Bachelor of Science in Computer Science & Engineering

Developing a framework for the Detection of Skin Diseases of Domestic Animal

by

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Submitted in partial fulfilment of the requirements for
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Abstract

There are many Domestic animals in our country.Especially they are cows, goat, hens, ducks. They play a vital role in our country's economy. Due to proper treatment, they are suffering from many skin diseases. Considering this, we developed a framework for the skin diseases detection of our domestic animals. The most difficulty is to gather the image set of the diseases. Because up until there is no built in dataset of the diseases. This system can detect the specific disease for a specific animal.Here we have gathered the image dataset from the farmers with the help of veterinary doctor. Here we have used convolutional neural network(CNN) to train the model.Then we have used this trained model in android studio .As our farmers are more comfortable with android mobile phone. This app can detect the skin diseases.

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Chapter 1

Introduction

1.1 Introduction

Bangladesh is an agricultural country. Our country's economy is dependent on agricultural products as well as on domestic animal farms. There are so much domestic animals in our country as like cows, goats, hens, ducks. They always suffer from many skin diseases. Due to lack of proper treatment they always die. Our farmer has a very few knowledge about the skin diseases of domestic animals. Veterinarian are not available in our village farmer's house. Sometimes a Veterinarian can do fault to detect a specific disease. So, they cannot take any steps. As a result many of the domestic animals die. Many of the farm owner are becoming impoverish. So our country's economy is hampering.

One report in 2010 shows that about 30 percent of the domestic animals die of skin diseases. A country like ours really suffer from a catastrophic damage with it. So now a days this is a burning question to all the farmers.

Basically, our domestic animals are cows, goats, hens and ducks. They suffer from many skin diseases. Cows normally suffer from dermatophilosis, papillomatosis, Ringworm. Among them dermatophilosis are the most dangerous. Goats normally suffer from ecthyma, Ringworm, lymphadenitis. Among them ecthyma are the most dangerous. Hens normally suffer from Fleas, Scaly leg mites, chicken mites, Poultry lice, Poultry skin tumor etc. Duck's and hen's skin diseases are basically same. So, all the skin diseases of the Poultry are included in Ducks

Through computer vision we can solve the problem. A machine efficiency is higher than any other human efficiency. Many of the farmers of our country have a smartphone. So if we can make an apps that will detect skin diseases of the

domestic animal and can suggest medicine for the specific disease. then it will help our farmer to take steps against the disease and Our farm owner will be benefitted as well as our country's economy.

1.2 Framework/Design Overview

Our medical veterinarian helped us to fetch the dataset images. As they always used to work this kind of diseases. They have helped us to gather the images and to separate the images.Then with this images we have trained a model with convolutional neural network (CNN).Then with tensorflow lite conversion we have used this model in android studio . And with java and xml we have made an apps that can detect the diseases.

1.3 Difficulties

It will work for the skin disease detection of domestic animals. As most of the farmers are unware of skin diseases.they can easily detect the disease with this app. But the main difficulties of this project is that as we have dataset limitation so it will take some time to be accurate more precisely.

1.4 Applications

The main purpose is Domestic Animal's Skin Disease Detection and suggestion of

Medicine. The project will be carried out to achieve following goals:

- Will detect skin diseases of domestic animals.
- Will built a free android application, which will be user friendly.
- Will suggest medicine for a specific disease

1.5 Motivation

A lot of research has been devoted to Image Processing and Machine Learning. This is a topic that has a wide area of application. This project will mainly focus on work that handles the problem at hand, namely Image Processing. In general, Diagnosis and detection of skin diseases is time consuming and difficult task due to the need to analyze the relevant microorganisms, which are carriers of the disease

1.6 Contribution of the thesis

In computer science no one have ever worked with domestic animal's skin diseases.So here we have built a dataset which in future will be more enriched.

1.7 Thesis Organization

The first part of this chapter is introduction: introduction, framework, difficulties and applications and motivation p are outlined in order to better define of the domestic animals skin disease addressed in this thesis. The second part of this chapter Literature review.The third part contains Methodology which contains how the thesis is solved.The final part outlines Results and discussion what is our result of our thesis and analysis on it.

1.8 Conclusion

As our country is an agricultural country.But most of the farmers are not aware of many disease.So we think that this type of agricultural app will help our farmer. So we think that this framework is essential for our country as well as for the world.

Chapter 2

Literature Review

2.1 Introduction

A lot of research has been devoted to Image Processing and machine learning. This is a topic that has a wide area of application. This project will mainly focus on work that handles the problem at hand, namely Image Processing.

