

DeepQ classification automated disease classification in global perspective approach and predictive decision using tensor flow

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Abstract

Despite being not an unusual place, its prognosis is extraordinarily tough due to the general nature of pores and tone, skin, hair, and body parts. This paper presents a method to apply diverse laptop imaginative and prescient primarily based techniques (deep learning) to routinely expect the diverse varieties of pores and skin diseases. The gadget makes use of 3 publicly to-be-had picture reputation architectures specifically V3 Inspec, V2Resnet V2, and AppNet Alex with adjustments for pores and skin disorder utility and efficiently predicts the pores and skin disorder primarily based totally on most vote casting from the multi-object networks. Respiratory ailments are those that affect the respiration gadget that is answerable for the manufacturing of oxygen to feed the entire body. These ailments are produced with the aid usage of tobacco, smoking, pollution inhalation, diseases, and publicity to materials including radon, and asbestos. This article targets to make contributions to the improvement of technology associated with Machine Learning carried out in medication with the aid of using constructing a challenge wherein a neural community version can provide a prognosis from a full body x-ray picture of an affected person and provide an explanation for its functioning as in reality as possible. So, as we are going to process particularly with lungs associated issues, it's suitable to recognize greater approximately what they, in reality, are, similarly to their results nature, genetic effects, and features.

Keywords: Deep Learning; Disease Classification; Tensor Flow; Automated System

1. Introduction

Covid-19, which has brought about an outstanding effect on our international with inside the ultimate 2 years, is a department of the breathing disorder resulting from the virus SARS-CoV-2 that impacts the breathing tract. It's transmitted with the aid of using the air and the drops emitted whilst talking, sneezing, or coughing. It seemed for the primary time in December 2019 in Wuhan, China, and it swiftly accelerated a number of the entire international till, on eleven March 2020, it turned into taking into consideration a plague with the aid of using the WHO [1][2].

A laptop can effectively and results easily interpret numerous pix wherein it's far hard for the human to interpret this sort of excessive variety of statistics and investigate the info of the picture inside. Therefore Computer-Aided-Detection and Computer-Based-Diagnosis have ended up appropriate and are beneath Neath improvement with the aid of using many studies groups. Four Computer primarily based analyses have been confirmed to be very useful in disorder analysis. The maximum familiar generation that's getting used for prediction is Artificial Intelligence the usage of Machine Learning [3][4].

Artificial Intelligence makes use of mastering strategies to find out about the pix to are expecting the sicknesses primarily based totally upon the not unusual place patterns. The device translates the pix and its slices and techniques

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the picture and predicts. To clear up the hassle of classifying a patient's chest x-ray picture and offering a correct diagnosis, as we mentioned earlier, we can use an Artificial Intelligence method referred to as Convolutional Neural Networks [5].

This form of community includes a set of rules that takes a picture as enters and detects a hard and fast of visible functions for which it's been trained. The aim right here on this specific mission is to categorize the enter picture in one of the 5 viable diagnostics that our version can perform. So the community will use the diagnosed picture traits to feed a classical Fully-Connected Neural Network and get a possible prediction for the 5 distinctive instructions to which the picture might also additionally belong as output. The elegance with the very best activation (possibility) is the only version selected as the best diagnostic for the x-ray picture [6][7].

2. Related Works

Decades ago, artificial intelligence (AI) became the paradigm underlying many computing projects applicable to various areas of our lives. One of them was Health, where the influence of AI is growing day by day. Moreover, no one currently knows the boundaries of this region. Due to the current global pandemic situation [8], AI has also been applied to treat the Covid-19 disease. This paper proposes a chest X-ray image classification system using machine learning. Specifically, we implemented a Deep Learning prototype to perform that image recognition [9].

More precisely, it consists of several layers of convolutional artificial neurons and a dense set of neuron layers (multilayer perceptron). As a result, classification accuracy exceeded 95% using images that were not fed into the system. Furthermore, recently demonstrated image interpretation belonging to artificial vision methods, in particular Grad-CAM, which attempts to return the most important regions of an image used by convolutional neural networks in classification tasks. Whether the Grad-CAM area is similar to the area used by pulmonologists to diagnose pneumonia has yet to be determined [10].

Several studies have demonstrated that neural networks are more than 95% efficient, but some people still believe that the human eye is more efficient than AI. In less than three months, the annotated images are out of stock due to the rapid growth of COVID-19. However, some researchers have developed a mechanism that can pass information from general object recognition to specific objects, which they call "DeTraC". Many researchers find this method simple and quick to use. The actual efficiency of this method is 83%, the sensitivity is 89%, the specificity is 87%, and the accuracy is 86% [11].

