ISSN: 2454-9940

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

E-Mail :
editor.ijasem@gmail.com
editor@ijasem.org

www.ijasem.org

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN 2454-9940

www.ijasem.org

Vol 19, Issue 2, 2025

The Development of a Skin Cancer Detection Classification System Utilizing Tensorflow and Python GUI

[1]Mohammed khaja Moizuddin, [2] MIR MUHIUDDIN AHMED, [3] MIRZA ISMAIL BAIG, [4] MOHD ARBAZ ALI, [5] MOHD SHABAZ SHAREEF,

[1] Assistant Professor, Department of AIML, Lords Institute of Engineering & Technology.

[2345] Student, Department of AIML, Lords Institute of Engineering & Technology.

Abstract—

Melanoma skin cancer (MSC) and non-melanoma skin cancer (NMSC), namely squamous cell carcinoma (SCC) and basal cell carcinoma (BCC), are among the most prevalent forms of human cancer. "Early Detection Skin Cancer" is a program developed to identify and categorize skin cancer; it is based on Python GUI and TensorFlow. This program examines skin lesions for signs of cancer using the Convolutional Neural Network (CNN) classification technique. The next step is to employ CNN to determine whether the lesion is SCC, BCC, or MSC. The validation image data used for the test came from 26 different samples of skin cancer patients from Hasan Sadikin Hospital in Bandung. The results of the tests demonstrate that this application can accurately identify MEL skin cancer, 55.56% of BCC skin cancer, and 42.86% of SCC skin cancer. The results of the categorization, however, might be impacted by the quality of the lesions' photographs.

Keywords—
PythonGUI,TensorFlow,MachineLearning, Convolutional Neural Network

Introduction

When it comes to healthcare and IT, skin cancer detection is a game-changer [1]. Early diagnosis is crucial for successful treatment of skin cancer, which is one of the most frequent kinds of cancer globally [2]. Artificial intelligence (AI) has recently shown promising results in the detection and classification of skin cancer [3]. Because of this, Python and TensorFlow have grown in popularity as powerful frameworks for creating AI apps [1,2]. application analyzes skin pictures and detects skin cancer indicators using a machine learning model. With any luck, this study will provide light on how to best use artificial intelligence tools like TensorFlow and Python to the problem of skin cancer detection and classification. Furthermore, future medical applications are anticipated to benefit from this study by becoming more advanced and successful.

TheoriticalReview

A major hazard to world health, skin cancer is among the most prevalent cancers. This cancer develops when skin cells start to grow in an uncontrolled manner, leading to the formation of a mass or tumor that may be either benign or malignant. Melanoma, basal cell carcinoma (BCC), and squamous cell carcinoma (SCC) are the three most common forms of skin cancer. Although melanoma is less frequent, it is more hazardous because it may spread to other regions of the body if not treated [4]. The most prevalent kinds of non-melanoma skin cancer are basal cell carcinoma and squamous cell carcinoma. An individual's vulnerability to skin cancer might be heightened by many risk factors. Factors such as sun exposure, a family history of skin cancer, and specific skin types (e.g., skin that burns easily, has lots of moles, or has light-colored hair and eyes) are also contributors. Dysplastic lesions, abnormalities in moles or other skin patches, or newly formed growths are all possible signs of skin cancer [5].
One subfield of AI, known as "machine learning," allows computers to "learn" (or "discover") new information, patterns, and judgments with little to no human input [6].

In the medical area, machine learning has several uses, one of which is in the identification and diagnosis of skin cancer and other disorders. Deep Learning, and more especially Convolutional Neural Networks (CNN) [7], is one Machine Learning approach that is often used to diagnose skin cancer. Only Shanxi University is authorized to utilize this license. Published by IEEE Xplore and downloaded on December 6, 2023 at 06:45:17 UTC. Limitations are in place.
38. 879-8-3503-0686-6/23, $31.00 © 2023 Data Collection at IEEE Society D
An artificial neural network, a deep neural network is