2.2 Related Literature Review

In general, Diagnosis and detection of skin diseases is time consuming and difficult task due to the need to analyze the relevant microorganisms, which are carriers of the disease.

In [1] The work is a detection of skin cancer. He used computer vision for this purpose. This work is in progress. Here basically human skin diseases are tried to be find through image processing. After feature extraction they used the neural network that is responsible for classifying the injuries. For the design of the neural network, they took the ABCD parameters from the PH2 database because it was performed by an expert dermatologist.

In [2] In this paper, detection of leaf diseases has been used method is threefold: 1) identifying the infected object based upon k-means clustering; 2) extracting the features set of the infected objects using color co-occurrence methodology for texture analysis; 3) detecting and classifying the type of disease using NNs, moreover, the presented scheme classifies the plant leaves into infected and not-infected classes. In details, a color transformation structure for the RGB leaf image is created, and then, a device-independent color space transformation for the color transformation structure is applied in next step. After that, the image

at hand is segmented using K-Means clustering technique. This all step are determined the infected object(s) and identify the mostly green colored pixels. After that, based on specified and varying threshold value that is computed for these pixels using Otsu's method, these mostly green pixels are masked as follows: if the green component of pixels component of pixel intensities is less than the pre-computed threshold value, the red, green and blue components of the pixel is assigned to a value of zero. This is done in sense that these pixels have no valuable weight to the disease identification and classification step, and most probably those pixels represent healthy areas in the leave. The pixels with zeros red, green and blue values and the pixels on the boundaries of the infected cluster were completely removed. Next in the infected cluster was then converted from RGB format to HIS format and SGDM matrices the texture statistics for each image were generated. The texture features for the segmented infected object in this phase are calculated. Finally, the recognition process was performed to the extracted features through a pretrained neural network

In [3] Poultry skin tumors are ulcerous lesions that are surrounded by a rim of thickened skin and dermis .Here he emphasis on the image quality of the poultry skin tumors.

In [4] Ho Lau, Have worked on an automatic skin cancer classification. After feature extraction they have used simple vector machine to classify the skin cancer from healthy skin. they have faced some problem at the time of feature extraction because of the picture quality so they tried GLCM feature extraction technique to prevent this problem.

In [5] Disease identification process include some steps out of which four main steps are as follows: first, for the input RGB image, a color transformation structure is taken, and then using a specific threshold value, the green pixels are masked and removed, which is further followed by segmentation process, and for getting useful segments the texture statistics are computed. At last, classifier is used for the features that are extracted to classify the disease. The robustness of the proposed algorithm is proved by using experimental results of about 500 plant leaves in a database.

In [6] For dermoscopy images, this research proposes a novel multi-classification algorithm based on convolutional neural networks (CNN). The initial step is to create a CNN network with nested residual structure, which can learn more information than the original residual structure. The planned network is then taught via transfer learning. Six types of lesion disorders are classified using the trained network, including nevus, seborrheic keratosis, psoriasis, seborrheic dermatitis, eczema, and basal cell carcinoma. The studies were done on six-classification and two-classification tasks

In [7] The goal of this study is to see how well deep learning performs in in-vivo skin capacitive image analysis using the AlexNet model.The image classifier was trained with a pre-trained model to apply specialized feature extraction, prediction, and classification for skin attributes including moisture, skin damage, and so on. In this investigation, over 1000 skin capacitive pictures were employed.The research's goals are to execute feature extraction using the pretrained model AlexNet, analyze the model's accuracy, and improve the system for multiple feature classification.The picture classification program has a high accuracy of over 0.98, and the test images were accurately identified when compared to the experimental results of skin moisture, skin injury.

In [8] This study intends to detect skin illness from a skin image and analyze it by applying a filter to reduce noise and undesired objects, converting the image to grey to aid processing, and obtaining relevant information.This can be used to demonstrate emergency orientation and provide evidence for any form of skin illness. The findings of this study can assist doctors in making initial diagnosis and determining the type of disease. That is skin-friendly and free of negative effects.

In [9] Using machine learning classification, They offer an automated image-based approach for recognizing skin disorders.This system evaluate, process, and relegate picture data based on various aspects of the photos using computational techniques. Skin photos are filtered and processed to remove unwanted noise and enhance the image.Feature extraction employing advanced techniques like Convolutional Neural Networks (CNN), picture classification using the softmax

classifier algorithm, and diagnosis report as an output.This technology is more accurate and produces findings faster than the previous method, making it an effective and reliable solution for detecting dermatological diseases.

