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DEEP-LEARNING-BASED SKIN-DISEASE DETECTION AND CATEGORIZATION

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ABSTRACT— Out of the three main kinds of skin cancer—basal cell adenocarcinoma (BCC), squamous cell cancer (SCC), and melanoma—melanoma has the lowest survival rate. Early detection of melanoma may improve patient outcomes. Image processing, which includes shaving, de-noising, sharpening, and resizing the skin picture; segmentation, it is used to segment out the area of interest from the provided image; and resizing are the four main aspects of the skin cancer detection technology. There are several approaches to segmentation. Common segmentation methods include K-means, cutoff in histograms, etc., and then feature extraction from the segmented photograph and categorized the image using the features set returned from the segmented picture. Several different types of categorization methods may do this. Data classification is performed using machine training and deep learning-based algorithms, which have recently been used in skin cancer detection technologies. The most popular classification strategies are the support vector machine (SVM), the feed forward neural network technique (ANN), and the deep convolutional ANN. In this post, we provide findings from our study on cancer of the skin detection, which includes a comprehensive literature review and an in-depth comparison of state-of-the-art algorithms.

INTRODUCTION

Cancer of the skin is quite prevalent nowadays. In 2020, there will be 100,350 new cases of melanoma skin cancer, including 60,350 male cases and 43,070 female cases, as reported by Surveillance Research from the American Cancer Society, Llc.

This year, skin cancer is expected to claim the lives of 6,850 persons, 3,450 women with 8,030 men [1].

In general, there are three distinct types of skin cancer. BCC, or basal cell carcinoma: As a result of prolonged exposure to sunlight, it forms at the epidermis' base. Because of its slow progression, skin cancer is often easily diagnosed. Imagine a little, red mass that is glossy, smooth, waxy, or light in color and coated in rough, clean, or scaly patches; this is the appearance of a basal cell carcinoma. (2).

Another kind of skin cancer is squamous cell carcinoma (SCC).

It behaves similarly to basal cell carcinoma in that it spreads through the skin's outer layer. It rapidly spread to other areas of skin early on. This is when BCC and SCC really part ways. Squamous cell carcinomas often manifest as small, smooth, brown or authentic-looking bumps. Malignant melanoma (MM) ranks third among skin cancers in terms of severity. Melanocytes are the site of this process. Melanoma skin cancer is easily identifiable by its asymmetrical and abnormal appearance in terms of form, borders, and color.

RELATED WORK

Statistics on the Disease Cancer. Association for Cancer Research of the United States of America

The American Cancer Society annually compiles the most up-to-date data on based on populations cancer occurrence and outcomes, based on incidence data from central cancer databases and mortality data from the US National Center for Statistics on Health. The estimated number of new cases of cancer in the US in 2023 is 1,958,310, with 609,820 fatalities attributable to the disease. However, overall cancer rates were better in males compared to women, with the exception of prostate cancer, whose incidence climbed by 3% year from 2014 through 2019, corresponding to an extra 99,000 new cases. Breast and uterus corpus cancers, as well as liver cancer but melanoma, both increased, whereas melanoma stabilized in men who were 50 and older and reduced in younger men. Lung cancer in women dropped at half the rate of males (1.1% vs. 2.6% yearly) from 2015 through 2019. The bulk of human papillomavirus-associated malignancies are found in women; nevertheless, a 65% decline in cervical cancer incidence between 2012 and 2019 amongst women in their twenties, the first cohort to get the human papillomavirus vaccination, augurs substantial reductions in the burden of HPV-associated cancers. Deaths from cancer continued to fall (by 1.5%) from 2019 to 2020, amounting to a 33% total drop since 1991 and a total of 3.8 million lives spared despite the epidemic. The significant decreases in mortality (about 2% yearly throughout 2016–2020) in leukemia, Melanoma, and cancer of the kidneys, despite stable/increasing prevalence, and accelerated falls for lung cancer, are especially indicative of this improvement reflecting breakthroughs in therapy. Breast, prostate, and endometrial corpus cancers, which have the highest racial inequalities in mortality, are on the rise, which may slow future advances in cancer death rates.