There are other models such as Alibaba that work with CT images. This Chinese AI algorithm achieved 96% efficiency in detecting Covid-19 pneumonia. Recently, with the development of medical technology, the concept of diagnosing skin diseases using a computer has emerged. Computer technology makes it easier to detect disease with just images of infected skin and can help analyze complex information. Artificial intelligence is playing a part in automation in all applications, even in healthcare [12].

3. Deep Q Classification

Based on existing results the processed image has 0.001% chance of getting 99.925% chance of being corona, a 0.005% chance of being normal, a 0.067% chance of being tuberculosis, and a 0.001% chance of being infected. "Viral Pneumonia" class. As you can see, the class with the highest probability (activation) is the second class. So this indicates that the most accurate diagnosis is "Covid". Now, we can think of the highest value in the prediction set that is always selected for final classification.

The major problem is setting several thresholds and selecting active nodes based on availability. In this case, each dataset value is taken into account, and select approximate approximation index. It is calculated based on the feature index and artificial brain features.

Well, it depends on the type of problem you are facing. The number of thresholds can determine the value at which a class must be active. In this way, dealing with activations is indeed a pretty good approximation of an artificial process for our brain works.



Figure 1 Skin Disease Dataset - Images

Deep learning is the major technique to process multi objects and datasets. Here we proposed supervised and unsupervised methods to process methods the dataset. The large dataset is classified based on vector and multi-object detection. In this case, each data set is identified based on classifiers. the features are selected based on machine learning techniques and pre-proxy three processing. in this case the prediction of user data set on the learning perspective is classified. Each feature is classified based on the current dataset value and its features.

In Fig.1. shows that each trained and test dataset is entered into the processing system. It gives the result of the decision of features and their values. Databases are divided into a training set, and a validation/test set. The training set is used for parametric fitting training, specifically subject to different weights and system errors in each training run. The test/test set adjusts the parameters and is used only to evaluate the efficiency and economy of the system.

First of all, earlier constructing the CNN-based Fully Connected Network of the version that we're going to use to clear up the problem, we want to acquire a huge quantity of records inside the shape of categorized images. With `categorized, ` is the way that professionals in radiology and medicinal drug have already categorized the photos that we get from multi-object datasets.

The part of records pre-processing is vital in gadget learning, wherein missing, unlabeled, mislabeled, or inconsistent-sized records can wreck the education of the version to research functions from that records. So it's critical to use the corresponding approach to make certain the statistics are prepared to be fed into the education process.

The normal manner records pre-processing is carried out is with the aid of using the use of Python libraries, like Keras in this case. For example, if a picture record is damaged or empty, it must be eliminated from the dataset to save you errors. In any other case, if a record has an exclusive length than the rest, it must be resized to the right dimensions shown in Fig.2. Thereby, there's a record pre-processing approach called ` records augmentation, ` that may every so often assist enhance the overall performance of our version. By rotating, rescaling, moving, and making use of hard and fast alterations to the entered images, it may boom the functionality of the version to generalize the functions it learns.

