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A Study on Deep Learning Methods for Skin Disease Classification

N.Vanitha[1] and M.Geetha[2]
[1]Assistant Professor, Department of Information Technology, Dr. N.G.P. Arts and Science College, Coimbatore, INDIA
[2]Student, Department of Information Technology, Dr. N.G.P. Arts and Science College, Coimbatore, INDIA

[2]Corresponding Author: geethamurugapandi227@gmail.com

ABSTRACT

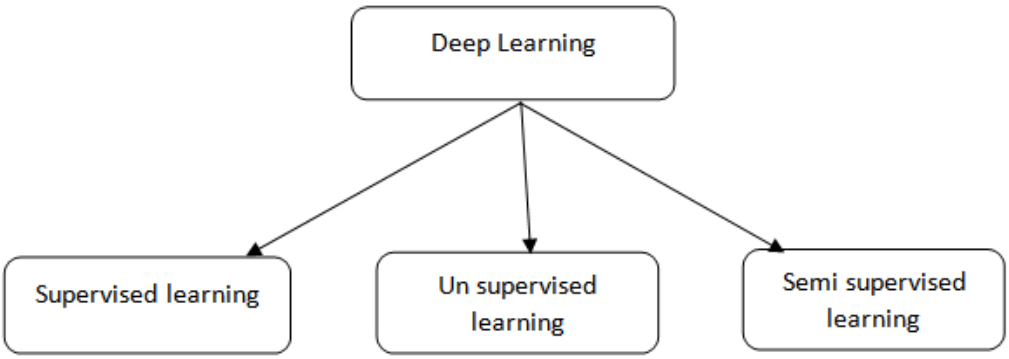
Dermatological disorders are one among the foremost widespread diseases within the world. Despite being common its diagnosis is extremely difficult due to its complexities of skin tone, color, presence of hair. This paper provides an approach to use various computer vision-based techniques (deep learning) to automatically predict the varied sorts of skin diseases. The system makes use of deep learning technology to coach itself with the varied skin images. the most objective of this technique is to realize maximum accuracy of disease of the skin prediction. The people health quite the other diseases. Skin diseases are mostly caused by mycosis, bacteria, allergy, or viruses, etc. The lasers advancement and Photonics based medical technology is employed in diagnosis of the skin diseases quickly and accurately. The medical equipment for such diagnosis is restricted and costliest. So, Deep learning techniques helps in detection of disease of the skin at an initial stage. The feature extraction plays a key role in classification of skin diseases. The usage of Deep Learning algorithms has reduced the necessity for human labor, like manual feature extraction and data reconstruction for classification purpose.

Keywords-- Disease of the Skin, Deep Learning, Types, Significance

I. INTRODUCTION

Deep learning is a man-made intelligence (AI) function that imitates the workings of the human brain in processing data and creating patterns to be used in deciding also referred to as deep neural learning Deep learning is a crucial element of knowledge science, which incorporates statistics and predictive modelling. Deep learning algorithm chooses its own features unlike the machine leaning making the prediction process easier for the top user because it doesn't use much of pre-processing.

Types of Deep Learning



Supervised Learning

Supervised learning may be a data processing chore which concludes a function from a characterized training data which contains series of coaching instances. Each example, in supervised learning, may be a combination comprising of an input object, which usually may be a vector, and a desired output response value, also referred to as the supervisory signal**.**

Unsupervised Learning

The problem that arises in both data science world and data processing in an unsupervised learning task is locating the hidden structure in an uncharacterized or unlabelled data. Therefore, when the learner is given an unlabelled example, no error or reward signal is present for evaluation of an impending solution.