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"Image-Processing-Based Melanoma Skin Cancer Detection"

among context: Skin cancer is quite prevalent among people. Non-melanoma and melanoma are the two main categories. Melanomas are more deadly than non-melanoma skin cancers, although they are far less prevalent. Therefore, it is important to create a CAD system that can identify this kind of lesions and facilitate early detection of the illness in order to increase the patient's chances of survival. The purpose of this work is to provide an easy-to-use approach for identifying and categorizing dermoscopy pictures of skin lesions according to the ABCD criteria. The suggested method consists of four stages. 1) Algorithms for filtering and boosting contrast are used in the preprocessing step. 2) The lesion is supposed to be found during the segmentation phase. The third phase is feature extraction, and it is based on the four characteristics of asymmetry, border irregularity, color, and diameter. 4) The total dermoscopy, especially value (TDV) is calculated by multiplying the weights assigned to each of the four retrieved characteristics, and this value is used to assign a benign, suspected, or malignant categorization to the lesion. The experiment is conducted in the MATLAB environment, and the PH2 database, which contains cases of potentially malignant skin cancer, serves as the basis for the suggested technique. Conclusions and Results The experimental results show that the devised method has an accuracy of 90%, demonstrating its dependability.

This paper, titled "Supervised artificial intelligence methods for cognitive radio network systems during cooperative spectrum handovers,"

Cognitive radio networks rely on communication models to undertake spectrum research and monitoring, which aids in the timely notification of primary users (PUs) and the subsequent distribution of transmission capacity to secondary users (SUs). Cognitive computing systems need novel computing models in order to regulate wireless channels, analyze business models in an unscripted manner, and communicate organically with people and machines. Cognitive wireless networks learn to handle spectrum handoffs in real time using AI and ML algorithms for automated training. They cut through the murk of handoffs to help humans make better judgments. Using the Home Position Register (HLR) and the Visitor Location Registration (VLR) databases, this study examines the data communication patterns of primary users (PU) and secondary users (SU) to better understand the learning and reasoning properties of cognitive radio (CR). As an alternative to conventional collaborative spectrum sensing (CSS) methods, the SpecPSO is presented for optimizing handovers via the use of supervised machine learning methodology for conducting dynamic handover by reacting to the surroundings and making smart judgments.

METHODOLOGY

A schematic of how the LSTM may be included into MobileNet V2 is shown. While MobileNet V2 is utilized to categorize the nature of the skin illness,

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LSTM is used to improve the model's performance by remembering the states of the features seen during the first round of picture classification. Even with a small set of functions, like Palmprint Recognition [17], the Mobile Net [68] architecture is very effective. MobileNet has a hierarchical, layered design [69]. The core structure relies on a number of convolutions, or abstraction layers, which seem to be the ideal arrangement that provides a thorough evaluation of the difficulty of a typical issue. Point-wise complexity is defined as a complexity of 11. The standard, restored linear unit (ReLU) is used in the design of platforms to create in-depth, and abstraction layers with in-depth and point structures are included. Adding the resolution multiplier variable helps to reduce the input image's and each layer's total number of dimensions.

3.2 The Suggested Model

The MobileNet V2 structure consists of the ReLu component, the residual layer that has a stride of 1, and the shrinking layer having a stride of 2. Each of the residual and shrinking layers consists of three further subdivisions.

The first layer consists of a ReLu6 convolution on an 11 grid.

In this design, Depth-Wise Convolution occurs in the second layer. Lightweight filtering is performed by a single convolutional layer added by the Depth-Wise layer.

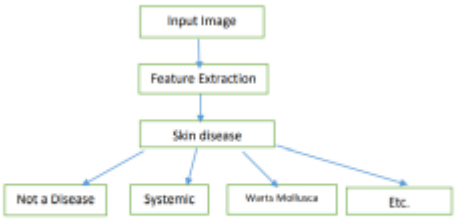
The suggested architecture's third layer is a non-linear 1 1 convolution layer. The ReLu6 sublayer is employed in the output domains in the third layer.

In low-precision scenarios, ReLu6 is utilized to guarantee resilience and improvise the model's unpredictability.

Within that larger order, the number of output channels from each tier is same.

Modern architectural models often use a filter with a size of 3 by 3, and training procedures like dropouts and normalization in batches are standard.

The gradient propagation throughout the network is supported by a residual component using sequential processing and ReLu6 as the activation part.



