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Securing Skin Cancer Detection using CNN Secured with Graphical Password

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Abstract

Skin cancer is measured as a major contributor to the causes of deaths around the world. The deathrate due to this disease is above all other skin related consolidated malignancies. In this paper, we utilize a dataset of dermoscopic images collected from different documents labelled and validated by professional dermatologists. In our work, we manually trained a resource controlled CNN model using transfer learning for binary (0/1) classification of skin lesions into two classes i.e. benign or malignant classes. CNN model is used because recent advancements in image processing using Deep Convolutional Neural Networks (CNN) have led numerous researchers to use them for skin lesion classification which concluded that CNN performed on par with expert dermatologists. Graphical passwords method widely used for authentication in today's mobile computing environment, this methodology was announced to enhance security element and overcome the weaknesses of existing passwords methods. In this paper we consider the method of user authentication using graphical password system which is based on stenographical methods. The study describes the generalized model of user authorization in secure systems with utilization of computerized watermarks (digital watermarks),a definitive model of the graphic password system, and lists the foremost requirements for digital watermarks to be utilized in the graphics systems of user authorization for protected information and telecommunication resources.

Keywords: Deep Neural Network, CNN, K-means clustering, Image Segmentation, Gaussian filter, Machine Learning, Graphical Password, Skin Cancer Detection.

I. INTRODUCTION

We know that there are numerous types of cancers were discovered and peoples battled with them. However, skin cancer is amongst fast-growing cancer nowadays. According to modern research, patients with a skin cancer diagnosis are significantly increasing more than any other cancer form every year. Detecting skin cancer at the initial stage can help in reducing the risk factor in patients. According to the research, the mortality rate may be reduced up to 90 %, if the skin cancer is diagnosed at an initial stage, Hence the diagnosis and classification of the skin cancer in its early stage are vitally essential .Considering the compound nature of the lesion, it becomes tough for the

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researchers to discover skin cancer only on the base of the geometrical features obtained through lesion. Another problem is that the size of the image database is increasing dramatically. So the practicality of such information is dependent on how well it can be accessed, searched and how well the relevant knowledge can be extracted from it. With advent of computer-aided diagnostic systems, researcher mostly emphasizes on automatic detection and classification of skin cancer. Medical images in the form of textural features, geometric features, colour features and in a combination have been used to identify and classify skin cancer diseases. In this paper, we train and evaluate the classification accuracy of a pre-trained CNN for skin cancer detection task. Moreover, we focused on a two- class problem rather than identifying different types of skin cancers primarily because of the limited variability in the datasets available for research purposes. In our study, we classified a given lesion as either benign or malignant (cancerous). However, it is still a thought-provoking task to identify most discriminative features for recognizing melanoma at its initial stage. Our research work aims to achieve high accurateness results in recognizing and classifying skin cancer, contributing to the present literature by,

- To develop a complete automated computer-aided system to detect melanoma cancer accurately.
- Design of an improved K-Mean approach for computationally efficient segmentation.
- Utilization of hybrid features incorporating both texture and color of the lesion.

As there is an increase in the use of computational devices, the personal information in those devices is increasing too, thus, there is need for confidentiality to protect that information. There are many existing ways of protecting external attacks towards the devices, textual passwords, patterns and graphical passwords, however , they are prone to offline attacks like dictionary attacks, shoulder surfing and eavesdropping. The graphical passwords provide better security as compared to the previously introduced methods. Security in mobile computational devices like smartphones and laptops is more crucial than the PCs or desktop, the security threats are increasing vastly. One of the reason is that mobile devices are mostly turned on all day long, mostly because of attaining wireless network access, thus making it more prone to security threats

A. MOTIVATION

- The situation when the user has several passwords for various systems may be a comment event today.
- The user may either mix the elements of different passwords or remember the password but forget which system it is for.
- Cancer of the skin are by far most common of all Type of cancer .
- According to one estimate, about 5.4 million of basal and squamous cell Skin cancer are Diagnosed each year .
- Melanoma is the most common form of skin disease that affects the skin surface cells known as melanocytes. It consists of cells that cause the skin to show black in color.

B. Problem Statement

To create a novel approach for skin cancer detection and Prediction using convolutional neural network modal

Secured with graphical password.

C. Objectives

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- Image-Based Authentication for Password Remembrancee, Prediction of Skin Cancer Based on CNN.
- Online Service using the cloud for user accessibility.

