, the number of AI start-ups is expected to increase in the coming years. Indicating the opportunities, the number of AI start-ups in India has increased significantly.

Moreover, India's talent gap for specialist AI developers is huge, and AI experts are needed by businesses more than ever. Businesses don't want to miss out on any technology that can revolutionize their business processes.

10 APPENDIX

10.1 SOURCE CODE

```
import numpy as np
import os
from flask import Flask, request, render_template
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
from tensorflow.keras.applications.resnet_v2 import preprocess_input

model=load_model(r"evgg.h5")

app=Flask(_name_)



@app.route('/')
def index():
    return render_template('index.html')



@app.route('/home')
def home():
    return render_template("index.html")

@app.route('/input')
```

```
def input1():
    return render_template("input.html")



@app.route('/predict', methods=["GET","POST"])
def res():
    if request.method=="POST":
        f=request.files['image']
        basepath=os.path.dirname(_file_)
        filepath=os.path.join(basepath,'uploads',f.filename)
        f.save(filepath)

        img=image.load_img(filepath,target_size=(224,224,3))
        x=image.img_to_array(img)
        x=np.expand_dims(x,axis=0)

        img_data=preprocess_input(x)
        prediction=np.argmax(model.predict(img_data), axis=1)

        index=['cataract','diabetic_retinopathy','glaucoma','normal']

        result=str(index[prediction[0]])
        print(result)
        return render_template('output.html', prediction=result)
```

if _name_ == "_main_":

app.run(debug=False)

GitHub Link

https://github.com/bharathi20BM002/ODIR-Seeing-the-Big-Picture-for-Eye-Health