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Automated Skin Disease Identification Using Deep Learning Algorithm

Mahiba[1], Kruthika LP[2], Poornima RM[3], NK Vidya[4], Poornima R[5]

[1]*Assistant Professor, Department of Computer Science and Engineering, MVJ College of Engineering, Bangalore, Karnataka, India.*
[2,3,4,5]*Undergraduate Scholar, Department of Computer Science and Engineering, MVJ College of Engineering, Bangalore, Karnataka, India.*

A B S T R A C T

Skin diseases are common diseases that may be caused due to allergies, viruses, bacteria, fungal infections, etc. Though there's a rapid advancement in medical technology to diagnose skin disease quickly and accurately it is still limited due to its cost. But analyzing and predicting the disease using a deep learning approach has come in handy. This project is mainly proposed by CNN. In this approach three image recognition architectures are used, namely Inception V3 for image recognition, InceptionResnet V2 is a CNN that is used in training more than a million images from the image net database and MobileNet is used for embedded vision applications with certain modifications to predict the skin diseases based on maximum voting from the three networks. The main objective of this system is to achieve maximum accuracy in skin disease prediction.

1. Introduction

Dermatology has become one of the most complicated branches of science due to

the complexity of the procedures involved in diagnosing diseases. Most of the skin diseases are very fatal if they are not treated at an initial stage also if the remedies are not apt for those skin problems then it makes it even worse. As the laboratory procedures take a lot of time , this paper gives an alternative approach to this problem, enabling users to predict skin disease using deep learning algorithms.

Image Recognition

1)Input: This method proposes an image processing method in order to detect skin diseases. It takes a digital image of an affected area of the skin through the camera as input. Our approach is simple, fast and does not require expensive equipment. Once the input is taken through the web camera it will be processed using image recognition architectures. They are:

- Inception V3
- Inception RV2
- MobileNet

2)Confusion Matrix: It gives the prediction results on a classification problem. The confusion matrix gives you not only the errors being made by the classifier but also about the types of errors that are being made. It is this breakdown it overcomes the limitation of using classification accuracy alone.

a) Inception V3: Confusion Matrix for Inception V3 describes the accuracy of the algorithm. Inception V3 is a CNN it assists in analyzing images and detecting an object.

b) Inception ResnetV2: Inception Res Net V2 is a convolutional neural network trained on more than a million images from the ImageNet database.

c) MobileNet: MobileNet is used for embedded vision applications with modifications for skin disease applications and successfully predicts the disease based on maximum voting from the three networks.

This project is mainly based on CNN. We use layers of the convolutional neural layer in order to predict the disease. The layers of CNN are:

- Convolutional Layer.
- Pooling Layer
- ReLU Layer

2. Literature Review

Mugdha S Manerkar, U Snekhalatha, Shashwata Harsh. The purpose of this study is to automatically segment various skin cancer images using the C-means and watershed algorithms and extract features through the Gray Level Co-occurrence Matrix (GLCM) and Image Quality Assessment (IQA) method. The different disease states are classified using a multi-class SVM classifier. The proposed method uses 45 digital images obtained from the MIT BMI database, including warts, benign skin cancer, malignant skin cancer, and normal skin images. To analyze the texture of different types of skin diseases, pre-processing techniques such as resizing, conversion, and contrast enhancement are applied to the 45 digital images collected from the MIT BMI database. The images are then segmented using c-means and watershed algorithms, and feature extraction is carried out using the GLCM and IQA methods to obtain statistical parameters for each algorithm. The multi-class SVM classifier is used to categorize the skin diseases as Benign Skin Cancer, Malignant Skin cancer and warts. In segmenting the skin cancer images, the C-means algorithm achieved better results with an accuracy of 98% compared to the watershed algorithm which had an accuracy of 92%. As a result, a computer-aided diagnostic tool was developed to diagnose various skin cancer conditions.