Semi Supervised Learning

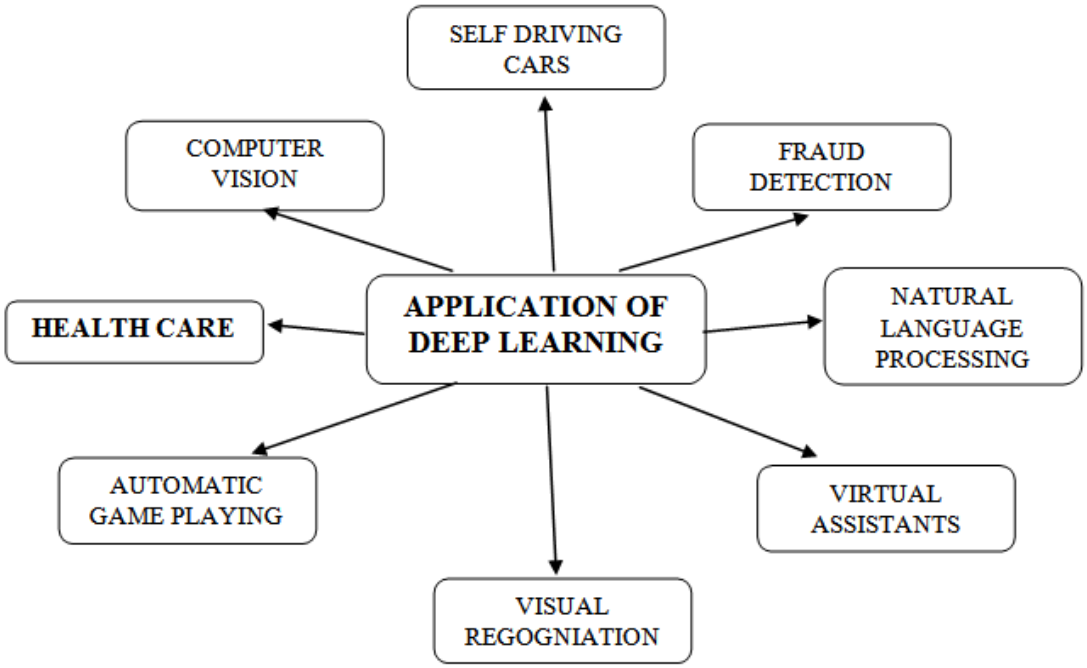
There is a category of supervised learning techniques and tasks which employs unlabelled data (for training) referred to as Semi-Supervised learning. This unlabelled data is typically an undersized quantity of labelled data which features a huge quantity of unlabelled data. this sort of learning falls in between of supervised (completely labelled) and unsupervised learning (not labelled).

1.1 Significance of Deep Learning

- Deep learning is on rage and is gaining much popularity thanks to its supremacy in terms of accuracy nowadays.

- Google's program, voice recognition system and self-driving cars all rely heavily on deep learning.
- Google announced Smart Reply, a deep learning network that writes short email responses for you. Netflix knows which show you'll want to observe next. Facebook recognizes your friend's face during a digital photo. YouTube's deep learning networks detect a beautiful still from a video to use as a thumbnail.
- Deep learning is clearly powerful but is additionally somewhat mysterious.

1.2 Application of Deep Learning



II. INTRODUCTION ON SKIN DISEASE

Skin is one among the most important and fastest growing tissue within the physical body. Skin diseases are the common health problems within the worldwide. it's the infections that occurring in people among all the ages. Skin is usually damaged because it's very sensitive a part of the body. There are 3000 and more unknown skin diseases. A cosmetically appearance spoiler disorder can have a big impact, and may cause considerable pain and permanent injury. skin cancers, like melanoma , are potentially lethal and their trouble is related to the temporality that they carry. People of just about 73% are affected with skin disease don't seek medical advice. Alongside a number of the deep learning algorithms are used for detecting skin diseases in whole body. The convolutional neural network (CNN) may be a category of deep learning neural networks. CNN represents an enormous advance in image recognition. They're wont to analyse the visual images and image classification. A convolutional neural network (CNN) is employed to extract features from images. This eliminates the necessity of manual feature work extraction. The features from the set of images aren't trained they're learned while the network trains on a group of images. It makes extreme accuracy for the deep learning models. Each layer increases the altogether the documents within the training set involvement of the learned features. a specific amount dataset is going to be provided to detecting the skin diseases