In [10] They attempted to create a prototype utilizing neural networks to detect skin disorders in this study. They chosed CNN, which stands for convolutional neural network, as their neural network of choice.DNN, or deep neural network, has been used in previous detection studies. They now have lessons to recognize dermatitis hand, eczema hand, eczema subcute, lichen simplex, statis dermatitis, and ulcers, which are all common skin conditions.This work is a hybrid of image processing algorithms and machine learning. Where image preprocessing has resulted in a picture that CNN is using to organize the classes.The preparation information is divided into five categories of skin provides, as previously said. By using the dermnet dataset of 500 images of various diseases, they were able to achieve a precision of 73 percent.

In [11] Skin disorders cause not only physical but also psychological problems, particularly in individuals whose faces have been scarred or deformed. Most people can receive convenient clinical photos of their facial skin condition using smart technologies.Convolutional neural networks (CNNs) have, on the other hand, performed as well as or better than humans in the imaging area. As a result, multiple CNN algorithms for face skin disease categorization based on clinical photos were investigated in this work.They created a dataset with 2656 photos of people with six different skin illnesses [seborrheic keratosis (SK), actinic keratosis (AK), rosacea (ROS), lupus erythematosus (LE), basal cell carcinoma (BCC), and squamous cell carcinoma (SCC)].They examined the outcomes of studies employing five standard network methods to classify these diseases in the dataset. Then, to do transfer learning on their models, they used an independent dataset of the same illness kinds but from other body areas.When the models that employed transfer learning were compared, the models that used transfer learning had higher average precision and recall for practically all structures. The top model scored 92.9 percent, 89.2 percent, and 84.3 percent recalls for the LE, BCC, and SK, respectively, in the test dataset of 388 facial photos, while the mean recall and precision were 77.0 percent and 70.8 percent, respectively.

2.3 Conclusion

A lot of research has been devoted to Image Processing. As our thesis related to machine learning and image processing, these mentioned research helped me to great understanding of my thesis and show me the way how should the problem be solved.

2.3.1 Implementation Challenges

There are several challenge in this project.As there is some similarity among the diseases. So this is a big challenge to separate the diseases. And the main problem is to build the dataset. So We have faced a great challenge to build the dataset.As day by day the diseases patteern will change . So in future we have to change some pattern in our dataset.

Chapter 3

Methodology

3.1 Introduction

In this project our experiment will be applied on domestic animal's skin diseases based on the image processing and data mining based procedure. In image processing field we use digital image processing and by applying data mining process we can discover the hidden pattern from the larger database or dataset. So we need for a large amount of data of healthy skin and affected skin Images.

3.2 Diagram/Overview of Framework

For skin diseases detection, Farmers should use an android device that has a camera. An image captured by a camera is the input to the system Apps. A classic technique to analyze the feature of the image is our background. At first we have to fetch specific dataset of all the individual disease. So for this reason we have to fetch dataset from farmer's farm. then we will process these dataset to anaconda to train our machine for all the diseases. An open platform named opencv that we will use first to compress or to cut our train data images in a fixed size. Opencv provides some built in function to perform these works because our dataset images will be different sizes .So we should combine them in a fixed size through opencv. After that a service of goggle named tensorflow that is built for image processing technique. Basically through our train image at first we will train the machine which skin is the affected skin and which image is the healthy skin. For this, tensorflow provides neural network technique that has some built in function to train. Basically The basic idea behind a neural network is to simulate lots of densely interconnected brain cells inside a computer so we

can get it to learn things, recognize patterns, and make decisions in a humanlike way. The amazing thing about a neural network is that we don't have to program it to learn explicitly: it learns all by itself, just like a brain. Convolutional neural network has a wide application in object detection. So after training of the images then we will use this trained image dataset to our android studio. Then through our android database management system we will keep the specific medicine for a specific diseases. So when our farmer's mobile will detect the disease then our apps will suggest him some medicine from the medicine database for the cure of the disease.