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT
ISSN 2454-9940
www.ijasem.org
Vol 19, Issue 2, 2025

the product of Deep Learning, a subfield of Machine Learning. CNNs, a subset of deep neural networks, excel at processing images, making them a promising tool in the fight against skin cancer. Fully connected layers (FCLs) are used for classification in CNN after convolution and pooling algorithms have learned the visual characteristics [8].
Applying CNN to the problem of skin cancer detection has shown encouraging results. Utilizing skin scans, CNN has the ability to detect indications of skin cancer with remarkable precision, often surpassing the accuracy of human diagnosis [9].
C. Tensorflow and Python Web Interface
Python is a widely used high-level language for developing applications in the fields of Machine Learning, artificial intelligence, and model building. Python provides a wide range of tools and frameworks, such as TensorFlow, that facilitate artificial intelligence and machine learning, in addition to an easily comprehensible syntax [10].
A number of tools for creating and training Machine Learning models are available in the open-source framework TensorFlow, which was created by the Google Brain Team. You can use TensorFlow on desktops, servers, and mobile devices, and it supports many different kinds of Machine Learning. When it comes to training complicated Machine Learning models, TensorFlow is your best option since it supports parallel processing and can use the GPU [10].
A graphical user interface (GUI) replaces text-based command lines with visual components like icons and windows, allowing users to more easily navigate and interact with software. The graphical user interface (GUI) simplifies the software's operation by eliminating the need for users to comprehend complicated command syntax. Tkinter, PyQt, and wxPython are just a few of the Python packages available for use in developing graphical user interfaces [11].
Python makes it easy to build a graphical user interface, so programmers may make their apps more intuitive and user-friendly.
Users are able to engage with the model directly via a graphical interface when Python-built GUIs are coupled with TensorFlow-created Machine Learning models.

Methodology

In order to gather data for the study and have a grasp of the theory, this stage is executed. To achieve this, we consult relevant books, journals, and websites for references, and we interview physicians with expertise in the field to fill in any gaps in our knowledge. In order to address the research challenges, this step is being taken.
Section A. Talk
The supervisors are consulted in order to get insight into the issues faced by the research and to brainstorm potential solutions.

B. Design and Implementation of Systems
Here, we create a system that employs the classification technique of Convolutional Neural Networks (CNN) with the help of the HDF5 machine learning model, the Python GUI, and TensorFlow. This design is done to assist research. This system employs the ResNet-50 architecture.

Section A: Data Mining
For the purpose of system testing, data gathering in the form of photographs is carried out.
System Testing (B)
Images of lesions in people who may have skin cancer are used to test the system.
C. Verifying Outcomes
The appropriate dermatologist and venereologist validate the categorization findings during patient testing.

A high-level, user-friendly programming language, Python, and an open-source framework for machine learning and artificial intelligence, TensorFlow, created by Google, are both mentioned in [1]. A graphical user interface (GUI) that facilitates natural

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT
ISSN 2454-9940
www.ijasem.org
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and efficient user interaction with the system may be constructed using one of these technologies [2]. This study will use PythonGUI and TensorFlow to build an application for skin cancer detection and categorization. More accurate and efficient skin cancer detection and classification is the goal of this application. This is

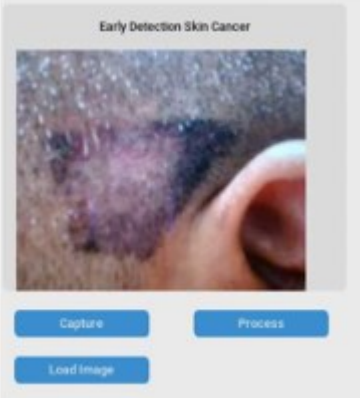

Fig. 2 Interface

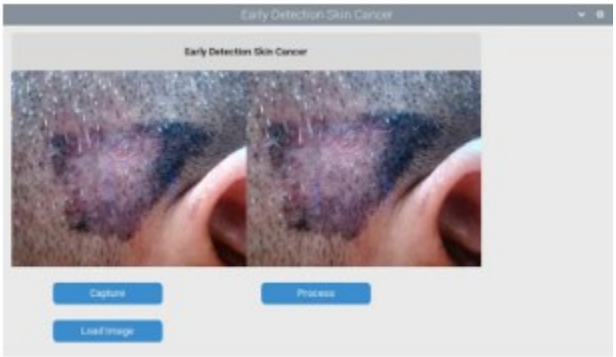

Fig. 3. Capture

RESULT AND DISCUSSION

This study's main contribution is the "Early Detection Skin Cancer" app, which can categorize skin lesions. Built using TensorFlow and Python, this app makes use of a Machine Learning model that has been trained to carry out categorization tasks. The results shown in Table 1 demonstrate how well the app classifies skin lesions using a

