**ResNet34 [15] and ResNeXt50 [6] given accuracy of 89.5% and 99.5% respectively.**

DenseNet-169 model from 81.35

Skin cancer detection: Applying a deep learning based model driven architecture in the cloud for classifying dermal cell images with 99.77%

VGGNet, ZFNet, ResNet, GoogLeNet, AlexNet, and LeNet [26] are different DCNN architectures that can be used in different applications. The AlexNet is the utilized DCNN architecture in the proposed skin cancer classification model with accuracy 98%

***Abstract—In this paper we are going to develop an automated skin lesion analyzer that can take affected skin lesion image from user and predict or approximate 3 skin diseases with 95% accuracy. To accomplish this goal we are going to use Neural Networks as they are the best data driven models with top most accuracy in all the fields they have been experimented till now. Since Neural Network models also need huge computation power to train the model on the input data and also to predict the output we are going to use a computationally less intensive architecture that can work even on hand held mobiles and embedded systems. To further featuring our model we have added dropout techniques for model regularization and adaptive learning rates to achieve global minima with ease even with the presence of plateaus. At last we will deploy a production level web application to serve users across the world.***

***Keywords: Embedded Systems, Neural Networks, Global Minima, Plateaus, Adaptive Learning Rates.***

**Risk-Aware Machine Learning Classifier for Skin**

**Lesion Diagnosis**

**Abstract:** Knowing when a machine learning system is not confident about its prediction is crucial

in medical domains where safety is critical. Ideally, a machine learning algorithm should make

a prediction only when it is highly certain about its competency, and refer the case to physicians

otherwise. In this paper, we investigate how Bayesian deep learning can improve the performance

of the machine–physician team in the skin lesion classification task. We used the publicly available

HAM10000 dataset, which includes samples from seven common skin lesion categories: Melanoma

(MEL), Melanocytic Nevi (NV), Basal Cell Carcinoma (BCC), Actinic Keratoses and Intraepithelial

Carcinoma (AKIEC), Benign Keratosis (BKL), Dermatofibroma (DF), and Vascular (VASC) lesions.

Our experimental results show that Bayesian deep networks can boost the diagnostic performance of

the standard DenseNet-169 model from 81.35% to 83.59% without incurring additional parameters or

heavy computation. More importantly, a hybrid physician–machine workflow reaches a classification

accuracy of 90% while only referring 35% of the cases to physicians. The findings are expected to

generalize to other medical diagnosis applications. We believe that the availability of risk-aware

machine learning methods will enable a wider adoption of machine learning technology in clinical

settings.

Skin cancer detection: Applying a deep learning based model driven architecture in the cloud for classifying dermal cell images

*Background:* Skin cancer is a common form of cancer, and early detection increases the survival rate. *Objective:* To build deep learning models to classify dermal cell images and detect skin cancer. *Methods:* A model-driven architecture in the cloud, that uses deep learning algorithms in its core implementations, is used to construct models that assist in predicting skin cancer with improved accuracy. The study illustrates the method of building models and applying them to classify dermal cell images. *Results:* The deep learning models built here are tested on standard datasets, and the metric area under the curve of 99.77% was observed. *Conclusions:* A practitioner can use the model-driven architecture and quickly build the deep learning models to predict skin cancer.

Man against machine: diagnostic performance of a

deep learning convolutional neural network for

dermoscopic melanoma recognition in comparison

to 58 dermatologists

Background: Deep learning convolutional neural networks (CNN) may facilitate melanoma detection, but data comparing a

CNN’s diagnostic performance to larger groups of dermatologists are lacking.

Methods: Google’s Inception v4 CNN architecture was trained and validated using dermoscopic images and corresponding

diagnoses. In a comparative cross-sectional reader study a 100-image test-set was used (level-I: dermoscopy only; level-II:

dermoscopy plus clinical information and images). Main outcome measures were sensitivity, specificity and area under the

curve (AUC) of receiver operating characteristics (ROC) for diagnostic classification (dichotomous) of lesions by the CNN versus

an international group of 58 dermatologists during level-I or -II of the reader study. Secondary end points included the

dermatologists’ diagnostic performance in their management decisions and differences in the diagnostic performance of

dermatologists during level-I and -II of the reader study. Additionally, the CNN’s performance was compared with the top-five

algorithms of the 2016 International Symposium on Biomedical Imaging (ISBI) challenge.

