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SAHIWAL COW BREED IDENTIFICATION

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Abstract
In this paper the study objective is to make recommendations for a Python-based Machine Learning System that can identify the Sahiwal cow breed. The problem for identifying cow breed in real is a major problem so by using Machine Learning model we can predict cow breed. The system makes use of CNN, a type of machine learning.
The 2000 photos in the cow breed dataset come from five different breeds of cows. Pictures are appropriately categorized by breed. The assessment gives them the output if the cow is Sahiwal or not and the next actions they should provide us the exact output with accuracy.
Keywords: Prediction, Machine Learning, Classification, Accuracy.

1.Introduction

Image analysis employing computer technology and a number of prediction applications are often employed in a variety of agricultural businesses. As farms become increasingly numerous and productive, the use of computer technology in automating agricultural processes is gradually growing.
Under the current conditions, it is possible to coordinate animal attendance and nutrition using Live weight (LW), milk output and fodder intake. These factors are very significant and need to be tightly regulated. Negative changes in live weight may be a sign of Animals health issues improper environmental conditions or inadequate nourishment. In order to overcome these issues, it therefore seems suitable to apply computational intelligence techniques particular a neural network approach. It employs a variety neural network model.
From a cow's image and body measurements, convolutional artificial neural networks are used to identify the breed of the animal. In turn, a multilayer perceptron is utilized to calculate the weight of cattle utilizing breed and size data as well as image analysis. By examining photographs of animals captured by synchronized cameras at various angles, the size of the cow is ascertained.

2. Literature Review

The Conventional neural network is frequently used in the literature to do various animal estimations for various reasons. Nonetheless, techniques and tools for computational intelligence based on ANN have become more popular recently.

Artificial neural network and artificial intelligence in the dairy industry are compared. In this project artificial neural networks will be used to estimate cows using photos of cows that were detected and convolution neural network and image processing body dimensions (BD) were calculated using the photogrammetric method.

Regression analysis is a practical tool used to estimate the live body weight of animals. use There is another use of the major component technique. Innovative analysis techniques are more adaptable than traditional ones. The technologies based on computational intelligence Are increasing being employed to solve issues related to increasing the productivity of agriculture. For Instance, the issue of predicting the breed of cow based on information about the weight and color of the cow using ANN was resolved in. While comparing the performance of Neural Networks with regression models for predicting animal weight, it was found that the former had a significant advantage. The issue of calculating the animals weight using image processing techniques was taken into considerations. It was shown that the Artificial neural networks and neuro systems are good at predicting the breeding value of dairy cattle

The classification precision of fine-tuning approaches is evaluated by **Lingyun Li et al, [1]**. Lingyun Li et al. address the issue of over-segmentation, which reduces the quality of image representation and is frequently observed when doing unsupervised component detection on convolutional neural network.

In their study, **Shaoyong Yu et al, [2]** present a novel deep learning-based model for classifying fine-grained cow breeds. Their work is broken down into three steps, first they create a dataset of cows; second they use CNN model to identify cow breed in images and third, they use a deep learning algorithm.

Grant Van Horn et al.[3] present the methods and tools needed in this study to collect fine-grained large-scale computer vision datasets using volunteer researchers. Also, they noticed in their study that learning algorithms built on CNN features and part localization were suprisingly resistant tool to training data with inaccurate labels.

They offered a venue dataset which is highly intriguing idea developed by **Yi Yu et al,[4],** the purpose of the venue of dataset are novel form of dataset for the FGVC is to ; Find a location using any social media photograph. Photos a description and categories of the venue are included in the dataset. They also suggested a venue finding strategy using this dataset.

