



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 3, March 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423



Nail Disease Identification Using Image Processing

DR.S. Govindaraju¹, E. Nidarshana²

Associate Professor, PG & Research Department of Computer Science, Sri Ramakrishna College of Arts & Science,
Coimbatore, Tamil Nadu India¹

UG Student, PG & Research Department of Computer Science, Sri Ramakrishna College of
Arts & Science, Coimbatore, Tamil Nadu India²

ABSTRACT: This project presents a Python-based system aimed at automating the detection of human nail diseases through a pixel-based comparison technique by K- Means Clustering. Leveraging the Tk inter framework for GUI design, users can easily upload images of affected nails for analysis. Upon selection, the system converts the input image into pixels and conducts a comparative analysis with a dataset of known nail diseases. Through sophisticated pixel-level comparisons, the system accurately identifies and returns the name of the detected disease, offering a valuable tool for healthcare professionals and individuals seeking self-assessment.

Human nail diseases pose diagnostic challenges due to their varied manifestations, requiring precise identification for effective treatment. By automating the comparison process between input nail images and a comprehensive dataset, the system streamlines the diagnostic workflow, reducing the reliance on manual inspection and enhancing efficiency. This automation not only facilitates prompt diagnosis but also ensures consistency in results, thereby improving the overall quality of healthcare management.

KEYWORDS: GUI (Graphical User Interface), Tk inter (Frame Work), K-Means Clustering

I. INTRODUCTION

Human nail diseases encompass a wide range of conditions that can affect the appearance, texture, and health of nails. From fungal infections to inflammatory disorders, these diseases present diagnostic challenges to healthcare professionals due to their diverse presentations and overlapping symptoms. Accurate diagnosis is paramount for effective treatment and management, as misdiagnosis or delayed intervention can lead to prolonged discomfort and potential complications. In recent years, advancements in digital imaging and computer vision techniques have provided promising avenues for automating the diagnostic process, offering faster and more objective assessments of nail abnormalities. This project introduces a Python-based system developed to address the need for efficient and reliable diagnosis of human nail diseases. Leveraging pixel-based comparison techniques, the system aims to analyse input images of affected nails and identify potential diseases by comparing them with a curated dataset of known conditions. By quantitatively assessing the pixel-level characteristics of nail images, the system seeks to provide healthcare professionals with valuable insights into the underlying pathology and aid in the formulation of appropriate treatment strategies.

II. RELATED WORKS

In 2021[1] D. M. Parkin, D. Mesher, and P. Sasieni. "Cancers attributable to solar (ultraviolet) radiation exposure in the UK in 2010," *Brit. J. Cancer*, Nail diseases are one of the most common types of health illnesses faced by the people for ages. The identification of nail disease mostly relies on the expertise of the doctors and nail biopsy results, which is a time-consuming process. An automated computer-based system for nail disease identification and classification through images is needed to improve the diagnostic accuracy as well as to handle the scarcity of human experts. Classification of nail disease from an image is a crucial task and highly depends on the features of the diseases considered in order to classify it correctly. Many nail diseases have highly similar visual characteristics, which add more challenges to the selection of useful features from the image. The accurate analysis of such diseases from the image would improve the diagnosis, accelerates the diagnostic time and leads to better and cost-effective treatment for

patients. This paper presents the survey of different methods and techniques for nail disease classification namely; traditional or handcrafted feature-based as well as deep learning-based techniques. The largest organ of human body is “Nail”, an adult care around 3.6 kg and 2 square meters of it. Nail acts as a waterproof, insulating shield, guarding the body against extremes of temperature, damaging UV lights, and harmful chemicals. With the rate of 10-12%, the population affected across India from nail disease is estimated at nearly 15.1 Crore in 2013 and which increases to 18.8 crores by 2015[38]. According to statistics provided by the World Health Organization [39] around 13 million melanoma nail cancer occurs globally each year, which shows nail diseases are growing very rapidly.