System Architecture

RESULT AND DISCUSSION

```
import numpy as np
import os
from keras.models import load_model
from keras.preprocessing import image
import tensorflow as tf
global graph
graph = tf.get_default_graph()
from flask import Flask , request, render_template
from werkzeug.utils import secure_filename
from gevent.pywsgi import WSGIServer

app = Flask(__name__)
model = load_model("skin.h5")

@app.route('/')
def index():
    return render_template('UIndex.html')

@app.route('/predict',methods = ['GET','POST'])
def upload():
    if request.method == 'POST':
        f = request.files['image']
        print("current path")
        basepath = os.path.dirname(__file__)
        print("current path", basepath)
        filepath = os.path.join(basepath,'uploads',f.filename)
        print("upload folder is ", filepath)
        f.save(filepath)
```

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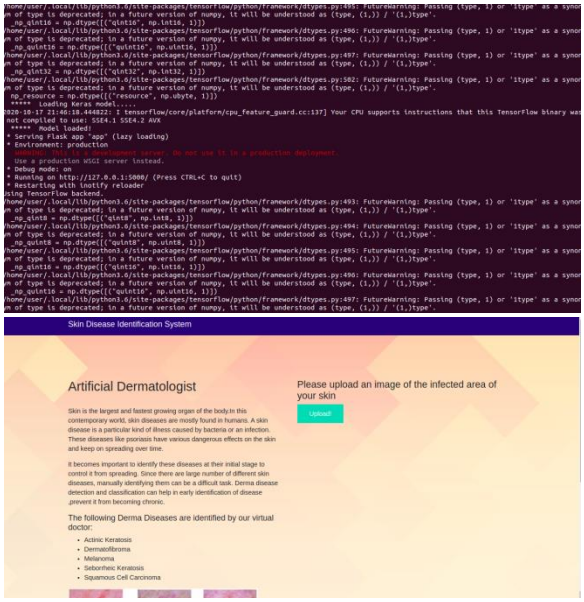


Synthetic Dermatologist

The skin is both the biggest and the most rapidly expanding of the body's organs.Humans are the primary carriers of skin disorders in the modern world. Skin diseases are a subset of infectious diseases that manifest on the skin. Psoriasis is only one example of a skin condition that may have devastating consequences and develop rapidly.

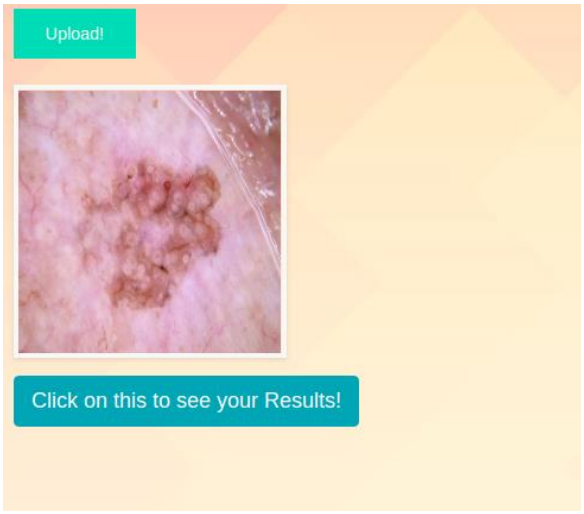
To prevent the further spread of these illnesses, early detection is crucial. There are many types of skin illnesses, and distinguishing between them may be challenging when done manually. The early diagnosis and categorization of derma diseases may aid in the prevention of chronic illness.

Currently, we have compiled a total of 5 pictures. what's in it images 1, 2, and 3 depict melanoma; images 4, and 5 depict seborrheic keratosis and squamous cell carcinoma, respectively.

In terms of Derma Diseases, our e-MD can diagnose the following:

Squamous cell carcinoma, melanoma, actinic keratosis, dermatofibroma, and seborrheic keratosis are all types of skin cancer.

You may use the upload button to send a picture.



CONCLUSION

Dermatologists are able to save time and increase diagnostic accuracy by looking for melanoma skin cancer early. Current and historical methods for early diagnosis of malignant skin cancer are the primary topic of this research. Picture pre-processing, post-processing, segmentation of images, Feature extraction, and categorization algorithms are all shown to have a role in the detection of melanoma skin cancer, as determined by a review of the relevant literature.

REFERENCES

[1] Cancer Facts and Figures. American Cancer Society. https://www.cancer.org/content/dam/cancer org/research/cancerfacts-and-statistics/annual cancer-facts-andfigures/2020/cancer-

factsand-figures-2020.pdf. Accessed January 8, 2020.

[2] Nadia Smaoui Zghal, Nabil Derbel, "Melanoma Skin Cancer Detection based on Image Processing", Current Medical Imaging Formerly Current Medical Imaging Reviews, Vol-16, ISSN15734056, 2018.