2.1 Significance of Deep Learning in Health Care

AI, machine learning, and deep learning have gained tons of attention for quite a while now. These technologies are revolutionizing various industries like retail, finance, travel, manufacturing, healthcare, and so on. Healthcare is one such industry that implements these technologies the foremost. As health may be a priority, doctors are continually trying to seek out ways to implement new technologies and supply impactful results. Deep learning in healthcare offers pathbreaking applications. Deep learning gathers a huge volume of knowledge, including patients' records, medical reports, and insurance records, and applies its neural networks to supply the simplest outcomes.

2.2 Deep Learning in Health Care

Deep learning is assisting medical professionals and researchers to get the hidden opportunities in data and to serve the healthcare industry better. Deep learning in healthcare provides doctors the analysis of any disease accurately and helps them treat them better, thus leading to better medical decisions.

Drug Discovery

Deep learning in healthcare helps in discovery of medicines and their development. The technology analyses the patient's medical record and provides the simplest treatment for them. Moreover, this technology is gaining insights from patient symptoms and tests.

Medical Imaging

Medical imaging techniques like MRI scans, CT scans, ECG, are wont to diagnose dreadful diseases like heart condition, cancer, brain tumor. Hence, deep learning helps doctors to analyse the disease better and supply patients with the simplest treatment.

Insurance Fraud

Deep learning is employed to analyse the medical insurance fraud claims. With predictive analytics, it can predict fraud claims that are likely to happen within the future. Moreover, deep learning helps insurance industry to send discounts and offers to their target patients.

Alzheimer's Disease

Alzheimer is one among the many challenges that medical industry faces. Deep learning technique is used to detect Alzheimer's disease at an early stage.

III. BACKGROUND STUDY

- In2In 2020, Adekanmi A. adegun and Serestina Viriri published a journal in IEEE Xplore on the topic of FCN-Based DenseNet Framework for Automated Detection and Classification of Skin Lesion in Dermoscopy Images and given the outcome of This work provides some novel approaches using deep learning techniques in these gmentation and classification methodologies of skin lesion images towards detection and diagnosis of skin cancer.
- In2018, Musa Mahmood, Shinjae Kwon, Gamze Kilic Berkmen, Yun-Soung Kim, Laura Scorr, H. A. Jinnah and Woon-Hong Yeo published a journal in IEEE Xplore on the topic of Soft Nanomembrane Sensors and Flexible Hybrid Bioelectronics for Wireless Quantification of Blepharo spasm and given the outcome of demonstrated the feasibility of wearable SKINTRONICS for wireless quantitative assessment of BL. The skin-friendly system enables a high-quality, real-time recording of electrophysiological signals from the contoured and dimpled skin with enhanced SNR compared to a commercial system due to minimized motion artifacts.
- In 2019, Arnaud Moreau, Peter Anderer, Marco Ross, Andreas Cerny, Timothy H. Almazan, and Barry Peterson published a journal in IEEE Xplore on the topic of Detection of Nocturnal Scratching Movements in Patients with Atopic Dermatitis Using Accelerometers and Recurrent Neural Networks and given the outcome of A novel algorithm to detect nocturnal scratching from accelerometer signals was presented. The proposed algorithm was validated on video data from 24 subjects and produced results comparable to the gold-standard video scoring, which demonstrates its effectiveness.

