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EARLY STAGE DISEASE DIAGNOSIS SYSTEM USING HUMAN NAIL IMAGE PROCESSING

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INTRODUCTION

1.1 OVERVIEW

In the healthcare domain, many diseases can be predicted by observing the color and shape of human nails. A white spot here, a rosy stain there, or some winkler projection may be an indication of disease in the body. Problems in the liver, lungs, and heart can show up in your nails. Doctors observe the nails of patients to get assistance in disease identification. Usually, pink nails indicate a healthy human. Healthy nails are smooth and consistent in color. Anything else affecting the growth and appearance of the fingernails or toenails may indicate an abnormality. A person's nails can say a lot about their health condition. The need for such systems to analyze nails for disease prediction is because the human eye is having subjectivity about colors, having limitations of the resolution, and a small amount of color change in a few pixels on the nail not being highlighted to human eyes which may lead to the wrong result, whereas computer recognize small color changes on nails.

To overcome the above problem we are building a model which is used for the prevention and early detection of Nail Disease, Basically nail disease diagnosis depends on the different characteristics like color, shape, texture, etc. Here the person can capture the images of the nail and then the image will be sent to the trained model. The model analyzes the image and detects whether the person is having nail disease or not and its type.

1.2 PURPOSE

Human's hand nail is analyzed to identify many diseases at early stage of diagnosis. Study of person hand nail color helps in identification of particular disease in healthcare domain. The proposed system guides in such scenario to take decision in disease diagnosis. The input to the proposed system is person nail image. The system will process an image of nail and extract features of nail which is used for disease diagnosis. Human nail consist of various features, out of which proposed system uses nail color changes for disease diagnosis. Here, first training set data is prepared using Weka tool from nail images of patients of specific diseases. A feature extracted from input nail image is compared with the training data set to get result. In this experiment we found that using color feature of nail image average 65% results are correctly matched with training set data during three tests conducted

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1. LITERATURE SURVEY

1.1 EXISTING PROBLEM

There are some existing systems which use color change of human palm for predicting disease. The system presented by Pandit et al. analyzes certain features in image and predicts probable disease using knowledge base of medical palmistry. Science of observing nails and palms to predict some diseases called Medical palmistry. Using example of the medical palmistry this model is discussed and presented for extraction of an interested portion of an image for further processing. This system presents work to get color of palm from the palm image and it works successfully on the different skin tones of human palm and increases accuracy of such observations of palm. The borders of palm are darker color than palm color in the scanned image of palm. Therefore exact boundary of palm may not found which can affect in the calculation of average color of palm. Image enhancement methods were used to overcome those problems. But this method is time consuming so to analyze nails it will take more time . So our system is using digital camera or mobile camera to get good quality image therefore it is easy to extract features of nails. There is another model, for nail color analysis which predicts diseases using digital image processing. The system presented by Hardik Pandit et. al observes the color of nails using the principles of medical science as basis and output of system is prediction of diseases, if found any. In healthcare domain doctors often observe human nails to as supporting information or symptoms in disease prediction. The same task is defined by the proposed model without any human intervention. The model gives more accurate results than human vision, because it overcomes the limitations of human eye like subjectivity and resolution power . As mentioned earlier different colors of nails indicate certain diseases. To implement this model, authors used computer based reference color values of ill nails to compare user's nail. That is, color values of nails of user's input images would be compared with these reference colors. If the case matches with any of reference color values, user would be victim of that disease. There will be 50 samples per color are taken for reference color values of ill nails. For example, for yellow nails, 50 different yellow nails color values are considered, and then their arithmetic mean is considered as a reference color value for yellow nails to RGB color components of reference color for that disease

1.2 PROPOSED SYSTEM

The main objective of this system design is to provide an application for use in healthcare domain this is advantageous in terms of cost and time. The proposed system will take nail image as an input and will perform some processing on input image. Then finally it will predict probable diseases. This system can be used by people as well as by doctors in healthcare domain. In healthcare domain to predict a disease, patient should go through various tests which are of high cost as mentioned in above table. The proposed system will help to avoid unwanted tests in the earlier stage of disease.

