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JUTE PEST CLASSIFICATION USING CNN ARCHITECTURE

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ABSTRACT

Jute is an important cash crop that is cultivated widely in many countries, including Bangladesh, India, and China. However, jute crops are vulnerable to various pest attacks that can significantly reduce the yield and quality of the crop. So, a deep learning model is developed in this project for Jute Pest detection and classification. The proposed system aims to identify different types of pests that attack jute crops based on the dataset. We trained and tested our CNN model on a dataset of jute pest images, achieving an accuracy of 96%. Our results demonstrate that the proposed system can effectively classify different pest types in jute crops, which can help farmers take timely actions to control pest infestation and improve the overall yield and quality of the jute crop. And this model is also deployed using the Django web framework and it shows the type of Jute Pest.

INTRODUCTION

Jute is an important natural fiber crop in India coming to cotton. In trade and sedulity, jute and mesta crop together known as raw jute as their uses are nearly same. Raw jute plays an important part in the country's economy. Raw jute was originally considered as a source of raw material for packaging industriousness only. But it has now surfaced as a versatile raw material for different operations, analogous as, cloth industriousness, paper industriousness, structure and automotive industriousness, uses as a soil deliverer, use as cosmetic and furnishing paraphernalia, etc. Raw jute is a biodegradable and annually renewable source, it's considered as an environmentally friendly crop and it helps in the conservation of the terrain and ecological balance.. Its silky luster, high tensile strength, low exhaustibility, considerable heat resistance, and long principal length are rates that can't be matched by synthetic fiber. Also, it can easily be blended with other natural and man- made fibers. While Mesta culture is distributed practically everywhere in the country, jute civilization mainly exists in the eastern

and northern regions. The identification of the jute pest in filaments is more difficult for farmers. So, a deep literacy model is demanded to descry and classify the type of jute pest.

[1] **Md sakib ulla sourav et.al**, used transfer learning (TL) and a deep learning convolutional network (DCNN) for jute pest identification. Model is trained by TL through VGG-19. They used Keras 5 and Tensor Flow 6 for the backend. They used the COCO image dataset for training. Only 145 are used for validation. It achieved a precision of 95.86 percent. They used Flutter software for deployment.

[2] **Hieu T.Ung et.al,** used different convolutional neural network-based models such as RANS, which focuses on crucial regions, feature pyramid networks, which are feature extractors composed of bottom-up and top-down pathways, MMAL, which accurately identifies informative regions, and the ensemble method, which is used to combine low-accuracy models to achieve high accuracy. They evaluated the models IP102 and D0 using two datasets. Out of all these methods, MMAL-net produces an accuracy of 72.15 in IP102 and 99.56 in D0...

[3**] Nikitha.K.S et.al**, used the Mobile Net v2 model, which is a pretrained model for image classification. The IP102 dataset was used, which contains 75000 observations, 80% of which are used for training and 20% for testing. Four classes for each pest are trained. They get the input image, i.e., the pest image, and they preprocess it and use Mobile Net v2 to classify it, and at last it gives the result of which pesticide can be used for this pest. It produces an accuracy of 85%.

[4] **Thenmozhi kasinathan et.al,** Used ANN, SVM, KNN, Naïve Bayes and proposed CNN model for insect Classification. They used two dataset from different authors Wang and Xie. Wang dataset contains 9 classes for classification and Xie dataset contains 24 classes for classification. Used 70-30%ration for training and testing. Each model produced different accuracy for classification such as ANN-55%, SVM-78%, KNN-68%, Naïve Bayes-28% and proposed CNN-98%.

[5] **Xianyu Zhu, Jinjiang Li et.al,** used LAD-NET model for apple pest classification. They used late appleset dataset for classification. They build the LAD-Net model is built by the LR-CBAM and the LAD-Inception modules, replacing a full connection with global average pooling. It produces the accuracy of 97.71%

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EXISTING SYSTEM

In existing system most of them used coco dataset, Wang and Xie author's dataset which contains only 9 classes and 24 classes for insect classification. Many of them used transfer learning model, mobile net v2 for classification, LAD-NET which uses weight for the dataset.