SL. NO.	AUTHOR	JOURNAL	TITLE OF THE PAPER	METHOD AND YEAR	OUTCOME
1	Tri-cong pham, Antoinedoucet,chi-mai luong Cong-thanh tran and Van dung hoang	IEEE XPLORE	Improving Skin-disease classification based on customized loss function combined with Balenced Mini-Batch Logic and Real-Time Image Augumentation	August 14,2020. Real-time Image Augmentation	In this study, we have proposed a new approach for multiple skin-disease classification by proposing a hybrid method, which combines designing ew loss function with a data level method of balanced mini-by a real- batch logic followed time image augmentation
2	Adekanmi A. adegun and Serestina Viriri	IEEE XPLORE	FCN-Based DenseNet Framework for Automated Detection and Classification of Skin Lesions in Dermoscopy Images	August 14, 2020. encoder-decoder network , FCN-based Densenet framework composing	This work provides some novel approaches using deep learningtechniquesinthesegmentationandclassificationmethodologiesof skinlesionimagestowardsdetectionanddiagnosis of skin cancer. A deep learning-based CAD framework that is composed of a multi-scale encoder-decoder segmentation networkandanFCN-basedDenseNetclassificationnetwork,hasbeenproposedforthedetectionandclassificationofskin lesion images to diagnose skin cancer disease
3	Musa Mahmood, Shinjae Kwon, Gamze	IEEE XPLORE	Soft Nanomembrane Sensors and Flexible Hybrid Bioelectronics for	November 10,2019.CNN	We have demonstrated the feasibility of wearable SKINTRONICS for wireless quantitative assessment of BL. The skin-friendly system enables a high-quality, real-time recording of electrophysiological signals from the contoured and dimpled skin with enhanced SNR compared to a commercial system due to minimized motion artifacts.

	Kilic Berkmen, Yun-Soung Kim, Laura Scorr, H. A. Jinnah and Woon-Hong Yeo		Wireless Quantification of Blepharospasm		This allin-one wearable solution will allow physicians to quickly generate quantitative data for accurate BL assessments and disease progression by eliminating subjective and manual diagnosis.
4	Arnaud Moreau , Peter Anderer, Marco Ross, Andreas Cerny, Timothy H. Almazan, and Barry Peterson	IEEE XPLORE	Detection of Nocturnal Scratching Movements in Patients with Atopic Dermatitis Using Accelerometers and Recurrent Neural Networks	July 4,2018. scratching detection algorithm	A novel algorithm to detect nocturnal scratching from accelerometer signals was presented. The proposed algorithm was validated on video data from 24 subjects and produced results comparable to the gold-standard video scoring, which demonstrates its effectiveness

Table 3.1: Background Study

IV. RESEARCH GAP IDENTIFIED

Systematic reviews are the standard for evaluating the current state of scientific knowledge regarding a specific clinical or policy question. Identification and prioritization of research gaps has the potential to lead to more rapid generation of subsequent research, informed by input from stakeholders Audiences including researchers, funders, clinicians, advocates, and patients could use information about prioritized research gaps to understand areas of uncertainty and more quickly initiate studies.

This study has several limitations: The efficacy of the presented algorithm was evaluated on a limited set of subjects, with a number of healthy controls. this is often thanks to the trouble of data acquisition, specifically the manual scoring of IR video. Therefore, a replication study with a bigger set of subjects including patients with scratching events and healthy controls aswell as patients with movement disorders during sleep like periodic limb movement disorder is advisable. an extra limitation is that the sensor placement analternative sensor placement could be explored.

V. CONCLUSION

In this work, we studied many deep learning algorithms to detect skin disease in future we will try on all features of deep learning techniques and achieve best accuracy.Hence there is a solid requirement for better understanding in to the legitamacy and consensus of many talk about methods. Dermatological disorders are one of the foremost widespread diseases within the planet. Despite being common its diagnosis is extremely difficult due to its complexities of skin tone, colour, presence of hair. This paper provides an approach to use various computer vision-based techniques (deep learning) to automatically predict the numerous kinds of skin diseases. The system makes use of deep learning technology to teach itself with the numerous skin images. The foremost objective of this system is to understand maximum accuracy of disease of the skin prediction. The people health quite the other diseases

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