3.Methodology

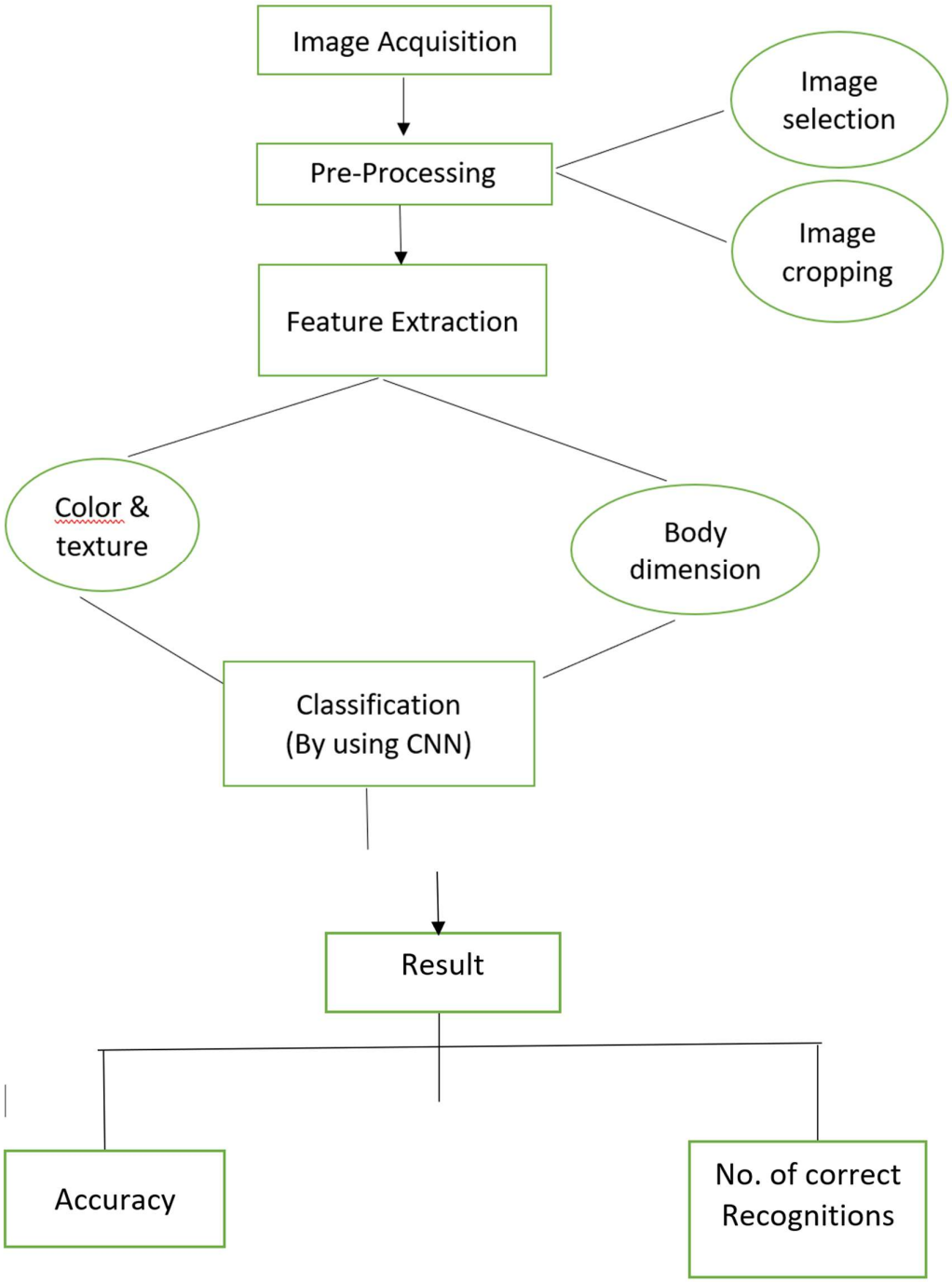
Accuracy and a dataset are required for real time cow breed identification. Artificial intelligence (AI) is used in machine learning to implement systems that can learn from experience and get better over time without being explicitly programmed. Several researchers are now able to construct automated intelligent systems, offer individualized advice and extract significant information from the data.

The most popular Supervised Learning technique, CNN, is used to address Classification and Regression problems. However, it is mostly used to solve classification problems in machine learning. CNN is a deep learning neural network created for the analysis of ordered arrays of data, such as photographs.

Image processing is the use of digital computer to run an algorithm on digital images. As a subcategory image processing is superior than image processing in many ways. By allowing applications of a much larger range of methods to be the input data, it can avoid problems like processing related noise and distortion accumulation. Since images may exist in two or more dimensions, digital image processing can be thought of as multidimensional. The creation and improvement of discrete mathematics theory, the development of computers, and demand for

a wide range of applications in environment, agriculture, military, industry and medical science are the three main influences on the generation and development of digital image processing.

3.2 Process Diagram



In the system, first we will give introduction guidelines that how to use the system and then the user will give the path of the image to the system. The system, after that the dataset of Sahiwal cow breed, stress are set and the system Compare different answers given for situations like

accuracy, shape, color etc. The answer to the survey of almost 300 cow breed dataset and based on the answer the different model perform the evaluation in their own terms. According to the conditions, the model will identify the breed whether it is Sahiwal or not using Conventional Neural Network .

3.3 Convolutional Neural Network (CNN)

Convolution Layer

The convolutional layer performs convolution on the input and sends the results to the subsequent layers. A convolutional receptive area whole pixel operation is merged into a single value. For instance, by using a convolution on an image, you may merge all of the field data into a single pixel while also a shrinking the size of the image. The ultimate result of the convolutional layer is a vector. Depending on the kind of problem we need to solve and the features we want to learn, we can use a variety of convolutional techniques.