[3] H. Anandakumar and K. Umamaheswari, "Supervised machine learning techniques in cognitive radio networks during cooperative spectrum handovers," Cluster Computing, vol. 20, no. 2, pp. 1505– 1515, Mar. 2017.

[4] H. Anandakumar and K. Umamaheswari, "A bio-inspired swarm intelligence technique for social aware cognitive radio handovers," Computers & Electrical Engineering, vol. 71, pp. 925–937, Oct. 2018.
doi:10.1016/j.compeleceng.2017.09.016

[5] E. Jana, R. Subban and S. Saraswathi, "Research on Skin Cancer Cell Detection Using Image Processing," 2017 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), Coimbatore, pp. 1-8, 2017. doi: 10.1109/ICCIC.2017.8524554.

[6] S. Jain, V. Jagtap and N. Pise, " Computer aided melanoma skin cancer detection using image processing", Procedia Computer Science, pp. 736–741, 2015.

[7] A.A. Amarathunga, E.P. Ellawala, G.N. Abeysekar and C.R Amalraj, "Expert system for diagnosis of skin diseases," International Journal of Scientific & Technology Research, 4(01):174-8, 4 Jan 2015.

[8] Goyal, Manu Oakley, Amanda Bansal, Priyanka Dancey, Darren Yap, Moi Hoon,(2020),"Skin Lesion Segmentation in Dermoscopic Images with Ensemble Deep Learning Methods", IEEE Access,Vol-8,ISSN: 21693536, January 2020.

[9] Pedro M.M. Pereira, Rui Fonseca-Pinto, Rui Pedro Paiva, Pedro A.A. Assuncao, Luis M.N. Tavora, Lucas A. Thomaz, Sergio M.M. Faria, (2020), "Dermoscopic skin lesion image segmentation based on Local Binary Pattern Clustering: Comparative study", Biomedical Signal Processing and Control, Vol-59, ISSN- 17468108, 2020.

[10] R. Kasmi and K. Mokrani, "Classification of malignant melanoma and benign skin lesions: implementation of automatic ABCD rule," in IET Image Processing, vol. 10, no. 6, pp. 448-455, 6 2016, doi: 10.1049/iet-ipr.2015.0385.

[11] Shalu, Aman Kamboj, "A Color-Based Approach for Melanoma Skin Cancer Detection", ICSCCC 2018 - 1st International Conference on Secure Cyber Computing and Communications, ISBN9781538663738, 2018.

[12] Swati Jayade, D. T. Ingole, Manik D. Ingole, "Skin Cancer Detection Using Gray Level Co-occurrence Matrix Feature Processing", ICDCS 2020 - 2020 5th International Conference on Devices, Circuits and Systems, ISBN: 9781728163680, 2020.

[13] Md. Zahid Hasan, Shadman Shoumik, Nusrat Zahan, "Integrated Use of Rough Sets and Artificial Neural Network for Skin Cancer Disease Classification", 5th International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering, IC4ME2 2019, ISBN9781728130606,2019.

[14] Ni Zhang, Yi-Xin Cai, Yong-Yong Wang, Yi-Tao Tian, Xiao-Li Wang,

Benjamin Badami, "Skin cancer diagnosis based on optimized convolutional neural network", Artificial Intelligence in Medicine, vol-102, ISSN- 18732860, PMID31980095, 2020.

[15] Suleiman MUSTAFA, Akio KIMURA, "A SVM-based diagnosis of melanoma using only useful image features", 2018 International Workshop on Advanced Image Technology, IWAIT 2018, ISSUE-1, ISBN-9781538626153, 2018.

[16] Nazia Hameed, Antesar M. Shabut, M. A. Hossain, "MultiClass Skin Diseases Classification Using Deep Convolutional Neural Network and Support Vector Machine", International Conference on Software, Knowledge Information, Industrial Management and Applications, SKIMA, ISBN-9781538691410, ISSN-25733214, 2019.

[17] Agung W. Setiawan, "Effect of Color Enhancement on Early Detection of Skin Cancer using Convolutional Neural Network", ISBN: 9781728148212,2020.

[18] Lokesh Singh, Rekh Ram Janghel, Satya Prakash Sahu, "Designing a Retrieval-Based Diagnostic Aid using Effective Features to Classify Skin Lesion in Dermoscopic Images", Procedia Computer Science, Vol-167, ISSN-18770509, 2020.

[19] AN GONG, XINJIE YAO, WEI LIN, "Dermoscopy Image Classification Based on StyleGANs and Decision Fusion", IEEE Access, Vol-8, ISSN – 21693536, April 2020