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Skin Examination Analysis System Using Ayurvedic Interpretation

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Abstract -

A human skin moisture measuring device having an interdigitated resistive sensor formed on a plate-like transparent Support is described, with a face designed to be placed into contact with the skin to be subjected to the moisture degree measurement. We can estimate/measure Skin Colour Index , Skin Texture Index, Skin AllergiesIndex , Skin Radical Index, Means for processing the signal coming from the interdigitated resistive sensor and from the image sensing means give as output a value of the measured moisture degree that is normalized with respect to the actual Surface of contact between skin and sensor.

KeyWords: AI/MI,SKIN INDEX

I. INTRODUCTION

The field of healthcare and wellness is constantly evolving, with an increasing emphasis on personalized and holistic approaches to health management. Ayurveda, an ancient system of medicine originating in India, has gained recognition and popularity for its holistic approach to health and well-being. Ayurveda places great importance on balancing the body and mind through diet, lifestyle, and natural remedies. One area where Ayurveda has shown promise is in the analysis and interpretation of skin conditions.

Skin health is a critical component of overall well-being, and skin conditions can often be indicators of underlying imbalances within the body. Recognizing the potential of Ayurveda in this context, there has been a growing interest in developing a Skin Examination Analysis System that incorporates Ayurvedic interpretation

Assessment parameters of shadow

संस्थानेन प्रमाणेन वर्णेन प्रभया तथा|

छाया विवर्तते यस्य स्वस्थोऽपि प्रेत एव सः||७||

Distortion of shadow in respect of changes in shape, measurement, colour and lustre should be considered as ominous sign even in healthy individual.

संस्थानमाकृतिर्ज्ञेया सुषमा विषमा च सा|

मध्यमल्पं महच्चोक्तं प्रमाणं त्रिविधं नृणाम्||८||

प्रतिप्रमाणसंस्थाना जलादर्शातपादिषु|

छाया या सा प्रतिच्छाया च्छाया वर्णप्रभाश्रया||९||

The term sansthana means shape which may be symmetrical or asymmetrical. Measurement is of three kinds namely short, medium, and large The image reflected in water, mirror, etc., corresponding to the measurement and shape of the body of the individual is known as praticchhaya which is nothing but reflected shadow based on the complexion and luster of the individual

LITERATURE REVIEW

Our college is having move with Keshayurved Pvt Ltd and department is working on problem statement to find out tech solution for value added and diagnostic services in respect ayurveda Dr. Harish Pathankar has guided us and given the problem statement innovate AI based dermatological tool to determine diagnosis skin and various indicates

The integration of Ayurvedic principles into modern healthcare systems has gained significant attention in recent years, particularly in the context of skin health management. Various studies and research papers have explored the efficacy of Ayurveda in assessing and treating skin conditions, highlighting the following key themes

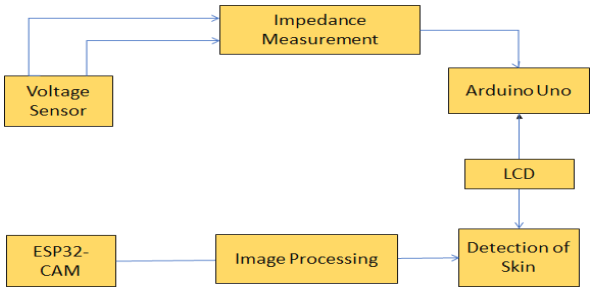
Ayurvedic Principles and Skin Health: Several scholarly articles have emphasized the holistic approach of Ayurveda to skin health, emphasizing the significance of balancing the three doshas (Vata, Pitta, and Kapha) for maintaining healthy skin. The literature highlights the interconnectedness of internal imbalances and external manifestations, underscoring the importance of personalized treatment approaches in Ayurvedic dermatology

Diagnostic Techniques and Ayurvedic Analysis: Literature has explored the integration of Ayurvedic diagnostic techniques, such as pulse diagnosis, tongue examination, and assessment of body constitution (Prakriti), in evaluating skin health and identifying dosha imbalances. These studies have highlighted the importance of a comprehensive assessment approach that considers both physical and psychological aspects of an individual's heal

Components

1. Arduino Uno board
2. ESP 32 Cam
3. ESP 32 Cam Module
4. Voltage Sensor
5. LCD Display
6. I2C Module LCD Display
7. Battery

Block Diagram



METHODOLOGY:

Developing a Skin Examination Analysis System using Ayurvedic interpretation requires a systematic approach that integrates both modern technological methodologies and traditional Ayurvedic principles. The following methodology can be adopted to build an effective and reliable system Requirement Analysis: Conduct a comprehensive analysis of the requirements, including the integration of Ayurvedic principles, user interface specifications, image processing capabilities, diagnostic algorithms, and personalized recommendation functionalities.