DRAWBACKS:

- Not focus on classifying the jute pest.
- Deployment is not done

PROPOSED SYSTEM

In proposed project, a Deep Learning algorithm is trained with the capable of preprocessing, feature extraction and classifying the type of pest images using CNN model and visualizing the image using jute pest image dataset. Classification of type of pest is affecting the jute is implemented by using three architecture Lenet, Resnet and proposed model based on Lenet architecture. It focuses on classifying the type of pest and the result is deployed in web-framework

METHODOLOGY

- Input images are given using keras pre-processing package.
- Various features are extracted using the CNN algorithm's layers.
- And it classifies the pests using three models and the best accuracy is deployed in the Django framework.
- The architecture diagram of the methodology is shown in Fig.1

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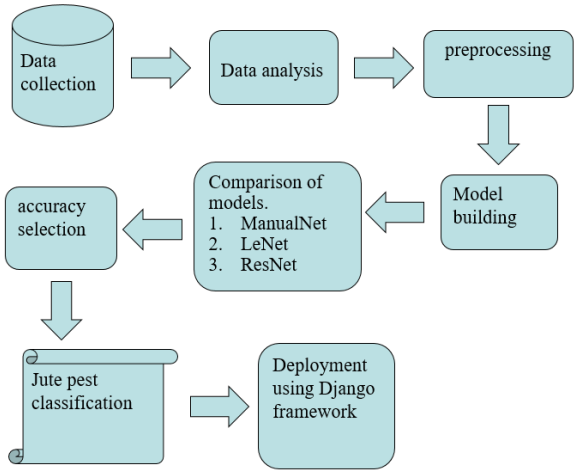

Fig.1 Architecture diagram

1. LENET

LENET is an earlier pre-trained models and a 5 layers with learnableParameters. It has 3 convolutional layer with a combination of averagePooling and 2 fully connected layer.

2. RESNET

ResNet-50 is a pretrained Deep Learning model for image Classification of the Convolutional Neural Network. Is a type of artificial neural network that allows the model to skip layers without Affecting performance.Resnet50 is used to denote the variant that canWork with 50 neural network layers.

3. MANUAL NET

It is manually build model based on LENET architecture. It has 3 convolutional layer and 3 max pooling layer and 2 fully connected layer. Here we can add any number of convolutional and max pooling layer in Fig.2.

```
Classifier=Sequential()
Classifier.add(Convolution2D(32,(3,3),input_shape=(224,224,3),activation='relu'))
Classifier.add(MaxPooling2D(pool_size=(2,2)))
Classifier.add(Convolution2D(28,(3,3),input_shape=(224,224,3),activation='relu'))
Classifier.add(MaxPooling2D(pool_size=(2,2)))
Classifier.add(Convolution2D(20,(3,3),input_shape=(224,224,3),activation='relu'))
Classifier.add(MaxPooling2D(pool_size=(2,2)))
Classifier.add(Flatten())
Classifier.add(Dense(38, activation='relu'))
Classifier.add(Dense(4, activation='softmax'))
Classifier.compile(optimizer='rmsprop',loss='categorical_crossentropy',metrics=['accuracy'])
```

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DATASET

IMAGE CLASSIFICATION	NO. OF TRAINING IMAGES	NO OF TESTING IMAGES
Field cricket	220	15
Spilsoma oblique	220	18
Yellow mite	220	21
Jute stem	220	14
Others	-	5
Total	880	73

Table.1 dataset

1. DATASET CONTAINS:

- The specified dataset has been taken from Kaggle where the above mentioned entries have been recorded under the name- Jute Pest Dataset.
- Colored image and some grey scaled image
- Image size: 256*256

2. PREPROCESSING

- Rescale- rescaling the image between 0-1.
- Shear range - used to crop the background image.
- Zoom range- used to zoom and extract the image parts.

ACCURACY AND LOSS GRAPH

- Accuracy and loss graph for LENET model is shown in Fig.3.

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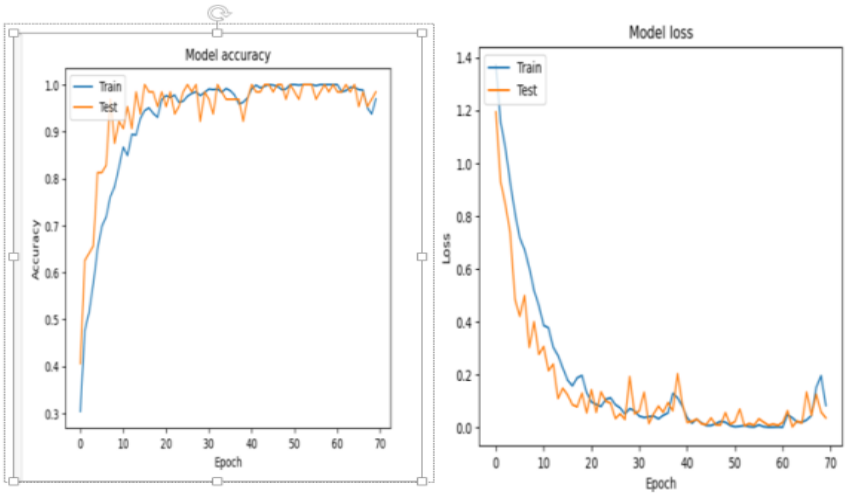

Fig.3 Accuracy and Loss graph for LENET model

- Accuracy and loss graph for RESNET architecture is shown in Fig.4.