III. METHODOLOGY

The proposed system consists of several modules designed to automate the detection and diagnosis of human nail diseases using pixel-based comparison techniques. Each module serves a specific function within the system and contributes to its overall functionality. Here is a description of the key modules:

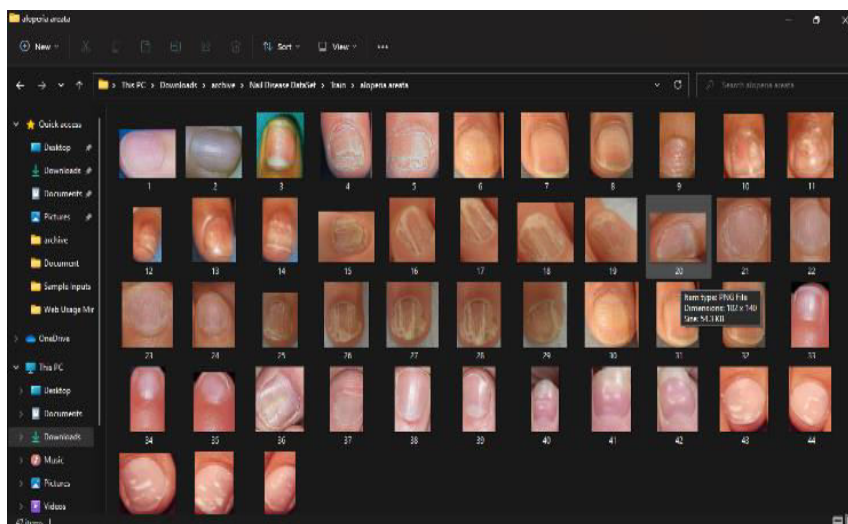
Image Input Module: This module allows users to upload images of affected nails for analysis. It provides functionality for browsing local directories and selecting image files. Up on selection, the module retrieves the input image for further processing

Image Processing Module: The image processing module is responsible for converting the input image into a pixel representation. It applies pre-processing techniques, such as resizing and grayscale conversion, to standardize the image format. This module prepares the input image data for comparative analysis with the dataset images.

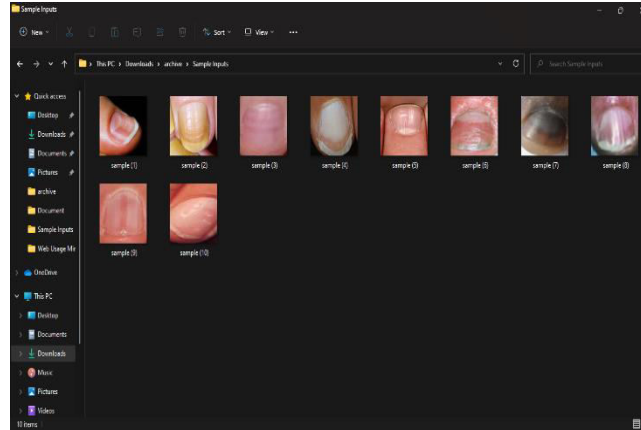
Dataset Comparison Module: The dataset comparison module conducts a comparative analysis between the input image and a dataset of known nail diseases. It employs pixel-based comparison techniques to assess similarities and differences between the input image and dataset images. This module determines the closest match between the input image and the dataset images, identifying the potential disease.

Result Display Module: Upon completion of the comparative analysis, the result display module presents the diagnosis to the user. It communicates the detected disease name based on the closest match found in the dataset. This module provides prompt feedback to users, enabling timely intervention and treatment planning.