Research and Data Collection: Gather a substantial amount of data on Ayurvedic principles, dermatological conditions, skin images, and existing diagnostic methods to establish a strong knowledge base for the system's development.

Algorithm Development: Develop advanced image processing algorithms that can analyze skin images to identify various skin conditions and correlate them with specific dosha imbalances based on Ayurvedic principles.

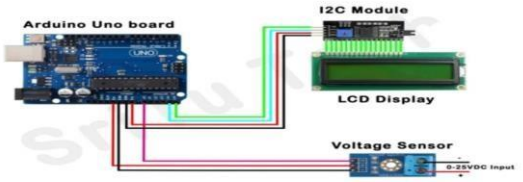
Dosha Assessment Integration: Integrate an assessment module that can accurately determine the user's dosha constitution through a series of questions, observations, and possibly biometric data inputs. Diagnostic Algorithm Integration: Incorporate diagnostic algorithms that leverage both Ayurvedic interpretations and modern dermatological practices to accurately diagnose various skin conditions and their underlying dosha imbalances.

Personalized Recommendation Engine: Develop a recommendation engine that suggests personalized Ayurvedic treatments, dietary modifications, lifestyle changes, and herbal remedies based on the user's dosha constitution and specific skin condition.

User Interface Design: Create an intuitive and user-friendly interface that allows users to easily capture skin images, input relevant information, and receive comprehensive analysis results and personalized recommendations in a clear and understandable format.

System Integration and Testing: Integrate all modules of the system and conduct rigorous testing to ensure the accuracy of the diagnostic results,the effectiveness of the personalized recommendations, and the overall performance of the user interface.

Clinical Validation and Testing: Collaborate with dermatologists and Ayurvedic practitioners to conduct comprehensive clinical trials and testing to validate the system's diagnostic accuracy and the efficacy of the recommended Ayurvedic treatments. Continuous Improvement and Maintenance: Gather feedback from users and experts, and continuously improve the system's algorithms and functionalities to enhance its diagnostic capabilities, recommendation accuracy, and overall user



Software

Transfer Learning Artificial Intelligence in Dermatology Image Analysis.. Artificial Intelligence (AI) :The intelligence manifested by machines made by humans, i.e., the ability of the machine to simulate natural intelligence. Transfer Learning :Transfer learning is a machine learning model that allows a model developed from one task to be transferred for another task after fine-tuning and augmentation Convolutional Neural Networks (CNNs) :CNNs are a class of neural networks; they are feed forward neural networks. Their artificial neurons can respond to a part of the surrounding units in the coverage area, most commonly applied to analyzing visual imagery

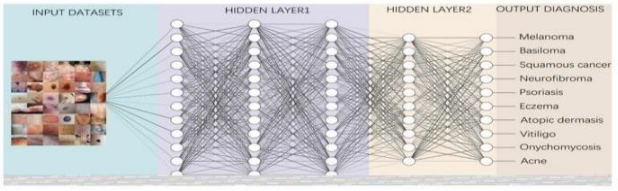
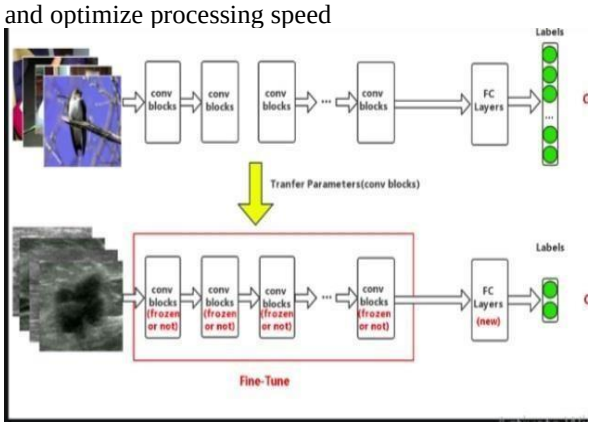


IMAGE PROCESSOR: The referred to as an image processing unit (IPU) or graphics processing unit (GPU), is a specialized hardware component designed to handle and manipulate images and graphics efficiently.

1. Input Data: The image processor receives input data in the form of image files or data streams. These images can come from various sources, such as cameras, storage devices, or software applications.
2. Data Conversion: The image data is typically in a digital format, represented as a grid of pixels. Each pixel contains color information, which can be in the form of RGB (Red, Green, Blue) values, grayscale values, or other color models
3. Image Processing Algorithms: The core function of an image processor is to perform various image processing operations on the input data. This includes tasks like resizing, filtering, enhancing, and applying various effects to the image. These operations are executed using specialized algorithms optimized for parallel processing,.