Maryim Omran and Ebtesam N. AlShemmary both [2] This paper presents a new technique for automated segmentation and classification of skin lesions. The process begins by filtering skin images to eliminate unwanted hair and noise, followed by segmentation to extract lesion areas. A region growing method with automatic initialization of seed points is used for segmentation, and the results are evaluated with well-known performance metrics. The extracted lesion areas are then represented using texture and color features, which are used to classify the lesion as benign or malignant through a support vector machine (SVM) classifier. The proposed technique utilizes SVM and k-NN classifiers, as well as their fusion, to classify skin lesions based on the extracted features. To test the performance of the system, a dataset of 726 samples from 141 images, comprising 5 different disease classes, was used. The results are quite promising, with an F-measure of 46.71% and 34% for SVM and k-NN classifiers, respectively, and a 61% F-measure for SVM and k-NN fusion. The proposed methodology involves using SVM and k-NN classifiers in the classification process.

Hariprasath Manoharan, S. Shitharth Skin issues are prevalent and affect a large portion of the population globally. However, assessing them can be challenging due to the complexities of skin tones, hair colors, and hairstyles. Skin disorders pose a significant public health risk worldwide, especially when they reach the invasive phase. Dermatological diseases are a major concern for the medical community. The incidence of skin disorders is increasing at an alarming rate due to factors like pollution and poor diet. Early signs of skin illness are often overlooked by individuals. Currently, skin conditions are diagnosed and treated through a biopsy process administered by a physician. However, a hybrid technique that can eliminate the need for human assessment is an encouraging development. Thorough investigations reveal that deep learning methods are potential means to construct a robust and reliable system for automated diagnosis and treatment of skin disorders. To detect skin diseases accurately, it is essential to distinguish between skin and non-skin tissue. This research proposes a skin disease classification system that utilizes MobileNetV2 and LSTM. The primary objective of this system is to achieve accuracy in skin disease prediction while ensuring efficient storage of complete state information for accurate predictions. The proposed methodology employs learning algorithms such as MobileNetV2 and LSTM. The proposed skin disease classification system aims to achieve accuracy in disease forecasting while maintaining optimal efficiency in storing complete state information for accurate predictions. To accomplish this, learning algorithms such as MobileNetV2 and LSTM are utilized as part of the proposed methodology.

Tanvi Goswami, Vipul K Dabhi, Harshadkumar B Prajapati Skin diseases have been a common health issue for ages, and their identification typically relies on the expertise of doctors and skin biopsy results, which can be a time-consuming process. To improve diagnostic accuracy and address the shortage of human experts, an automated computer-based system for skin disease identification and classification through images is needed. Classifying skin diseases from an image is a crucial task that heavily relies on the features of the diseases to classify them correctly. However, many skin diseases have similar visual characteristics, making it challenging to select useful features from the image. Accurately analyzing such diseases from images would improve diagnosis, accelerate diagnostic time, and lead to better and more cost-effective treatment for patients. This paper provides a survey of various methods and techniques for skin disease classification, including traditional or handcrafted feature-based techniques and deep learning-based techniques. Classifying skin diseases through images can be challenging, as many of them have similar visual characteristics. Therefore, the proposed methodology involves exploring different approaches and techniques for skin disease classification through images.

Qingqio Hu, Siyang Yin, Huiyang Ni, Yisiyuan Melanoma is a dangerous type of skin disease with a high fatality rate, and its incidence has increased significantly in recent years. Early detection of melanoma is crucial for effective treatment. However, dermatology can be costly, making it necessary to have an automatic system that can diagnose melanoma through lesion images. In this study, we propose a sparse representation-based method for the segmentation and classification of lesion images. Our proposed framework is based on a kernel sparse representation, which generates discriminative sparse codes to represent features in a high-dimensional feature space. We utilize an adaptive K-SVD algorithm for kernel dictionary and classifier learning. The central idea of our methodology involves utilizing kernel space representation in combination with an adaptive K-SVD algorithm, which we believe will enhance the accuracy and efficiency of our framework for lesion image segmentation and classification.