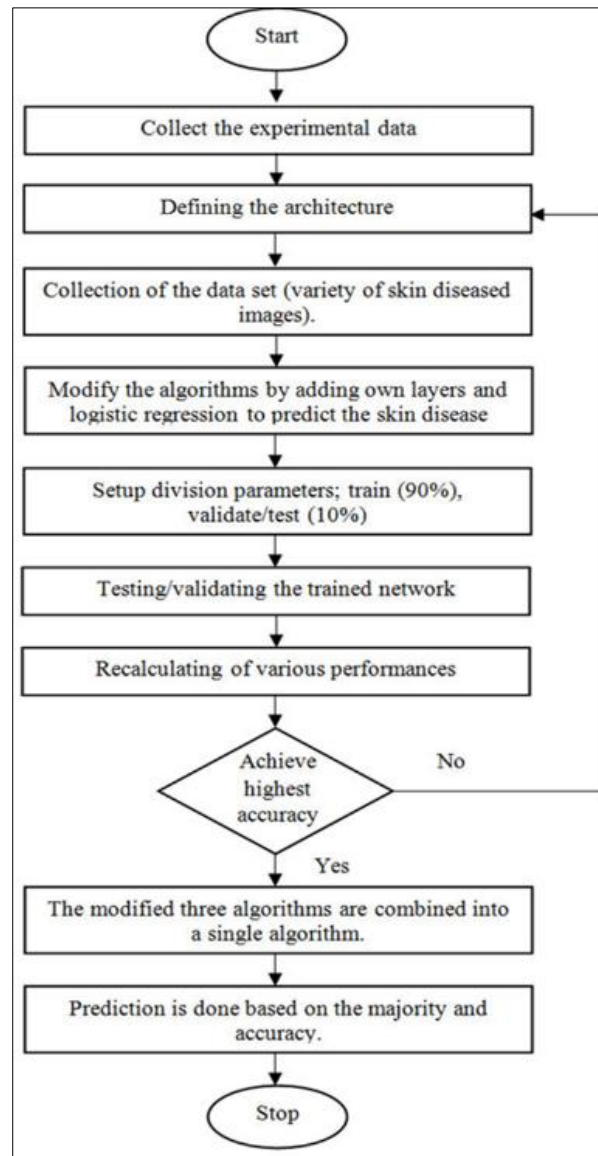


Figure 2 Flow chart for disease detection process using DeepQ classification

4. Methodologies and Experiments

Development of a huge plan to check the unique capabilities and standard capability on a number platform aggregate is first of all initiated via way of means of the take a look at method. The strategies used are strictly and exceptionally controlled. The approach includes the use of pre-educated picture recognizers with changes to perceive pores and skin images. But earlier than explaining its shape and functioning, let's first realize a touch extra approximately Artificial Networks (ANN). In standard, synthetic networks are computational fashions stimulated via way of means of an organic mind that constitutes the center of deep studying algorithms.

Their principal additives are neurons, named because of their similarity with the maximum fundamental unit that composes a bodily neural community. Furthermore, those neurons are disposed of in a chain of layers in that every neuron is attached to all of the neurons inside the subsequent layer. This connection method is on occasion referred to as synapsis. So, with that preliminary shape, the facts can propagate via the entrance to the community's output to make the complete community learn. Using the country of the artwork structure notably will increase the performance by as much as 88 percent. And similarly extra via way of means of the use of ensemble capabilities mapping, combing the fashions educated the use of Inception V3, MobileNet, Resnet, and Xception a vote casting primarily based on total version may be an ensemble and thereby growing the performance. Thirteen For stronger overall performance and choosing the top-rated structure for the application, we've got used the logistic regression technique. In this approach, the dividing mode is ready to 90% for the schooling of the facts, and 10% for the validating/checking out of the facts.

To signify the performance of a type version (or “classifier”) on a fixed of taking look at facts for which the authentic values, a desk of misunderstanding matrix is used.

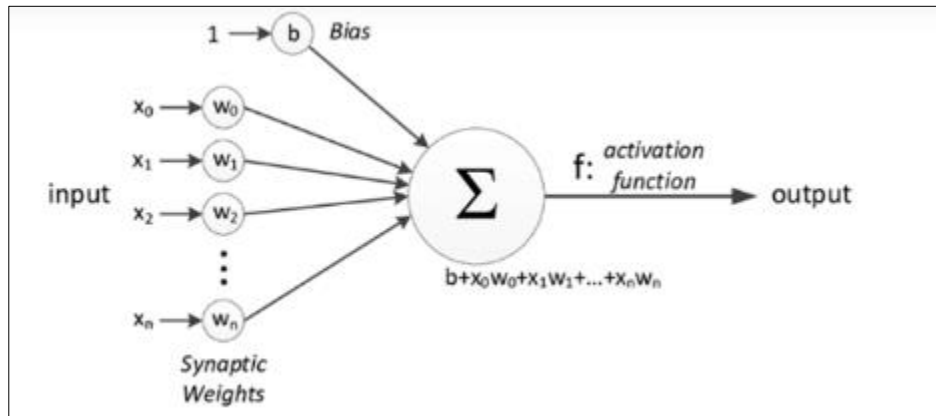
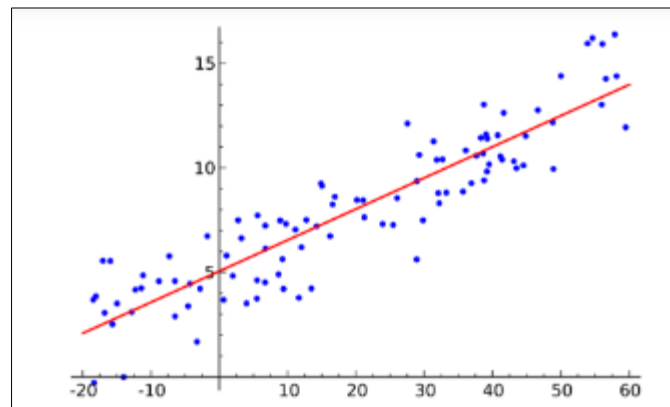


Figure 3 DeepQ learning activation function for detecting disease



In the above graph the X axis represents the input values and y axis represents the weight function. These weight functions are assigned to the input values.