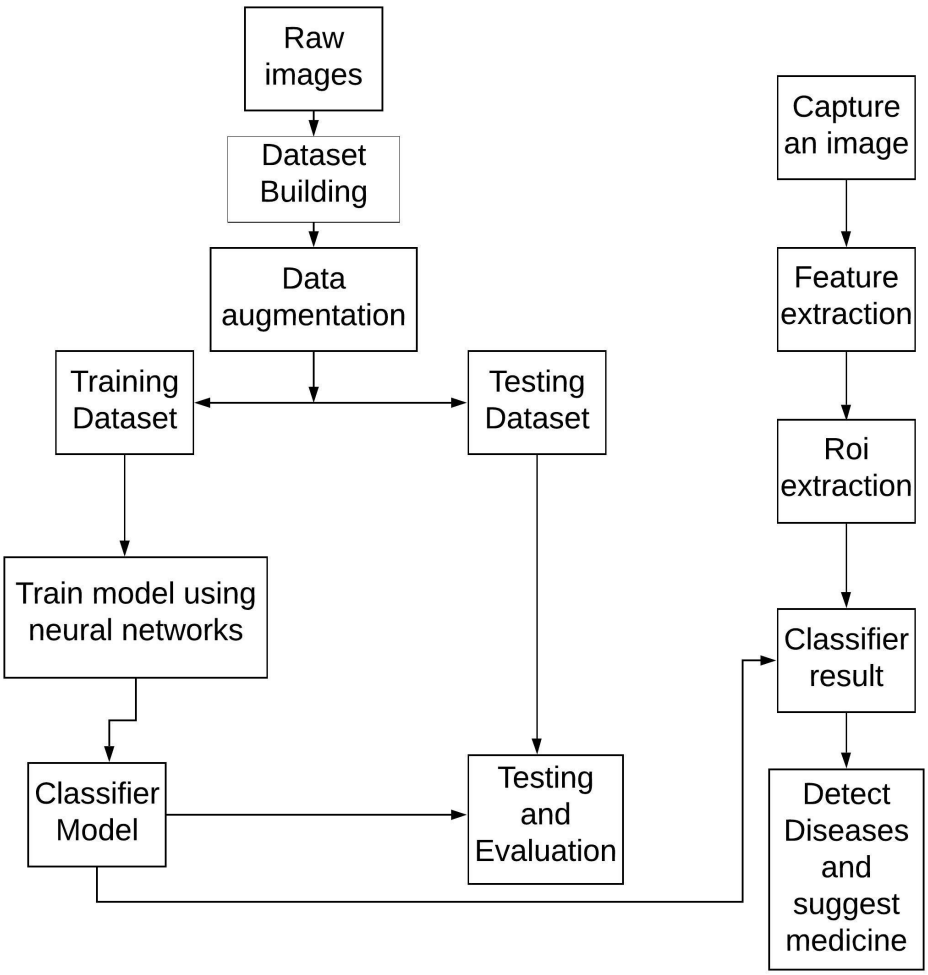

Figure 3.1: Overview of proposed method

3.3 Detailed Explanation

3.3.1 Raw Images

As We have used machine learning technique to detect the skin diseases. So We needed images to build our model. That's why at first we have to gather raw images from out farmers. So we have gathered images from the farmers and from the website where they have worked on skin diseases. Then we have classified the images into our specific diseases.

3.3.2 Dataset Building

Then we have made dataset by choosing the images. Here basically to make datset we have to be careful because sometimes some images cane be overlapped. So we were so many careful when making the datset. We have tried to focus on the special skin diseases of the domestic animal. We have got help from the veterans to identify the diseases and we had to study on the diseases and went to the farm of the farmers.Our faremrs helped us to get the images.

3.3.3 Data Augmentation

As for the machine learning algorithm we have to split our images into two set. One is Training dataset and the other is testing dataset. Basically in our training dataset most of the images were there and some images were in testing dtaset to check our model how much precise is it.For all the specific diseases there was images in the testing dataset.

3.3.4 preprocessing

Image processing refers to improving image data (properties) by removing unnecessary artifacts and enhancing certain essential image features so that the deep learning methods can take advantage of this improved data. In this paper, preprocessing is the first step of the domestic animal skin diseases detection framework. However, the preprocessing step consists of three segments: resizing

and scaling, augmentation, and normalization. Images/frames are resized to 128 * 128 pixels to reduce computational cost and time, which leads to the boosted performance of the model. Moreover, the original images consist of RGB coefficients in the 0–255 range that will be too high to be processed. Therefore, we have converted the pixel values to the [0, 1] interval by scaling with a 1/255.0 factor. On the other hand, augmentation refers to generating more training instances from the prevailing ones through some specified transformations for raising up the generalization power of the deep learning models. In this work, online, i.e., real-time augmentation, has been used on resized and re scaled training images, which creates transformed images at each epoch of training. In this regard, we have utilized four different transformation methods: horizontal flip, width shift, height shift, and rotation. This mechanism leads to a better generalization of the model. Normalization is added to standardize raw input pixels, which will transform input pixels by making mean 0 and standard deviation of 1. If data are not normalized, there may be some numerical data points in our data set that might be very high and others that might be very low. In unnormalized data, thus naturally, large values become dominant according to relatively small values during training, as the importance of each input is not equally distributed. When we have normalized our training data, however, we have put all of our data on the same scale, which makes convergence faster while training the network. Effect of normalization on the performance of the model is briefly explained in this paper.