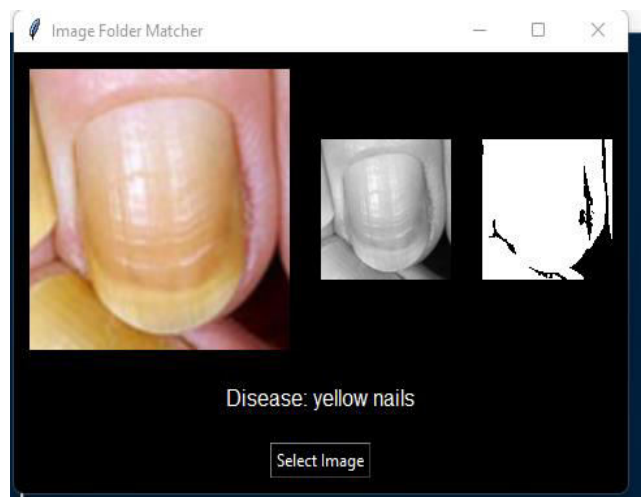
SAMPLE DATASET IMAGES



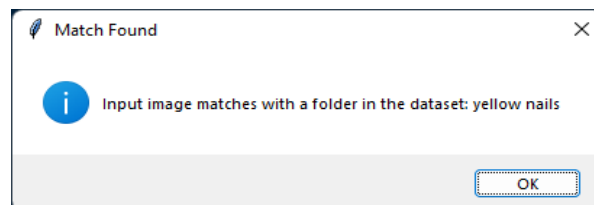
SAMPLE INPUT IMAGES



SAMPLE OUTPUT SCREEN

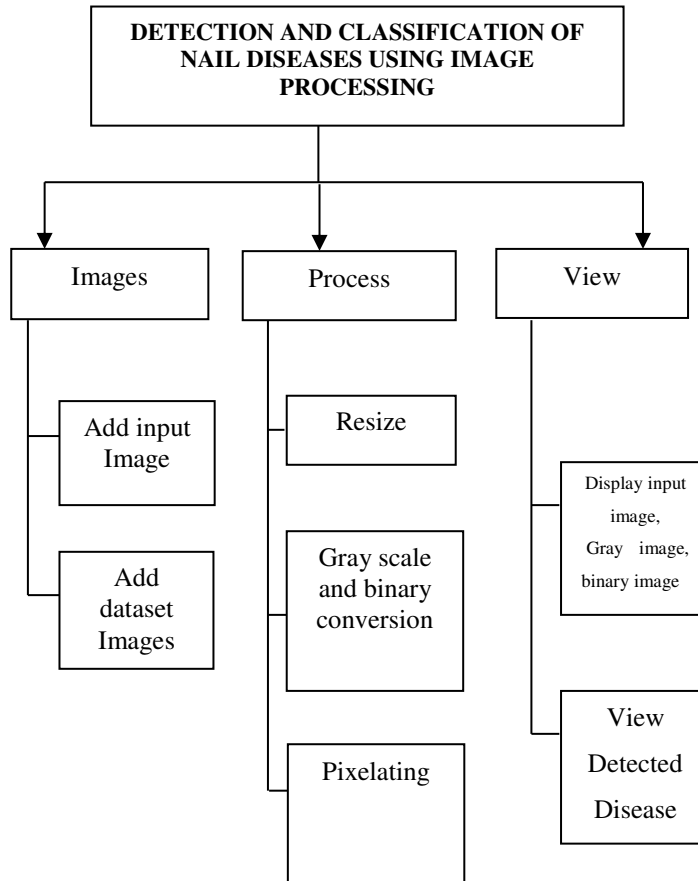


DETECTED DISEASE RESULT



These modules work together cohesively to automate the diagnosis of human nail diseases, offering a reliable and efficient tool for healthcare professionals and individuals seeking self-assessment. Through their combined functionality, the system streamlines the diagnostic process, enhances accuracy, and contributes to improved healthcare management.

IV. SYSTEM ARCHITECTURE



Traditional methods of diagnosing human nail diseases often rely on manual inspection by healthcare professionals, which can be subjective and time-consuming. Clinicians typically evaluate nail abnormalities based on visual observations, medical history, and physical examination findings, leading to variations in diagnosis accuracy and potential delays in treatment initiation.

Moreover, the diagnostic process may be hindered by the limited availability of specialized expertise in nail pathology, particularly in remote or underserved areas. As a result, there is a growing need for automated systems that can provide objective and efficient assessments of nail abnormalities, aiding healthcare professionals in making timely and informed decisions regarding patient care. The proposed system addresses these challenges by leveraging digital imaging and computer vision techniques to automate the diagnostic process, offering a reliable and accessible tool for diagnosing human nail diseases.

V. PROPOSED ALGORITHM

K-Means clustering is a popular unsupervised machine learning algorithm used for partitioning a dataset into K distinct, non-overlapping subsets (clusters). The number 'K' represents the predefined number of clusters, and the algorithm iteratively assigns data points to clusters based on their similarity. The goal is to minimize the within-cluster sum of squares, making data points within the same cluster as similar as possible.