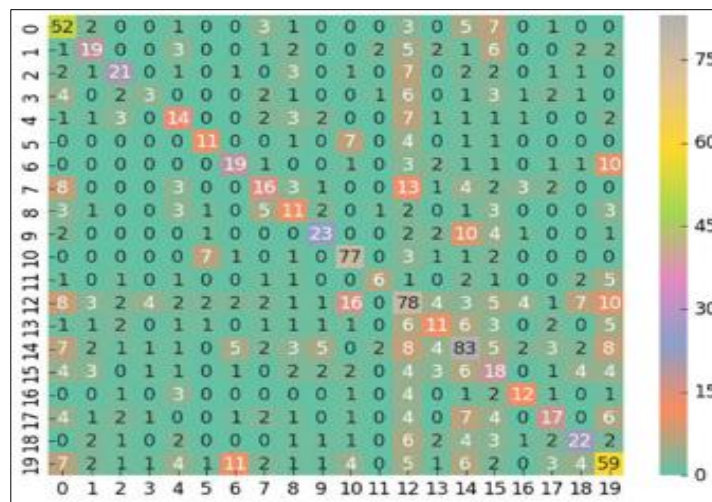


Figure 4 Confusion Matrix and Result for selecting features

above image neuron is selected based on input values such as $x_0, x_1, x_2,$ and x_n and the weight functions are assigned to each input as follows w_0, w_1, w_2, w_n . The sum of each coordinate position is selected from the confusion matrix. The error function is recorded and the mean value is calculated. Based on the below pseudocode shows the entire decision-making.

```

last_output = baseModel.layers[-1].output
x = tf.keras.layers.Dropout(0.5) (last_output)
x = tf.keras.layers.GlobalMaxPooling2D() (last_output)
x = tf.keras.layers.Dense(256, activation = 'relu',
kernel_regularizer=tf.keras.regularizers.l2(0.02),
activity_regularizer=tf.keras.regularizers.l2(0.02),
kernel_initializer='he_normal')(x)
x = tf.keras.layers.BatchNormalization() (x)
x = tf.keras.layers.Dropout(0.45) (x)
x = tf.keras.layers.Dense(numClasses, activation='softmax')(x)

model = tf.keras.Model(inputs=baseModel.input, outputs=x)
    
```

Figure 5 TensorFlow code for disease classification

Table 1 Disease Classification results using TensorFlow

Disease Numbers in Iterations	Accuracy	Prediction	Recall
1	0.98	0.94	0.32
2	0.94	0.95	0.33
3	0.95	0.96	0.32
4	0.96	0.95	0.34
5	0.97	0.96	0.34
6	0.94	0.97	0.33
7	0.95	0.94	0.31
8	0.96	0.98	0.32
9	0.95	0.94	0.33
10	0.97	0.95	0.34

We have hired diverse kinds of Deep getting to know algorithms (Inception_v3, MobileNet, Resnet)for function extraction and getting to know a set of rules (ideally Random woodland or Logistic Regression) for schooling and checking out purposes. Using the kingdom of the artwork structure appreciably will increase the performance by as much as 88 percent. And in addition greater through the use of ensemble capabilities mapping, combing the fashions skilled the use of Inception V3, MobileNet, Resnet, and Xception balloting primarily based on total version can be ensembled and thereby growing the performance. For more advantageous overall performance and choosing the most desirable structure for the utility, we've used the logistic regression technique. In this method, the dividing mode is about 90% for the schooling of the data, and 10% for the validating/checking out of the data.

Table 2 Comparison of Existing methods with the proposed system

Methods	Dataset	Prediction	Accuracy
Inception_v3	50	0.67	0.57
	100	0.72	0.58
	500	0.78	0.59
MobileNet	50	0.72	0.63
	100	0.74	0.56
	500	0.84	0.67
ResNet	50	0.76	0.76
	100	0.81	0.73
	500	0.78	0.75
DeepQ	50	0.95	0.98
	100	0.97	0.96
	500	0.95	0.95

5. Conclusion

As the preceding fashions accomplished on this subject of utility have been capable of recording most six pores and skin sicknesses with the most accuracy stage of 75%. By enforcing a deep getting-to-know set of rules we're capable of expecting as many as 20 sicknesses with a better accuracy stage of 95%. This proves that deep getting-to-know algorithms have a massive ability to inside the actual global pores and skin sickness diagnosis. If even a higher gadget with excessive give-up gadget hardware and software program with a huge dataset is used the accuracy may be multiplied appreciably and the version may be used for scientific experimentation because it does have any invasive measures. Once having reached 95% accuracy, we can finish that the version does an excessive range of accurate guesses, however, there may be additionally plenty of paintings to be accomplished with the purpose to enhance the outcomes of a Machine Learning set of rules on such complicated tasks. In this paper, the classified results are the key role which tries and provides an explanation for the energy of the contemporary-day era carried out to the decision of large volume of dataset issues that can be solved before based on beneficial to offer a higher well-known comparison result of an intelligent decision.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest.

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Author's short Biography

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