3.3.5 Spatial Feature Extraction

Spatial features or elements can be defined as the characteristics relevant to the context of the scenes. However, in the case of skin disease detection, spatial features include surrounding aspects of the animals, colour of the animal. In recent times, CNN has proven its prosperity to a great extent in extracting complex spatial features of the images. The integral component of the CNN is the convolutional layer that takes after the name of this network. Convolutional layers can learn local and translation invariant patterns from the images through "convolution". It denotes a linear mathematical operation that performs matrix multiplication between the filter of a specific dimension and the portion of the

image on which the filter hovers. The outcome of a convolutional layer is termed as “feature map”, passed to an activation function that introduces nonlinearity in the output. Another integral element of CNN is the pooling layer that has come up with a downsampling strategy. The key purpose of this layer is to accumulate the most activated presence of a feature by gradually decreasing the spatial

3.3.6 Classification Using Softmax

For classification, the Softmax activation function is used in the output layer that produces the probability distribution of the five classes based on the extracted features of the previous step. This function outputs probabilistic values ranging between 0 to 1, all summing up to 1. Softmax activation function generates probability distribution by using the following equation:

$$S(\vec{i})_k = \frac{e^{i_k}}{\sum_{n=1}^{t} e^{i_n}}$$

In this equation, !i denotes the input vector, k is the index of the current element in the input vector, all the i values refer to the elements of the input vector, and t represents the total number of classes.

3.3.7 Scratch Model

Building a deep neural network from scratch is essential for a better understanding of the mechanism of deep learning methods and getting insight into the dataset’s feature space. In this paper, a scratch model is developed by incorporating CNN with LSTM. After applying the preprocessing tasks, the processed photo taken by the camera are passed to the CNN architecture, used as a spatial feature extractor. The CNN architecture is comprised of nine layers containing convolution layers with a varied number of filters of 3 * 3 dimension, maxpool of 2 * 2 pool size with stride 2, and flatten layers. In this architecture, the “same-padding” is used, and the stride dimension is (1, 1). For faster convergence during training, ReLU is used as an activation function that provides output to the [0, ¥] interval. Afterwards, a flatten layer is appended to create a single long feature vector for each selected photos. This CNN architecture processes the image , and features are extracted from those images. In this regard, we have implemented the CNN

part our model using TimeDistributed layer of Keras.An LSTM layer of 128 hidden units is utilized to extract the temporal features from the feature vector produced by CNN architecture. A dense layer of 128 neurons is added next with a dropout rate of 0.2, followed by the output layer, where the Softmax activation function is used to classify four individual diseases of the animal. Therefore, in total, the scratch model contains 17,248,843 weights/parameters.

3.3.8 TensorFlow lite

TensorFlow Lite is a set of tools that enables on-device machine learning by helping developers run their models on mobile, embedded, and IoT devices.It is Optimized for on-device machine learning, by addressing 5 key constraints: latency (there's no round-trip to a server), privacy (no personal data leaves the device), connectivity (internet connectivity is not required), size (reduced model and binary size) and power consumption (efficient inference and a lack of network connections). Multiple platform support, covering Android and iOS devices, embedded Linux, and micro-controllers.Diverse language support, which includes Java, Swift, Objective-C, C++, and Python.It has High performance, with hardware acceleration and model optimization. It has End-to-end examples, for common machine learning tasks such as image classification, object detection, pose estimation, question answering, text classification, etc. on multiple platforms.