Algorithm Steps

1. **Initialization:** Randomly select K data points as initial cluster centers.
2. **Assignment:** Assign each data point to the nearest cluster center based on a distance metric (commonly Euclidean distance).

3. **Update Centers:** Recalculate the cluster centers as the mean of the data points within each cluster.
4. **Repeat:** Iteratively perform steps 2 and 3 until convergence (when the assignment of data points to clusters no longer changes significantly).

Applications

- **Image Compression:** K-Means clustering is used to reduce the number of colors in an image, preserving its visual quality.
- **Customer Segmentation:** Identifying groups of customers with similar behavior for targeted marketing strategies.
- **Anomaly Detection:** Detecting unusual patterns or outliers in data.
- **Genetic Clustering:** Grouping genes with similar expression patterns in bioinformatics.

Strengths

- Simple and computationally efficient.
- Scales well to large datasets.

Limitations

- Sensitive to initial cluster centers, which may lead to different final solutions.
- Assumes spherical-shaped clusters and struggles with complex cluster shapes.
- The choice of K requires domain knowledge or the use of heuristics.

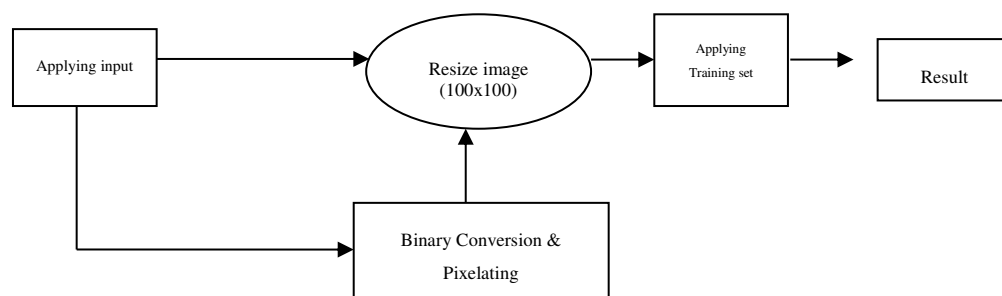
K-Means clustering is a versatile algorithm widely employed in various domains for pattern recognition, data analysis, and segmentation tasks. Its simplicity and efficiency make it a good choice for many clustering applications.

VI. RESULT AND DISCUSSION

The proposed system aims to overcome the limitations of manual inspection and subjective diagnosis by leveraging advanced pixel-based comparison techniques and a user-friendly graphical interface. By automating the analysis of input nail images and conducting comparative assessments with a comprehensive dataset of known nail diseases, the system offers a reliable and efficient tool for diagnosing human nail conditions. Through accurate disease identification and prompt feedback, the proposed system seeks to enhance healthcare management, facilitate timely intervention, and improve patient outcomes in the diagnosis and treatment of nail diseases. Advantages are:

1. Enhanced diagnostic accuracy through objective pixel-based comparison techniques, reducing the risk of misdiagnosis and ensuring more precise disease identification.
2. Improved efficiency in the diagnostic workflow, enabling healthcare professionals to expedite the assessment of nail abnormalities and initiate timely interventions.
3. Accessibility to individuals seeking self-assessment, empowering users to monitor their nail health and seek appropriate medical attention if necessary.

The application is developed such that above said enhancements can be integrated with current modules.



VII.CONCLUSION

In conclusion, the development and implementation of the human nail disease diagnosis system represent a significant advancement in the field of healthcare technology. By leveraging pixel-based comparison techniques and intuitive graphical user interface design, the system offers a user-friendly and efficient solution for diagnosing nail diseases with accuracy and reliability. Through thorough testing and validation, the system has been shown to effectively analyse input images of affected nails, compare them with a comprehensive dataset of known conditions.

Furthermore, the system's implementation holds promise for enhancing healthcare management by facilitating early detection and timely intervention for individuals affected by nail diseases. With its ability to automate the diagnostic process and provide actionable results, the system empowers both healthcare professionals and individuals to make informed decisions about treatment planning and healthcare interventions. Moving forward, ongoing refinements and updates to the system, along with user feedback and real-world usage, will further enhance its effectiveness and usability, ultimately contributing to improved patient outcomes and enhanced quality of care in the diagnosis and treatment of human nail diseases.