4. Parallel Processing: Modern image processors, such as GPUs, are designed to perform parallel processing tasks. They consist of thousands of small processing units (cores) that can work simultaneously on different parts of the image. This parallelism enables high-speed image processing.
5. Memory Management: Image processors have dedicated memory for storing image data and intermediate results during processing. Efficient memory management is crucial to avoid bottlenecks and optimize processing speed



Results :

Hardware Result

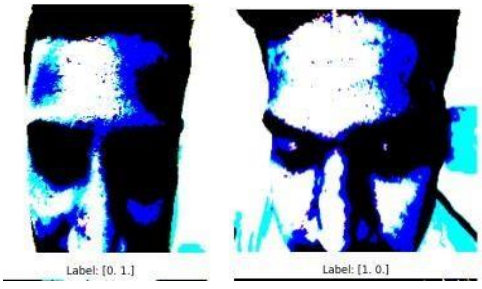
Final Reading of Dry and Moisture Indices :

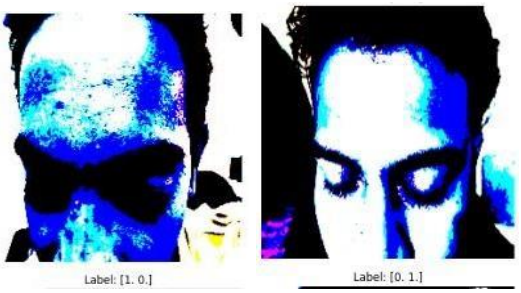
I. Dry Skin Index:- 0 to 1

II. Moisture Skin Index:- 1 to 10

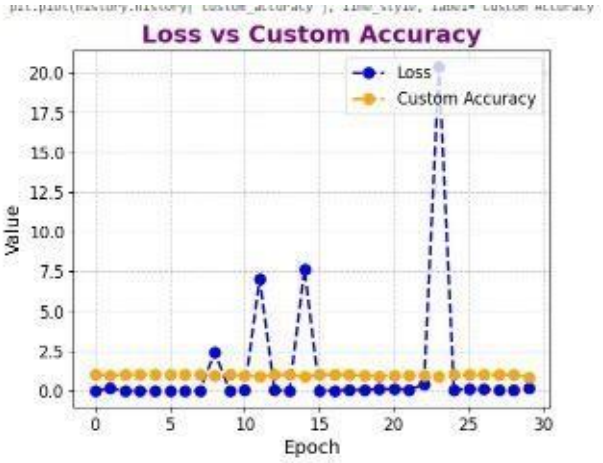
Name of Student	Normal Impedance of Skin	Moisture Impedance of Skin
Tanay	0.63	1.28
Tushar	0.87	2.21
Bhushan	0.32	1.42
Suhas	0.10	1.95
Sachin	0.29	1.56

Software Result

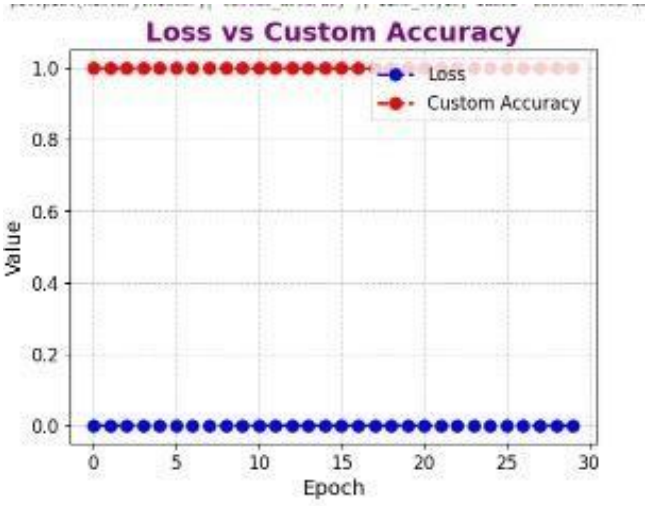




Loss vs Accuracy



Accuracy of 1st 30 Epoch



Accuracy of 2st 30 Epoch

Conclusion

Skin Disease Detection: Using AI or ML algorithms, it's possible to detect and diagnose various skin diseases by analyzing features such as skin dryness index and skin moisture index. These algorithms can be trained on large datasets of skin images, possibly augmented with additional patient information such as medical history, to accurately classify and diagnose conditions like eczema, psoriasis, dermatitis, etc. The dryness and moisture indices could be calculated based on image analysis techniques or sensor data from devices. Impedance Measurement for Skin Health: Impedance measurement is a technique used to assess the electrical properties of biological tissues, including the skin. By measuring impedance, it's possible to derive parameters related to skin health, such as the dry skin index and moistureindex.
This can be particularly useful in applications where direct skin contact is feasible, such as handheld devices or wearables. ML algorithms can be trained to analyze impedance data and extract meaningful insights related to skin health, including identifying dryness or moisture levels in the skin. Both applications leverage AI/ML to process and analyze complex data related to skin health, ultimately providing valuable insights for diagnosis, monitoring, and treatment of various skin conditions.

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