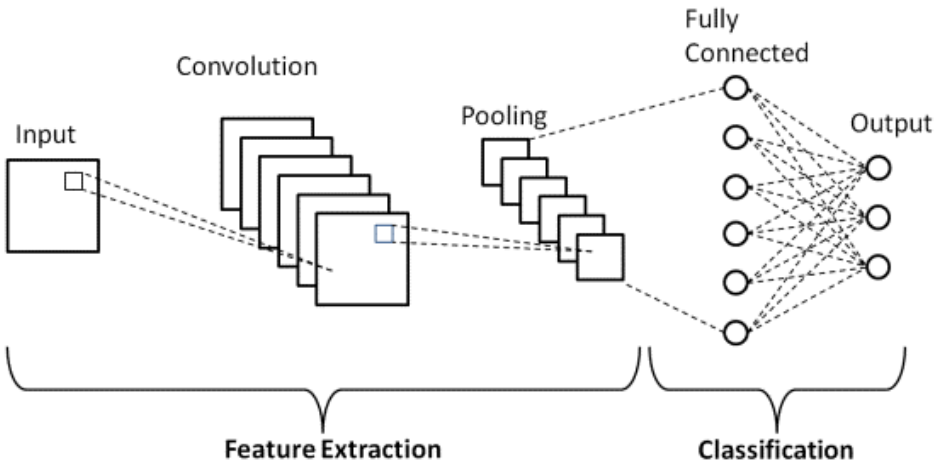

Figure 3.2: The architecture of the model

3.3.9 Implementation

With the approach of convolutional neural network we have trained our model.Then we have converted our model into tensorflow lite model And used in android studio.Then with java we have made an apps. So this app can now detect the diseases.

These Programming language were needed to implement our thesis

- Python
- Java
- XML

3.4 Conclusion

With our greatest effort,we have implemented the algorithm to make the app.As nothing is hundred percent error-less. Our model may have some error.We expect that gradually these error will be solved.

Chapter 4

Results and Discussions

4.1 Introduction

Some text in introduction of results and analysis.

4.2 Dataset Description

Here we have gathered the datasets from farmer. Medical veternary officer helped us to identify specific diseases. They have given us the specific image dataset for a specif diseases. We have worked with four domestic animals.Cows,Ducks,Hens,Goats.Gradually we can enrich our dataset.Then this framework will be more accurate.

4.3 Cows Dataset

We have collected Four Diseases image dataset of cows skin diseases. It contains about 1500 images of 320*240 four Diseases. As until there is no built-in dataset for these disease. So we hope that in future we will get a dataset.Here four diseases of cows are Dermatophilosis, Pepillomatosis, Ringworm and urticaria with one healthy image dataset.

Figure 4.1: Dermatophilosis of Cow

Figure 4.2: Pepillomatosis of Cow

Figure 4.3: Ringworm of Cow

4.4 Goats Dataset

We have collected Four Diseases image dataset of Goats skin diseases. It contains about 1500 images of 320*240 four Diseases. As until there is no built-in dataset for these disease. So we hope that in future we will get a dataset.Goats also have four kinds of diseases.They are Echtyma,Ringworm,Dermatophilosis and Lymphadenitis with one healthy image dataset.

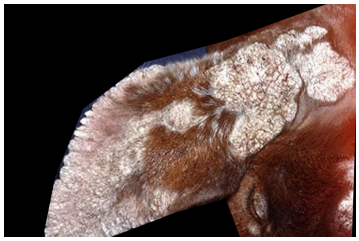

Figure 4.4: Ecthyma of Goat

Figure 4.5: Lymphadenitis of Goat

Figure 4.6: Ringworm of Cow

4.5 Hens Dataset

We have collected Four Diseases image dataset of hens skin diseases. It contains about 1500 images of 320*240 four Diseases with one healthy image dataset. As until there is no built-in dataset for these disease. So we hope that in future we will get a dataset.Hens also have four types of skin diseases, they are Fleas,Scaly leg mites, fowl pox,skin tumor and with one set of healthy images dataset.

Figure 4.7: Scaly Leg mites of hen

Figure 4.8: Fleas of hen

Figure 4.9: Tumor of hen

4.6 Ducks Dataset

We have collected Four Diseases image dataset of Ducks skin diseases. It contains about 1500 images of 320*240 four Diseases with one healthy image dataset. As until there is no built-in dataset for these disease. So we hope that in future we will get a dataset.Ducks they have also four kinds of skin diseases.They are Bumblefoot,sticky eye infection,wet weather,wry neck.

Figure 4.10: Sticky eye infection of Duck

Figure 4.11: Scaly leg mites of Duck

Figure 4.12: Bumblefoot of Duck

4.7 Impact Analysis

Most of the farmers of our country will get help from this thesis.

4.7.1 Social and Environmental Impact

This app can make a revolution in the domestic animal farm in our country. As our farmer will get a quick response from this app.They can easily understand what should do now.

4.7.2 Ethical Impact

It will have a positive impact on our farm in worldwide.