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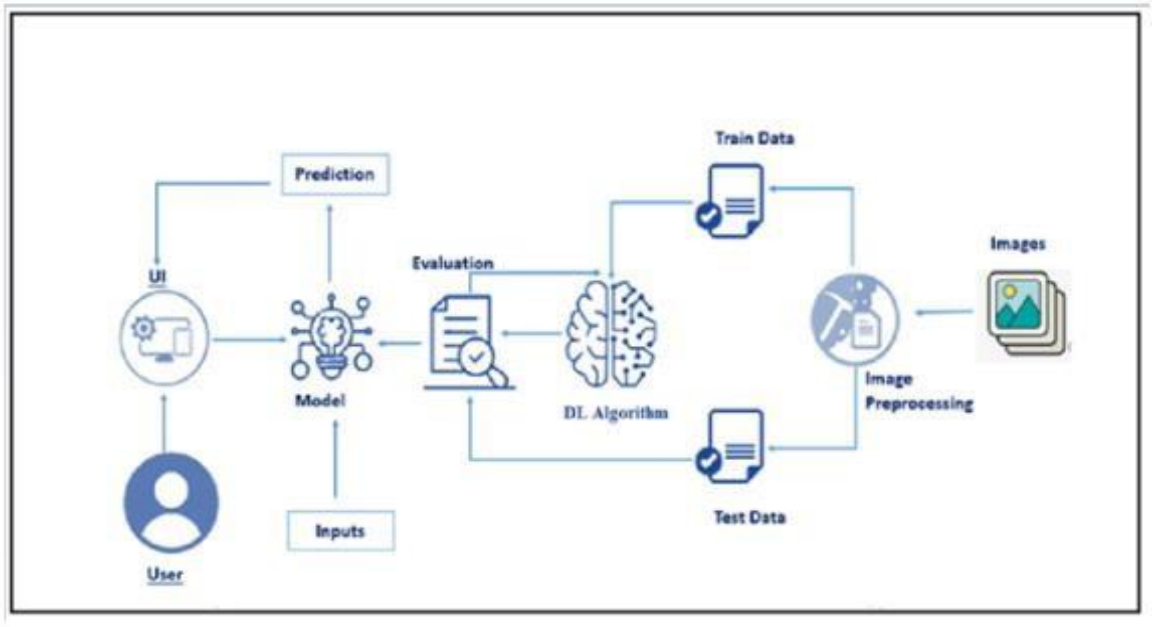
2. THEORITICAL ANALYSIS

2.1 BLOCK DIAGRAM



2.2 HARDWARE AND SOFTWARE REQUIREMENTS

2.2.1 SOFTWARE REQUIREMENTS

• A Device with a constant internet connection.

• Python

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. It was created by Guido van Rossum, and first released on February 20, 1991. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The

Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

• Anaconda Navigator

Anaconda Navigator is a free and open-source distribution of the Python and R programming languages for data science and machine learning related applications. It can be installed on Windows, Linux, and macOS.Conda is an open-source, cross-platform, package management system. Anaconda comes with so very nice tools like JupyterLab, Jupyter Notebook,QtConsole, Spyder, Glueviz, Orange, Rstudio, Visual Studio Code. For this project, we will be using Jupyter notebook and Spyder.

• Jupyter Notebook

The Jupyter Notebook is an open source web application that you can use to create and share documents that contain live code, equations, visualizations, and text. Jupyter Notebook is maintained by the people at Project Jupyter. Jupyter Notebooks are a spin-off project from the IPython project, which used to have an IPython Notebook project itself. The name, Jupyter, comes from the core supported programming languages that it supports: Julia, Python, and R. Jupyter ships with the IPython kernel, which allows you to write your programs in Python, but there are currently over 100 other kernels that you can also use.

• Spyder

Spyder, the Scientific Python Development Environment, is a free integrated development environment (IDE) that is included with Anaconda. It includes editing, interactive testing,debugging, and introspection features.

• Tensor flow

TensorFlow is an end-to-end open-source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources that lets researchers push the state-of-the-art in ML and developers can easily build and deploy ML powered applications.

• Keras

Keras leverages various optimization techniques to make high-level neural network API easier and more performant. It supports the following features: Consistent, simple, and extensible API.