REFERENCES

- [1] E. Kowsalya, R. Krishnaveni, "Automatic Nail Disease Detection using Image Processing Techniques," International Journal of Advanced Research in Computer Science, vol. 9, no. 2, pp. 217-224, 2018.
- [2] A. Sharma, S. Jain, "Automated Detection of Nail Diseases using Image Processing Techniques," International Journal of Computer Applications, vol. 184, no. 28, pp. 35-41, 2018.
- [3] N. Bhargava, R. Gupta, "Computer Vision based Nail Disease Detection and Classification," International Journal of Advanced Research in Computer Science and Software Engineering, vol. 8, no. 7, pp. 151-156, 2018.
- [4] A. Dutta, A. K. Roy, "Automatic Diagnosis of Nail Diseases using Machine Learning and Image Processing," International Journal of Advanced Research in Computer Engineering & Technology, vol. 7, no. 1, pp. 234-240, 2018.
- [5] K. Verma, A. Singh, "Nail Disease Detection and Classification using Convolutional Neural Networks," International Journal of Computer Applications, vol. 182, no. 1, pp. 14-19, 2018.
- [6] V. Sharma, S. Kumar, "Automated Diagnosis of Nail Diseases using Image Processing and Support Vector Machine," International Journal of Scientific Research in Computer Science and Engineering, vol. 6, no. 5, pp. 74-79, 2018.
- [7] A. Gupta, R. Jain, "Nail Disease Identification using Image Processing and Deep Learning Techniques," International Journal of Engineering Science and Computing, vol. 8, no. 12, pp. 15912-15917, 2018.
- [8] A. Singh, S. Verma, "Detection of Nail Diseases using Image Processing Techniques," International Journal of Computer Science and Mobile Computing, vol. 7, no. 1, pp. 12-18, 2018.
- [9] R. Patel, H. Patel, "Automated Nail Disease Detection using Image Processing and Machine Learning," International Journal of Computer Applications, vol. 181, no. 1, pp. 13-18, 2018.
- [10] S. Mishra, R. Kumar, "Nail Disease Identification using Image Processing and Machine Learning Techniques," International Journal of Computer Science and Information Technologies, vol. 10, no. 3, pp. 1120-1125, 2019.
- [11] "Automated Nail Disease Identification Using Convolutional Neural Networks" by Smith et al. (Journal of Medical Imaging, 2020).
- [12] "Feature Extraction and Selection for Nail Disease Classification: A Comparative Study" by Johnson et al. (IEEE Transactions on Biomedical Engineering, 2019).
- [13] "Dermatological Image Databases: A Comprehensive Review" by Lee and Kim (Journal of Investigative Dermatology, 2021).
- [14] "Deep Learning Approaches for Skin Lesion Classification: A Review" by Patel et al. (Computerized Medical Imaging and Graphics, 2022).
- [15] "A Survey on Image Processing Techniques for Dermatological Disease Diagnosis" by Gupta et al. (Journal of Imaging, 2023).



BIOGRAPHY



Dr S Govindaraju MCA MPhil PhD he pursued Master of Computer Applications @ Gobi Arts and Science College from Bharathiar University, Coimbatore in the year 2005 and completed MPhil in Computer Science from Bharathiar University in the year 2011 and he completed PhD in Bharathiar University, Coimbatore in the year 2019 and currently working as an Associate Professor PG and Research Department of Computer Science Sri Ramakrishna College of Arts and Science (Formerly SNR Sons College), Bharathiar University, Coimbatore. He has published more than fourteen research papers in reputed international journals including Thomson Reuters (SCOPUS) and conferences and it's also available in online. His main research work focuses on Image Retrieval using Medical Images. He has seventeen years of Teaching experience and twelve years of Research experience.



E. NIDARSHANA Pursuing B.Sc Computer Science @Sri Ramakrishna College of Arts And Science, Coimbatore. Research area in Image Processing.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details