4.8 Evaluation Metrics

In order to assess the integrity of the mathematical or machine learning models, evaluation metrics are widely used. In the paper, to test the scratch and fine-tuned pretrained models, the five most significant evaluation metrics, accuracy, specificity, precision, sensitivity, and f1 score, were used. These metrics are defined as follows:

$$A_C = \frac{TP+TN}{TP+FP+TN+FN}$$
$$S_p = \frac{TN}{TN+FP}$$
$$P_r = \frac{TP}{TP+FP}$$
$$S_t = \frac{TP}{TP+FN}$$
$$\text{F1Score } = 2 \times \frac{P_T \times S_t}{P_r + S_t}$$

In the above equations, Ac, Sp, Pr, and St denote accuracy, specificity, precision, and sensitivity. Additionally, TP, FP, TN, and FN refer to true positive, false positive, true negative, and false negative.

4.9 Evaluation of Performance

Our dataset was split into the train,test and validation. About 80 percent images were for train set and 10 percent for test set and another 10 percent for validation set.Our images is resized to 128*128*3 to reduce complexity. By augmentation horizontal flipping, rotation, width shifting, and height shifting are applied for better generalization.Then normalization techniques helps is to enhance performance .

Table 4.1: Normal Performance of Hens Skin Diseases Detection

	Training accuracy	Validation Accuracy	Test Accuracy
Normalize Data	93.43%	91%	91%
Unnormalize Data	90%	88%	88%

Table 4.2: Normal Performance of Ducks Skin Diseases Detection

	Training accuracy	Validation Accuracy	Test Accuracy
Normalize Data	89.67%	87%	88%
Unnormalize Data	85%	84%	85%

Table 4.3: Normal Performance of Cows Skin Diseases Detection

	Training accuracy	Validation Accuracy	Test Accuracy
Normalize Data	92.89%	90%	90%
Unnormalize Data	90%	88%	88%

Table 4.4: Normal Performance of Goats Skin Diseases Detection

	Training accuracy	Validation Accuracy	Test Accuracy
Normalize Data	93.31%	91%	91%
Unnormalize Data	90%	88%	88%

This scratch model was formed by combining CNN with LSTM, compiled through Adam optimizer with 0.0001 learning rate and categorical cross-entropy loss function. Categorical cross-entropy is a type of loss function where the target values for multiclass classification are represented in a one-hot vector. The multinomial probability distribution provided by the Softmax activation function in the output layer is used by the categorical cross-entropy loss function for measuring the prediction error/loss of the model. This function computes the loss in the following manner:

$$CCL = -\log p(k)$$

In the above equation, CCL refers to the categorical cross-entropy loss, and p(k) denotes the probabilistic value of the class k that is fired-up in the one-hot vector. However, the model is trained till 65 epochs with batch size of 64. The training and validation accuracy, as well as the loss curves of this scratch model. At 54th epoch, the training accuracy stops increasing, whereas, at this epoch, we got the maximum validation accuracy, i.e., 90fact that at the 54th epoch, the model performs the best, and after this epoch, the model ceases learning.However, the overall performance is assessed through the F1 score throughout the experiments.

Then we converted our trained Model into tensorflow lite model to use in android studio. TensorFlow Lite is a set of tools that enables on-device machine learning by helping developers run their models on mobile, embedded, and IoT devices. Here we have used quantized Model to enhance the performance.