• Flask

Web framework used for building. It is a web application framework written in python which will be running in local browser with a user interface. In this application, whenever the user interacts with UI and selects emoji, it will suggest the best and top movies of that genre to the user

MODULES:

- Numpy
- Scikit_learn
- Tensorflow==2.10.0

- Keras==2.3.1
- Flask

Model:VGG16

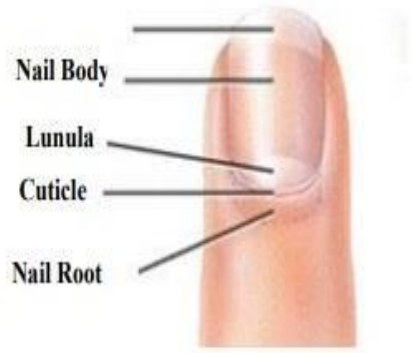
VGG16 proved to be a significant milestone in the quest of people to make computers "see" the world.A lot of effort has been put into improving this ability under the discipline of computer vision(cv)for many decades.VGG16 is one of the significant innovations that paved the way for several innovations that followed in this field.

2.2.2 HARDWARE REQUIREMENTS

- Operating system: window 7 and above with 64 bit
- 7 and above with 64bit
- Processor Type -Intel Core i3-3220
- RAM: 4Gb and above
- Hard disk: min 100GB

4. EXPERIMENTAL INVESTIGATIONS

In the process of data collection we also gathered some information on how the nail is structured and what are the type of nails in colour,shape,length etc. and also found how the expertise people can find the disease by just looking the nail.



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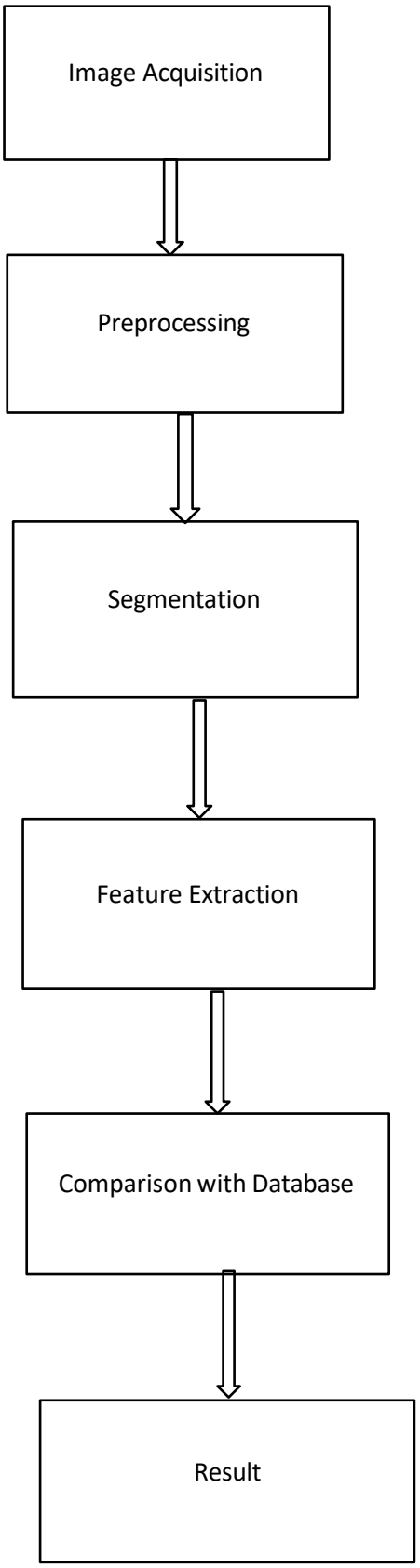
5. FLOWCHART