Results: In level-I dermatologists achieved a mean (6standard deviation) sensitivity and specificity for lesion classification of

86.6% (69.3%) and 71.3% (611.2%), respectively. More clinical information (level-II) improved the sensitivity to 88.9% (69.6%,

P¼0.19) and specificity to 75.7% (611.7%, P<0.05). The CNN ROC curve revealed a higher specificity of 82.5% when compared

with dermatologists in level-I (71.3%, P<0.01) and level-II (75.7%, P<0.01) at their sensitivities of 86.6% and 88.9%, respectively.

The CNN ROC AUC was greater than the mean ROC area of dermatologists (0.86 versus 0.79, P<0.01). The CNN scored results

close to the top three algorithms of the ISBI 2016 challenge.

Conclusions: For the first time we compared a CNN’s diagnostic performance with a large international group of 58

dermatologists, including 30 experts. Most dermatologists were outperformed by the CNN. Irrespective of any physicians’

experience, they may benefit from assistance by a CNN’s image classification.

Clinical trial number: This study was registered at the German Clinical Trial Register (DRKS-Study-ID: DRKS00013570; https://

www.drks.de/drks\_web/).

Key words: melanoma, melanocytic nevi, dermoscopy, deep learning convolutional neural network, computer algorithm,

automated melanoma detection

**AB Melanoma Skin Cancer Detection using**

**Image Processing and Machine LearningSTRACT**

Dermatological Diseases are one of the biggest medical issues in 21st century

due to its highly complex and expensive diagnosis with difficulties and

subjectivity of human interpretation. In cases of fatal diseases like Melanoma

diagnosis in early stages play a vital role in determining the probability of getting

cured. We believe that the application of automated methods will help in early

diagnosis especially with the set of images with variety of diagnosis. Hence, in

this article we present a completely automated system of dermatological disease

recognition through lesion images, a machine intervention in contrast to

conventional medical personnel-based detection. Our model is designed into

three phases compromising of data collection and augmentation, designing

model and finally prediction. We have used multiple AI algorithms like

Convolutional Neural Network and Support Vector Machine and amalgamated it

with image processing tools to form a better structure, leading to higher

accuracy of 85%.

**Risk-Aware Machine Learning Classifier for Skin**

**Lesion Diagnosis**

**Abstract:** Knowing when a machine learning system is not confident about its prediction is crucial

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a prediction only when it is highly certain about its competency, and refer the case to physicians

otherwise. In this paper, we investigate how Bayesian deep learning can improve the performance

of the machine–physician team in the skin lesion classification task. We used the publicly available

HAM10000 dataset, which includes samples from seven common skin lesion categories: Melanoma

(MEL), Melanocytic Nevi (NV), Basal Cell Carcinoma (BCC), Actinic Keratoses and Intraepithelial

Carcinoma (AKIEC), Benign Keratosis (BKL), Dermatofibroma (DF), and Vascular (VASC) lesions.

Our experimental results show that Bayesian deep networks can boost the diagnostic performance of

the standard DenseNet-169 model from 81.35% to 83.59% without incurring additional parameters or

heavy computation. More importantly, a hybrid physician–machine workflow reaches a classification

accuracy of 90% while only referring 35% of the cases to physicians. The findings are expected to

generalize to other medical diagnosis applications. We believe that the availability of risk-aware

machine learning methods will enable a wider adoption of machine learning technology in clinical

settings.

**Keywords:** Bayesian deep network; model uncertainty; Monte Carlo dropout; physician-friendly

machine learning; skin lesion

Skin Lesion Detection using Texture Based Segmentation and Classification by Convolutional Neural Networks (CNN)