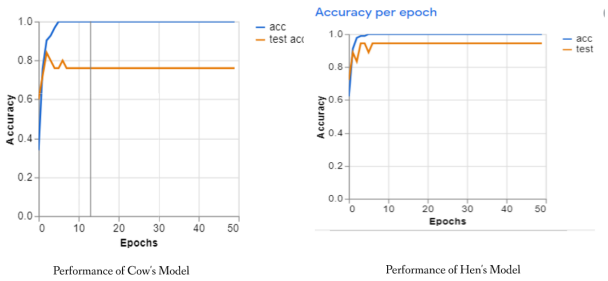

Figure 4.13: Performance of Cows and Hens model

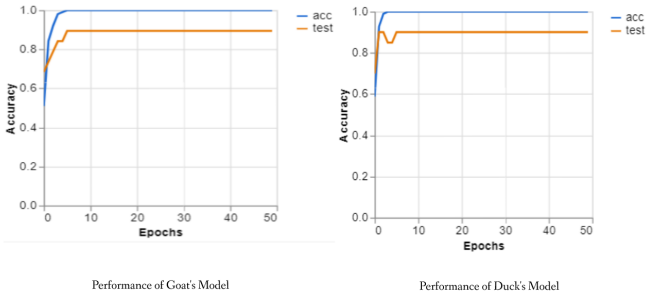

Figure 4.14: Performance of Goats and Ducks model

Figure 4.15: Opening of Our app

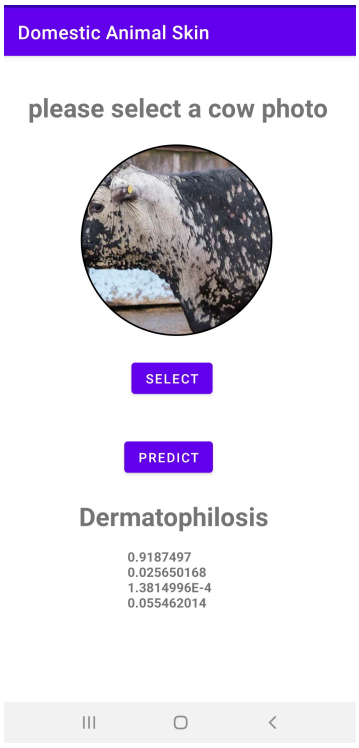

Figure 4.16: Disease detection of our Model

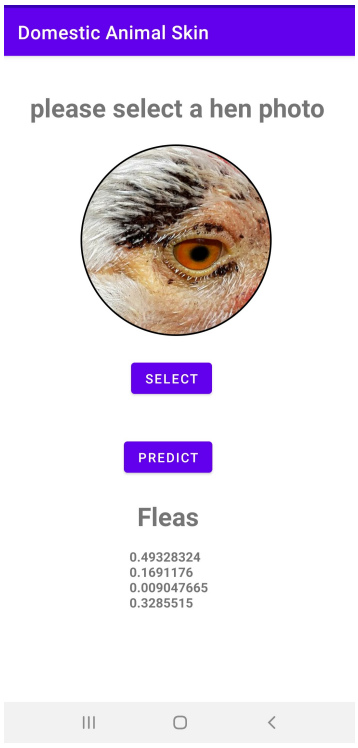

Figure 4.17: Disease Detection of our Model

4.10 Required Resources

SOFTWARE AND HARDWARE REQUIREMENT SPECIFICATION The software and hardware requirement for the Skin Diseases Detection of Domestic Animals :

Hardware requirements

- Processor:Pentium IV onwards
- RAM:2 GB or higher
- Input:Images

Software requirements

- Operating System:Windows XP or higher, Android
- RAM:2 GB or higher
- Software:Anaconda, Android studio

4.11 Conclusion

In this paper,Using transfer learning and CNN we have classified four Diseases of every animal.This is quite challenging because we have no built in dataset. That's why we had to fetch dataset images from the veterinarian. It was a challenging for us to build the dataset.Here we have built a new skin disease dataset of four domestic animal.Each disease dataset folder contain about 200 images. In future the amount of images will be increased and our model will be more accurate then. Here four diseases of cows are Dermatophilosis, Pepillomatosis, Ringworm and urticaria with one healthy image dataset. Goats also have four kinds of diseases.They are Echtyma,Ringworm,Dermatophilosis and Lymphadenitis with one healthy image dataset.Hens also have four types of skin diseases, they are Fleas,Scaly leg mites, fowl pox,skin tumor and with one set of healthy images dataset.For Ducks they have also four kinds of skin diseases.They are Bumblefoot,sticky eye infection,wet weather,wry neck and with one set of healthy image

dataset.Our android app is so much of user friendly.We can also use our model in any platform where machine learning is supported.

Chapter 5

Conclusion

5.1 Conclusion

This project is about the skin disease detection of domestic animals.At first we have built a dataset of the diseases.For this we have got help from the veterinarian.After feature extraction and background removal, we have used machine learning algorithm CNN to train our model.After that we have converted our model to tensorflow lite model to use in android app.In android app basically we capture the image of the diseases.After capturing the image,If predict button is clicked then our app can predict the possible disease.Though no prediction is hundred percent correct but we have managed to predict about 90 percent diseases.

5.2 Future Work

As there was no built in dataset for domestic animal's skin disease detection.Our dataset was small.So in future dataset will be enriched by new images.Then the model will be more accurate.In future we can add medicine suggestion to the farmers for the animal's diseases and a suggestion what should they do for the diseases and how the disease should be treated.We expect that for another domestic animal ,we can also add them in our model.Then this helps us farmer greatly.

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