Name: Atharva Sunil Sawant
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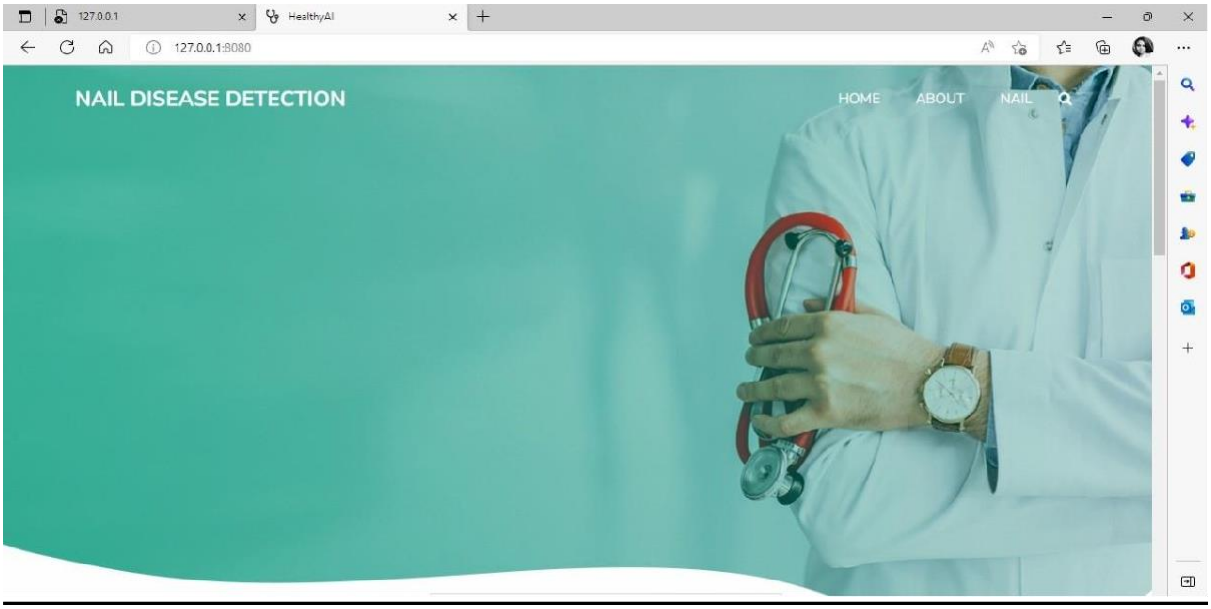
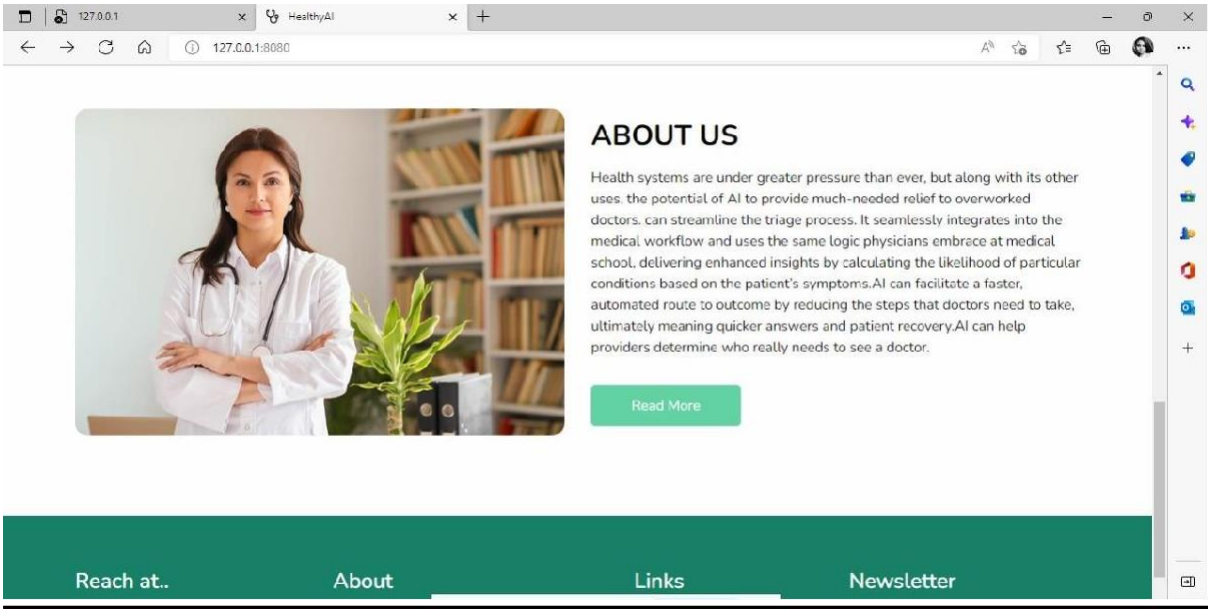
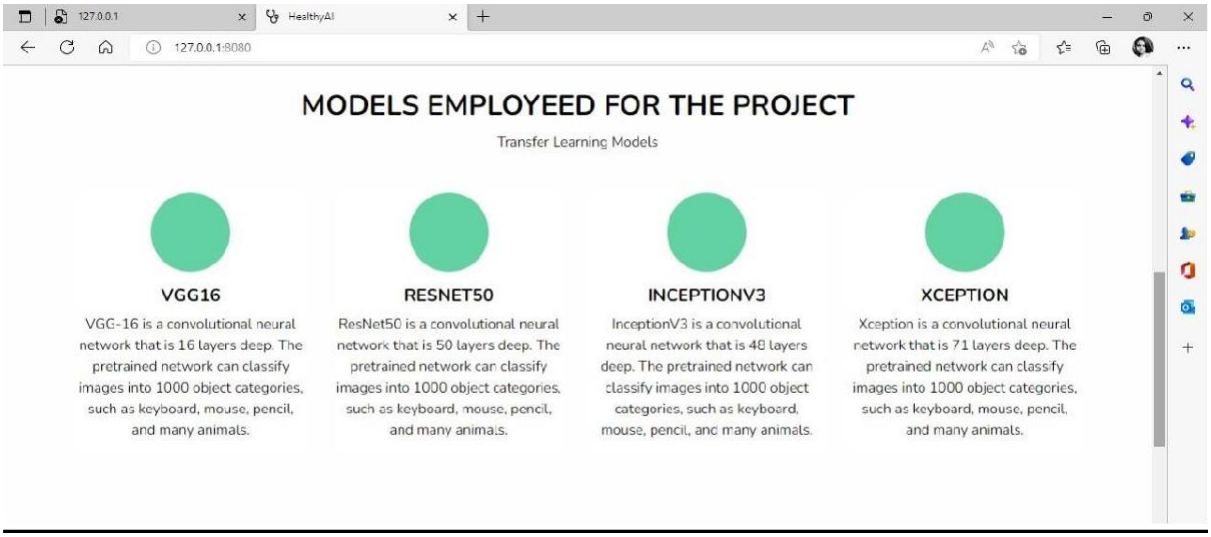
6. RESULT