***Abstract: Skin cancer is one of the dangerous cancers like breast cancer, brain tumour, and lung cancer. The detection of a skin lesion is melanoma or nonmelanoma is a very crucial issue. The earlier detection of melanoma is one of the best solutions for this issue. There is a various technique for detecting the skin lesion. Because of the technology advancement earlier detection of the skin lesion is possible. Malignant melanoma is a very harmful melanoma it is the cancerous cell that will lead to growth and that can be a mole in different colours red, black and brown. Skin lesion segmentation from dermoscopic images is a very challenging task nowadays because of the contrast of those images. there are various techniques for detecting the skin cancer base on the characteristics of the images shape, colour, textures. We proposed a system for skin cancer detection using texture-based segmentation and classification using Convolutional Neural Network. GLCM (Gray Level Co-occurrence Matrix) matrix is exacting the features from an image. And used Neural network tool for checking the accuracy of training network. Nowadays Deep Learning technique is very popular for classification of images. CNN is one of the techniques of Deep Learning. The proposed work will help in classification of skin lesion. Model will helpful for dermatologists for classifying melanomas.***

***Keywords*: *Convolutional Neural Network, DullRazor software, Lesion, Melanoma, Se***

**RESULT AND DISCUSSION**

Dermoscopic image dataset loaded for processing and filtering is done by using DullRazor application and Gaussian filtering it's giving better result in preprocessing step. Otsu thresholding used for segmenting the image as shown in fig. Features Extracted by GLCM and we have checked accuracy by using Neural network toolbox. By comparing the accuracy of Neural Network tool and convolutional neural network. By using CNN, we are getting accuracy averagely 96% for classification of dermoscopic images

Classification step resulting as the image is melanoma or non-melanoma type cancer. Fig.3 shows the result of segmentation, types of skin lesion and accuracy of classification. In Fig.3 showing the type of skin lesion is common nevus or non-melanoma

Skin Lesion Classification Using Convolutional

Neural Network With Novel Regularizer

**ABSTRACT** One of the most common types of human malignancies is skin cancer, which is chie\_y

diagnosed visually, initiating with a clinical screening followed by dermoscopic analysis, histopathological

assessment, and a biopsy. Due to the \_ne-grained differences in the appearance of skin lesions, automated

classi\_cation is quite challenging through images. To attain highly segregated and potentially general

tasks against the \_nely grained object categorized, deep convolutional neural networks (CNNs) are used.

In this paper, we propose a new prediction model that classi\_es skin lesions into benign or malignant

lesions based on a novel regularizer technique. Hence, this is a binary classi\_er that discriminates between

benign or malignant lesions. The proposed model achieved an average accuracy of 97.49%, which in

turns showed its superiority over other state-of-the-art methods. The performance of CNN in terms of

AUC-ROC with an embedded novel regularizer is tested on multiple use cases. The area under the curve

(AUC) achieved for nevus against melanoma lesion, seborrheic keratosis versus basal cell carcinoma lesion,

seborrheic keratosis versus melanoma lesion, solar lentigo versus melanoma lesion is 0.77, 0.93, 0.85, and

0.86, respectively. Our results showed that the proposed learning model outperformed the existing algorithm

and can be used to assist medical practitioners in classifying various skin lesions.

**INDEX TERMS** Convolutional neural network, skin lesion, novel regularizer, AUC-ROC.

Skin Cancer Classification using Deep Learning and Transfer Learning

***Abstract*— Skin cancer, specially melanoma is one of most deadly diseases. In the color images of skin, there is a high similarity between different skin lesion like melanoma and nevus, which increase the difficulty of the detection and diagnosis. A reliable automated system for skin lesion classification is essential for early detection to save effort, time and human life. In this paper, an automated skin lesion classification method is proposed. In this method, a pre-trained deep learning network and transfer learning are utilized. In addition to fine-tuning and data augmentation, the transfer learning is applied to AlexNet by replacing the last layer by a softmax to classify three different lesions (melanoma, common nevus and atypical nevus). The proposed model is trained and tested using the ph2 dataset. The well-known quantative measures, accuracy, sensitivity, specificity, and precision are used in evaluating the performance of the proposed method where the obtained values of these measures are 98.61%, 98.33%, 98.93%, and 97.73%, respectively. The performance of the proposed method is compared with the existing methods where the classification rate of the proposed method outperformed the performance of the existing methods.** A DCNN has been used in a number of application to improve performance such visual tasks, natural language processing, action recognition [24, 25]. VGGNet, ZFNet, ResNet, GoogLeNet, AlexNet, and LeNet [26] are different DCNN architectures that can be used in different applications. The AlexNet is the utilized DCNN architecture in the proposed skin cancer classification model. A brief description of these net is presented in the next subsection.