Fig. 4 Load Image

included information culled from various web resources as well as medical records obtained from Hasan Sadikin Hospital. It is worth mentioning that the Melanoma (MEL) categorization was absolutely spot-on, properly identifying all 8 cases. The model achieved a 55.56% accuracy rate for classifying Basal Cell Carcinoma (BCC) out of 9 instances. Also, out of seven cases, three were correctly classified as Squamous Cell Carcinoma (SCC), with an accuracy rate of 42.86 percent. In addition, dermatologists and genital experts reviewed the model's results after further testing it with real patient data. In the instance of Squamous Cell Carcinoma (SCC), the model correctly identified one case out of two samples that were obtained directly from patients. Taken as a whole, these results show how well the application's Machine Learning model performs, especially when it comes to complex categorization jobs. On top of that, the app's UI is very straightforward and simple to use. Capturing photos of lesions, importing existing image files, and doing classification all need just a few clicks from the user.

Table 1 Data Validation

No	Sample	Prediction	Actually
1		MEL	MEL

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN 2454-9940

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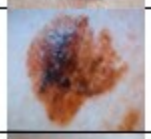
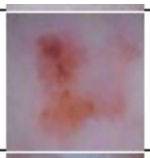
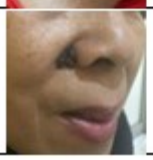
2		MEL	MEL
3		MEL	MEL
4		MEL	MEL
5		MEL	MEL
6		MEL	MEL
7		MEL	MEL
8		MEL	MEL
9		BCC	BCC
10		MEL	BCC
11		Other	BCC
12		BCC	BCC
13		MEL	BCC
14		BCC	BCC
15		MEL	BCC

ISSN 2454-9940

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16		BCC	BCC
17		BCC	BCC
18		Other	SCC
19		Other	SCC
20		MEL	SCC
21		BCC	SCC
22		Other	SCC
23		SCC	SCC
24		SCC	SCC

Be advised that there are still restrictions to this application. The accuracy of the lesion picture, for instance, can influence the categorization outcomes. Classification findings can be off if the lesion picture is fuzzy or poorly defined. As a result, it is the user's responsibility to guarantee that the lesion picture is sharp and clear.

CONCLUSION

The existing literature suggests that a Python GUI and TensorFlow-based software for skin cancer early detection offers promising results. 41 Only Shanxi University is authorized to utilize this license. Published by IEEE Xplore and downloaded on December 6, 2023 at 06:45:17 UTC. Limitations are in place. makes encouraging progress. "Early Detection Skin Cancer" is an app that can accurately categorize skin lesions. Proof that Convolutional Neural Networks (CNN) and other Machine Learning models are up to the job of categorization. Additionally, the application's interfaces are user-friendly since they are built using the Python GUI. With just a few clicks, users may effortlessly take a picture of the lesion, upload the image files, and begin the categorization process. One potential issue with this application is that the categorization results might be impacted by the quality of the lesion picture. Classification findings can be off if the lesion picture is fuzzy or poorly defined. As a result, it is the user's responsibility to guarantee that the lesion picture is sharp and clear. The 'Early Detection Skin Cancer' app can classify skin lesions, but the accuracy of these findings relies on human medical experts verifying them. The application's classifications are validated for accuracy and clinical significance by dermatologists and venereologists. The accuracy and trustworthiness of the classification results depend on this validation procedure. The application's categorizations are more credible and in line with clinical standards once medical specialists were involved. Multiple areas have room for improvement in the realm of future research and development. To start, more data can be used to train Machine Learning models, which means they can provide more accurate results. Secondly, better functionality, such the capacity to monitor the progression of skin lesion changes, may be included into the program. Finally, the app's compatibility and performance may be checked by testing it on different devices. Finally, this software has the makings of a useful tool for doctors in the fight against skin cancer by aiding in early diagnosis.

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