Name: Atharva Sunil Sawant
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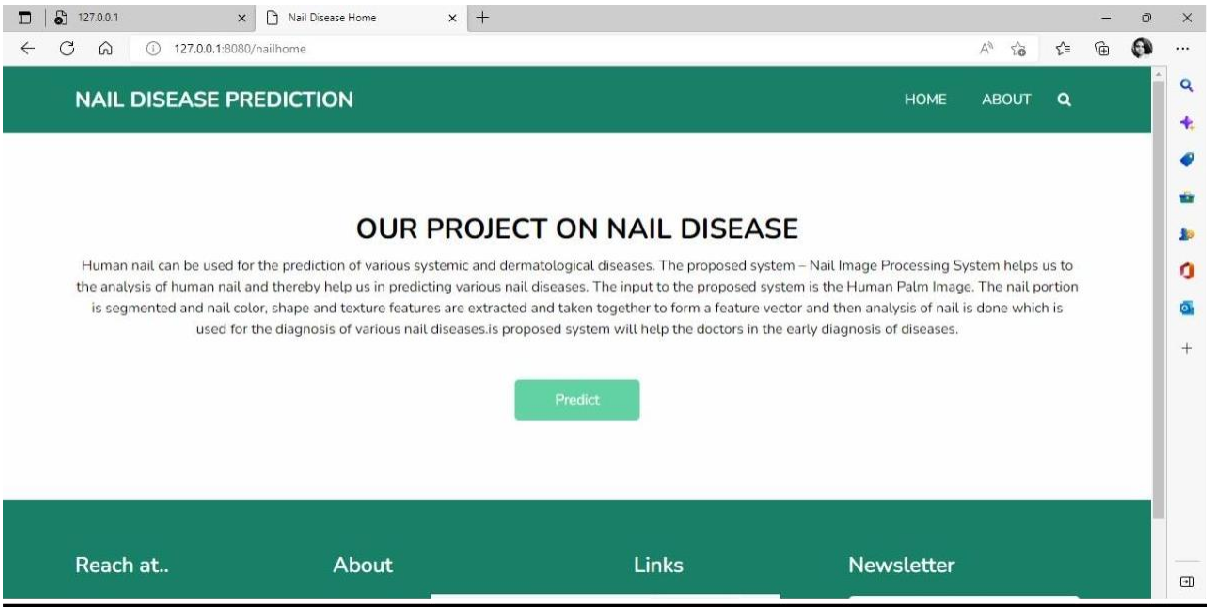