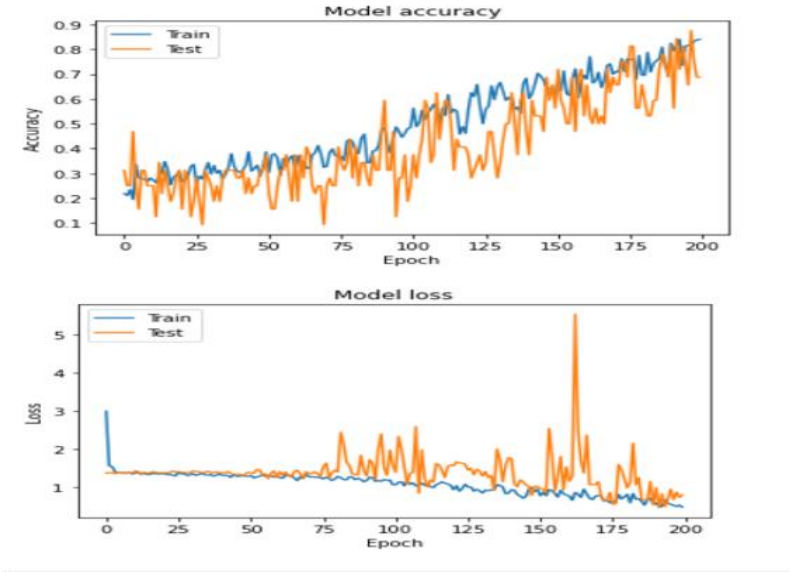

Fig Fig.4 Accuracy and Loss graph for RESNET model

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- Accuracy and Loss graph for Manual Net model is shown in Fig.5

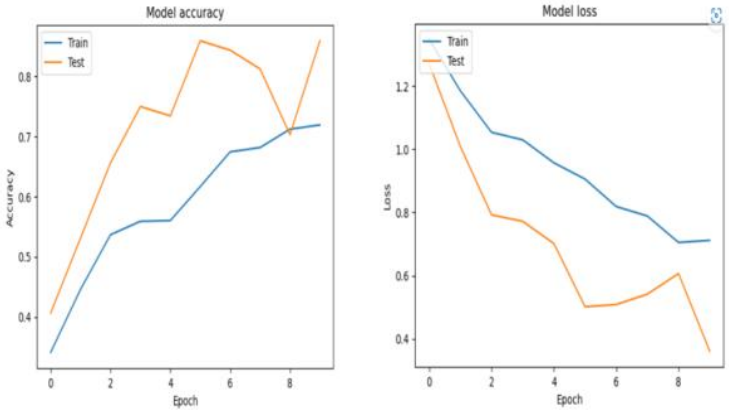

Fig.5 Accuracy and Loss graph for RESNET model

COMPARISON OF MODELS

The comparison of architectures based on number of epochs is shown in Table.2 .

Here, the Accuracy of Manual Net when compared to LENET is low. Once the dataset is enhanced and fine tuning of parameters are done, we can get higher accuracy for Manual Net when compared to LENET.

MODEL	ACCURACY	LOSS	EPOCHS
Manual Net	87	36	20
LENET	96	8	70
	96	1	20
RESNET	83	48	200
	30	1.3	20

Table.2 comparison of models

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CONCLUSION

In this project, Jute pest image is classified using three different CNN models in deep learning technique is proposed. This problem has already been approached in different techniques, but the good results have been achieved in this Deep Learning Methodology. This project is mainly focuses on feature engineering with different CNN models and shows the comparison of models with different accuracy level. Nowadays, Jute pest detection software includes the use of feature engineering and the solution is totally based on feature learning does not seem close yet because of a major limitation. Thus, Jute pest image classification could be achieved by means of deep learning techniques.

FUTURE WORK

Jute pest classification can be created for mobile based application and can also be deployed in cloud.

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