Sample Subset Layer (pooling, MAX-pooling)

The subsampling layer enlarges planes by locally averaging the output neurons' values. Hence, a hierarchical structure is established. More widespread properties that are less dependent on the image distortion are extracted from later levels. A convolution layer and a subsampling layer differ in that convolution layer has nearby neurons areas overlap it, whereas a subsampling layer does not.

Normalizing Layer

On this layer, the conventional normalization of inputs take place. The values at this layer's inputs from prior training iterations are taken into account for calculating the samples values. By this method, the network may be learned more quickly, which enhances the outcome.

4.Implementation

Libraries :-

```
from tkinter import *
from PIL import ImageTk, Image
import tkinter.messagebox as tkMessageBox
from tkinter import filedialog
import ctypes,os,csv,cv2
import threading
import numpy as np
from tensorflow import keras
import tensorflow_hub as hub
```

GUI Window :-

```
home = Tk()
home.title("Cow Detection")
directory = "./"
img = Image.open(directory+"/images/home.png")
```

```
img = ImageTk.PhotoImage(img)
panel = Label(home, image=img)
panel.pack(side="top", fill="both", expand="yes")
user32 = ctypes.windll.user32
user32.SetProcessDPIAware()
[w, h] = [user32.GetSystemMetrics(0), user32.GetSystemMetrics(1)]
lt = [w, h]
a = str(lt[0]//2-425)
b= str(lt[1]//2-225)
home.geometry("850x550+"+a+"+"+b)
home.resizable(0,0)
file = ''
model                                                                    =
keras.models.load_model('./model.h5py',custom_objects={'KerasLayer':hub.KerasLayer})
```

5. Result

The Dataset contains 2 classes, first for sahiwal cow breed and second for all other classes. First classs contains 19 images and second class contains 250 images. In total dataset it contains 269 images. We use 80% of data for training and 20% for testing purpose.

Test Loss = 0.2307313233613968

Test Accuracy = 0.9074074029922485

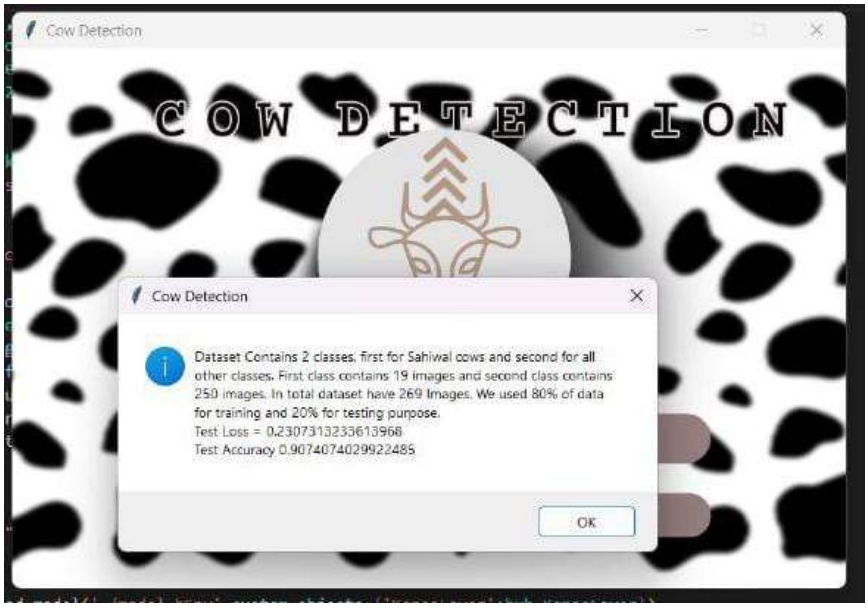


Fig.1 Model Detection

Fig.2 Examples of correct recognition

Fig.3 Examples of false recognition

6.Conclusion

Four thousand photos from eight different categories makeup our brand new, domain-specific image collection of different breeds of cow. We also ran an experiment to determine the base line values of several matrices by using three different classifiers by extracting pictures features using the WEKA image filter software. As we well knowledge, fine-grained visual categorization (FGVC) is the division of items into smaller groupings based on distinction within each class. A very difficult task gathering a finely grained dataset. It necessitates in depth domain expertise. Deep neural network had excelled in a variety of computer vision applications. Thus, we think that implementing deep learning methods like CNN should be one of the top goals. The result may differ in some may and accuracy value may rise if deep learning is use to implement experimental work on this dataset. In the future, smartphone app or other model could be trained using this dataset. In nations like Pakistan, India, Bangladesh where raising cattle is a major industry and an integral component of village life. They can choose breeds more skillfully with the aid of this kind of model or application.

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