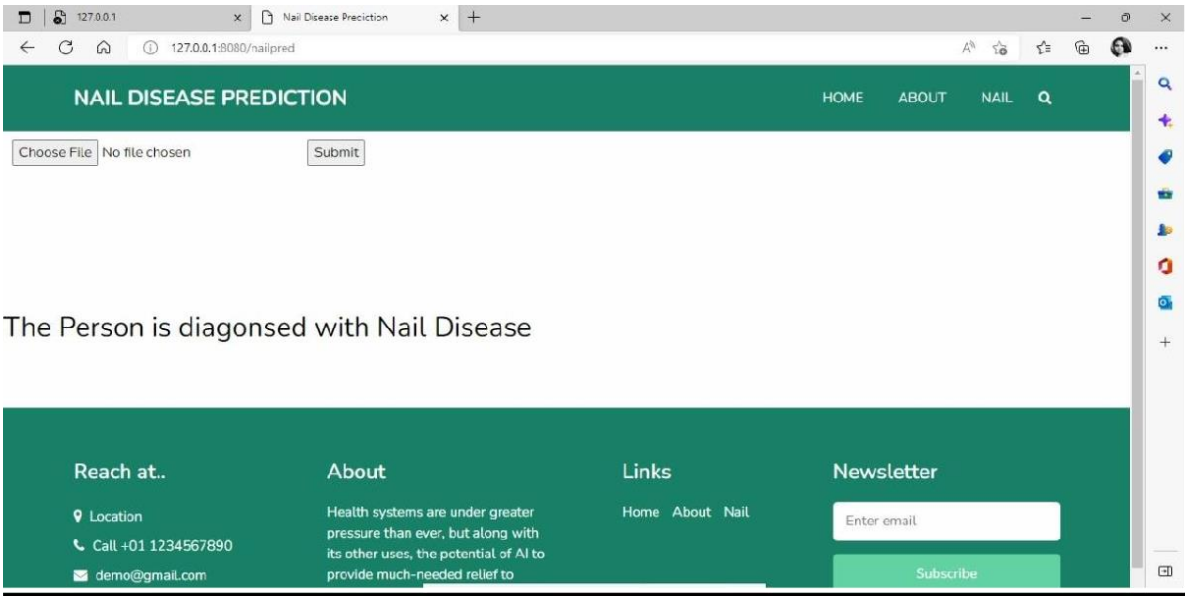

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7. ADVANTAGES & DISADVANTAGES

7.1 Advantages

➢ Easy to use.

➢ Cost efficient.

- The nail colour,nail shape,and nail texture feature for disease diagnosis which are trivial which is present in a single image of nail,which makes it advantage since it requires only a image as input and no more data requires only a image as input and no more data required
- The project has achieved 97% accuracy which can be used to process the images for disease detection

5.2 Disadvantages

➢ Results may not be perfect.

➢ New nail image cannot be identified.

➢ Furthur improvement is needed.

➢ Images should be detailed.

➢ Some knowledge on technology is needed to use.

- Slow to train
- It takes quite a lot of disk space and bandwidth which makes it inefficient

8. APPLICATIONS

The project which can be used by doctors and patients to make sure about the disease and what type of disease the patient might have been suffering from.

- Specific disease detection using particular image.

  Eg.Covid net:Uses lung x ray images to detect covid 19 disease

- Semantic segmentation
- Deep fashion detection

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9. CONCLUSION

In presented system, system analyzes the human nail and gives probable disease for person including healthy case. Here, for disease prediction nail color (average RGB) value used as a nail feature. This model gives more accurate results than human vision, because it overcomes the limitations of human eye like subjectivity and resolution power.Various diseases of human body that cannot be finded by the medical system is easily resolved and predicted by this computer.The accuracy and chance of occurring disease can also be predicted by this.

The project is beneficial to one who is in dilemma of ceartain disease caused or not and to the people who thought they have a disease ,since

Prevention is better than cure.

10. FUTURE SCOPE

In presented work, nail color's RGB average value from input image is used for classifying the diseases, but in future we can add some other feature of nail like pattern of nail for classifying the diseases. Along with these features we can also collect other symptoms observe in patient as an input to our system for disease prediction. Combining features of nails both color and pattern and other symptoms of patient's for more accurate results. It will be combination of textual features and features extracted from human body parts such as nail features etc.

11. BIBLIOGRAPHY

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- https://www.academia.edu/16661418/System_for_Disease_detection_by_analyzing_finger_nails_Color_and_Texture
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10.APPENDIX

https://github.com/Atharvasawant10/EARLY-STAGE-DISEASEDIAGNOSIS-SYSTEMUSING-HUMAN-NAIL-IMAGE-PROCESSING

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