3. PROPOSED SYSTEM

The proposed solution will uses Artificial Intelligence learning methods to learn about the images to predict the diseases based upon the common patterns. The machine interprets the images and its slices and processes the image and predicts. Machine Learning is also firmly attached to computational statistics

which makes prediction through computers easier and feasible. In commercial terms Predictive Analysis is machine learning used to design multiple algorithms and models that greatly helps the process of prediction. Here the machine learns itself and divide the data provided into the levels of prediction and in a very short period of time gives the accurate results. Deep learning unlike machine learning uses a large dataset for the learning process and the number of classifiers used gets reduced substantially. The training time for the deep learning algorithm increases because of the usage of the very large dataset. Deep learning algorithm chooses its own features unlike the machine leaning making the prediction process easier for the end user as it does not use much of pre- processing

4. IMPLEMENTATION AND PROCESS

1. **Dataset :**

Gather a diverse and representative set of skin images. This may involve acquiring images from various sources, such as public datasets, online repositories, or capturing images using specific devices or cameras. Annotate the skin images with relevant labels or tags. Clean and preprocess the images to ensure consistency and remove any artifacts or noise. Common preprocessing techniques include resizing the images to a uniform size, adjusting brightness and contrast, normalizing pixel values, and applying image augmentation techniques to increase the diversity of the datasetDivide the dataset into training, validation, and test sets for training, model selection, and evaluation. Increase dataset diversity by applying transformations like rotation, scaling, flipping, etc., to the training data. Extract relevant image features using techniques like edge detection, color histograms, or deep learning-based methods. Train a machine learning or deep learning model using the preprocessed and augmented dataset. Assess the trained model's performance using the validation set, adjusting it based on evaluation results, and repeating the training process if needed.

2. **Data Pre-Processing :**

Resize the images: Ensure all the images have the same dimensions to maintain consistency and facilitate processing. Adjust brightness and contrast: Normalize the brightness and contrast levels across images to minimize variations in lighting conditions. Normalize pixel values: Scale the pixel values to a common range, such as [0, 1], to ensure numerical stability during training.

Remove noise and artifacts: Apply filters or denoising techniques to remove any unwanted noise or artifacts that may affect the model's performance. Handle class imbalance: If there is a significant class imbalance in the dataset, consider techniques like oversampling, undersampling, or data augmentation to address the imbalance. Apply image augmentation: Introduce variations in the training data by applying random transformations such as rotation, scaling, flipping, and cropping. This helps the model generalize better.

3. **Data Augmentation:**

Increase dataset diversity by applying random transformations to the images, such as rotation, scaling, flipping, and adding random noise. This helps the model generalize better and handle variations in skin conditions.

4. **Splitting the Dataset:**

Divide the dataset into training, validation, and test sets. The training set is used to train the deep learning model, the validation set is used for hyperparameter tuning and model selection, and the test set is used for final evaluation..

5. **Model Selection :**

Choose an appropriate deep-learning architecture for the skin disease detection task. Popular choices include Convolutional Neural Networks (CNNs), such as VGG, ResNet, or Inception, which have shown excellent performance in image classification tasks.

6. **Transfer Learning:**

Utilize pre-trained models, such as those trained on large-scale image datasets like ImageNet, as a starting point. Fine-tune the pre-trained model by training it on the skin disease dataset to leverage the learned representations and accelerate training.

7. **Model Training:**

Train the selected deep learning model using the preprocessed and augmented training dataset. This involves feeding the input images through the network, calculating the loss, and optimizing the model's weights using backpropagation and gradient descent algorithms.

8. **Hyperparameter Tuning**:

Experiment with different hyperparameters, such as learning rate, batch size, and optimizer, to optimize the model's performance. This is typically done using the validation set and techniques like grid search or random search.

9. **Model Evaluation**:

Evaluate the trained model on the test set to measure its performance in detecting skin diseases. Metrics such as accuracy, precision, recall, and F1 score are commonly used to assess the model's performance.

10. **Deployment and Integration**:

Once the model is trained and evaluated, integrate it into a user-friendly interface or application where users can input skin images for disease detection. This may involve creating a web or mobile application or integrating the model into an existing healthcare system.