II. LITERATURE SURVEY

A. Literature Survey

"Deep Neural Network based Mobile Democracy Application for Triaging Skin Cancer Detection", in this paper author has made recent advancements in image processing using Deep Convolutional Neural Networks (CNN) that led numerous researchers to use them for skin lesion classification which concluded that CNN performed on par with expert dermatologists. In this paper, we used a dataset of 48,373 dermoscopic images collected from three different archives labelled and validated by expert dermatologists. In our work, we manually trained a resource constrained CNN model called MobileNetV2 using transfer learning for binary classification of skin lesions into benign or malignant classes. Using batch size of 32, the trained model resulted in an overall accuracy of 91.33%. The trained model was then used to develop a mobile application for iOS devices using the Core ML library. The mobile application was then tested on a new dataset to assess its performance on an unseen library of images. [1]

"Classification of Melanoma and Nevus in Digital Images of Diagnosis of Skin Cancer", in this research paper, author presented an intelligent system for classification of skin cancer into melanoma and nevus. It was observed that major problem that causes the misclassification is lesion detection and segmentation. The K-mean clustering technique using centroid selection is used to extract the ROI from the cancer image more accurately and efficiently. Textural and color features extraction techniques are used to obtain best-suited features for classification. For texture features, GLCM and LBP features are combined with the color features to achieve a high classification accuracy of 96%. In this way, the proposed technique has been able to classify skin cancer images into melanoma and nevus more accurately and efficiently. The effectiveness and performance of the proposed approach are validated on DERMIS image dataset. [2]

"Construction Of Topological Graphic Passwords By Hanzi-gpws", within the paper, the author structures another kind of graphical secret word(a password), called Hanzi-gpw, which is the shortened form of Hanzi graphical password..It is not the same as the predominant graphical passwords, since Hanzi-gpws received in computer by algebraic matrix. These methods are based on the topological structures and the coloring and labeling. The author understood the change between text-based passwords from Hansi-gpws. The utilization of Chinese characters to design password may appeal to most Chinese people. Chinese people use the Chinese characters kanji language which is more simple to recall than than the text- based passwords. [3]

"Conundrum-Pass: a replacement Graphical Password Approach", in the paper, author introduces a unique graphical password approach. The main aim of proposing a different approach is to minimize infiltration attacks like shoulder surfing, eavesdropping, or other similar attacks, that could affect the privacy of the user. The main idea is to use a picture password and integrate the idea of shuffling into it. The user selects the image they desire, selects the desired number of grids and successively selects the grid they want to choose as their password. Further at the time of authentication, they select the grids that they choose and successfully unlock the device. The importance of proposed technique is that by introducing the idea of shuffling, he reduced the possibilities of attacks. However, there is still

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room for improvement in this technique, advancements can be made in future by implementing it through a network to use it for authentication of more crucial systems.[4]

"Computer-Aided Model for Skin Diagnosis Using Deep Learning", in this research paper, the author proposes an upgraded automated computer–aided model for skin diagnosis using deep learning. The model incorporates an enhanced segmentation phase for locating the infected lesion of the skin and a Convolution Neural Network (CNN) is predicted as a component extractor. A classifier model has been structured (designed) to support multiclass linear Support Vector Machine (SVM) trained with CNN features extracted from the digital skin images dataset. The outcomes show an exceptional performance in the terms of sensitivity, specificity and accuracy.[5].

Table 1 Showing Summary Of Literature Review-

TABLE I
LITERATURE REVIEW

Sr, No.	**Paper Title**	**Paper Theme/Idea**	Advantages
1.	Deep Neural network based mobile dermoscopy Application for Triagingg skin cancer detection. (2109)	Teledermoscopy is an area that enables patients to get early detection for suspicious lesions using deep convolutional neural network.	Gives prediction of cancer and early detection for better treatment and patient centric-health management.
2.	Construction Of Topological Graphic Passwords By Hanzi-gpws(2019)	We design a new-type of graphical password, called Hanzi graphical password, it is differ from the existing graphical passwords, since Hanzi-gpws are saved in computer by algebraic matrix	Are based on topological structures and graph coloring/labelings
3.	Computer - Aided Model for Skin Diagnosis Using Deep Learning (2019)	Proposes a redesigned automated computer-aided model for skin analysis using deep learning.	Experimental results show an outstanding performance in the terms of sensitivity, specificity and accuracy compared with others in literature/systems.
4.	Conundrum-Pass: A New Graphical Password Approach	In the proposed system, the research contributes by introducing a new approach to the graphical password, which can be expected to work well against attacks like a dictionary attack, shoulder surfing or eavesdropping.	. This can also help in improving and providing security of the graphical password system with no cost increase in terms of unlocking time.
5	Classification of Melanoma and Nevus in Digital Images for Diagnosis of Skin Cancer	This paper has introduced anintelligent system to detect and distinguish melonama from nevus by using state of the art image processing technique. First, removing of noise from the skin lesion is done.	Textural and color features extraction techniques are used to obtain best-suited features for classification.

III. CONCLUSIONS

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In the proposed model, we presented an intelligent system for classification of skin cancer into melanoma and nevus. It is observed that major problem that causes the misclassification is lesion detection and segmentation. The K-mean clustering technique using centroid selection is used to extract the ROI from the cancer image more accurately and efficiently. Textural and color features extraction techniques are used to obtain best-suited features for classification. For texture features, GLCM and LBP features are combined with the color features to achieve a high classification accuracy of 96 percent. In this way, our proposed technique has been able to classify skin cancer images into melanoma and nevus more accurately and efficiently. The effectiveness and performance of the proposed approach are secured using graphical password.

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