11. Continuous Improvement:

Regularly update and retrain the model with new data to improve its performance over time. Monitor the model's performance in real-world scenarios and iterate on the system to address any limitations or challenges encountered.

5. RESULT :-

This model is developed using common machine learning techniques like linear regression, (IDE) with the Python PyCharm Integrated Development Environment. mainly because the quantity of airborne contaminants impacts the value of the air quality index. If the value of the feature changes concurrently with the value of the independent variable, thenfeatures and independent variables are likely related.

The model's efficacy (RMSE) may be evaluated using a number of evaluation measures, including Mean Square Error (MSE), R- Square Error, and Root Mean Square Error. The data utilised for the trials is split into train and test data, with the model considering 80% of the training data and 20% of the test data, which is used to determine whether the model is functioning properly.

6. CONCLUSION:-

Skin diseases are destructive sicknesses that can be securely analyzed when identified early and to maintain a healthy lifestyle. One of the precise ways of recognizing these diseases early is by utilizing an AI calculation which is CNN which offers possible solutions. This paper contains the technique of identifying skin disease with approximate accuracy more than 90% as CNN is exceptionally strong and it made for image processing. We train various kinds of skin disease cells through image format and apply CNN so that it can perform well. Dataset is taken manually from various sites. We have analyzed various sorts of calculations utilized to identify skin malignant growth in this paper. Consequently, after an examination of various calculations, CNN is ended up being the best calculation to distinguish skin disease.

FUTURE WORK:-

1. The model must determine the pollutant that caused the value to arise.
2. The two questions are which age groups are most impacted and what safety precautionsare to be taken.
3. The model would do well to display the preventive steps being done to reduce the AQI.

REFERENCES

TEXT BOOK :-

- Geron Aurelien. Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 2nd Edition, Kindle Edition, O'Reilly Media, 13 March 2017.
- Gary B. Shelly. Systems Analysis and Design, Shelly Cashman Series' textbooks, 1991.
- Oliver Theobald. Machine Learning for Absolute Beginners: A Plain English, Independently Published, 2017.

WEBSITES:-

- https://www.javatpoint.com/linear-regression-in-machine-learning.
- https://www.javatpoint.com/machine-learning-random-forest-algorithm.
- https://www.youtube.com/watch?v=nxFG5xdpDto.

RESEARCH PAPERS :-

[1] VinayShekharBannihatti and Sujay S Kumar,Varun Saboo- “Dermatological disease detection using image processing and machine learning” ,AIRP International Conference on Pp. 1-6, 2020.

[2] Pravin Ambad- “A image analysis system to detect skin diseases”,www.Iosrjournals.Org, Vadgaon, Pune, India 2016.

[3] Amarathunga,- “Expert system for diagnosis of skin diseases”, International Journal of Scientific & Technology Research, vol. 4, no. 01, 2015.

[4] Zeljkovic, Druzgalski,and Tameze, Mayorga Pan-“Supplemental melanoma diagnosis for darker skin complexion gradients”, American Health care exchanges P,2015.

[5] Arifin.M, Golam Kibria.M , Firoze. A,Ashraful amini, M & Hong yan,-"Dermatological disease diagnosis using color-skin images", International Conference on Machine Learning and Cybernetics, 2012.

[6] Jana e., Subban, R, & Saraswathi S.-"Research on skin cancer cell detection using image processing" ,IEEE international conference on computational intelligence and computing research, 2017.

[7] Mhaske, h. R., & Phalke -"Melanoma skin cancer detection and classification based on supervised and unsupervised learning", D.A, International Conference on circuits, controls and communications, 2013.

[8] Alfed N, Khelifi, F, Bouridane, A, & Seker, H,-"Pigment network-based skin cancer detection", 37th annual international conference of the IEEE engineering in medicine, 2015.

[9] Evgin Goceri, - "Skin disease diagnosis from photograph using DL" , ECCOMAS thematic conference on computational vision and medical image processing, 239-246, 2019.

[10] Parvathaneni NagaSrinivasu, Jalluri Gnana SivaSai -"Classification of skin disease using deep learning neural network with LSTM", Sensors 21(8), 2852, 2021.