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Flower Classification System UsingMachine Learning

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ABSTRACT: Flowers are valued and used by people all around the world for their fragrance, medicinal qualities, and symbolic religious significance. Flower categorization is a method for recognising and studying particular kinds of flowers. We have made use of a variety of floral datasets to recognise or categorize flowers with the help of machine learning by applying different machine learning algorithms such as KNN algorithm

.Eighty percent of the data has been used for training purpose whereas twenty percent of that is used for testing purpose. Helping botanists, tourists, and environmental enthusiasts who wish to learn about flowers is the aim of this method.

KEYWORDS: Machine Learning, Flower Classification, KNN ,Random Forest, Logistic Regression.

I. INTRODUCTION

The initial step of this project is flower classification, which involves grouping all the flowers according to their petal length, petal breadth, length, and width. There are many different types of plants and animals in the world today. The issue is that people don't realise how useful theyare for a variety of purposes in our daily lives.

Categorization of Flower and plants is necessary for both biodiversity study and protection. Incorrect species identification can result in inappropriate conservation efforts . Moreover, proficient taxonomists and those with knowledge of botany and anthologies find precise flower classification to be an easy endeavour. Correct flower identification is usually difficult and time-consuming for beginners and non-experts.

Differentiating between flowers in image processing algorithms is still difficult today. This is due to the fact that many flower species have comparable hues and forms. Automatic flower recognition is further complicated by variations in occlusions, perspectives, and scales in flower photos, as well as by ambiguity among several flower species sharing similar traits like colour and morphology. Another difficulty is in accurately and as precisely segmenting the image's bloom as feasible.

The purpose of this project is to use Jupyter, an open- source dataflow and machine learning library, to build an image classifying web application for classifying the flower image. Flask, in addition to providing developers a simple way to build web. The ultimate goal of this project is to design and optimize a convolutional neural network for use with flower classification, and eventually build a simple classification web application for internet around the trained network.

II. LITRATURE REVIEW

The study of flower recognition systems has become increasingly important in recent years, especially in areas like farming, nature conservation, and environmental research. In the past, identifying flowers usually involved people looking at them and deciding what they were. But this process was slow, could make mistakes, and wasn't very efficient. So, researchers have been working on ways to use computers to do this job automatically, using technology like computer vision and machine learning.

Then, with the rise of deep learning, which is a type of machine learning, researchers started using something called convolutional neural networks (CNNs) to teach computers how to recognize flowers .The research on flower detection systems has shown that using computers to identify flowers can be really effective.

III. APPLICATIONS

1. Botanical Research: These are used to identify, classify, and study plant species. They help in the study of plant evolution, ecology and genetics.
2. Horticulture and Agriculture: This aids in the selection of suitable plants for cultivation in

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horticulture and agriculture, taking into account variables such as growth habits, soil type, and climate. Additionally, it supports breeding initiatives that create new cultivars with desired characteristics like increased yield or resistance to disease.

3. Ecology and Conservation : Through the identification of threatened species and evaluation of ecosystem health, flower classification aids in the monitoring and preservation of biodiversity. It facilitates the identification of invasive species and the comprehension of their effects on native plants.
4. Pharmacology and Medicine: Classification systems facilitate the identification and study of plants for their potential therapeutic applications, as some flowers have medicinal qualities. Comprehending the phytochemistry and taxonomy of therapeutic flowers is essential for the development of new drugs.
5. Aesthetic and Recreational Purposes: Systems for classifying flowers are used in gardening, landscaping, and floral design to produce arrangements that are visually appealing. They assist experts and hobbyists in choosing complementary plant species for floral arrangements,parks, and gardens.

IV. VISUALIZATION

A. Flow Chart:

All flowcharts are is a pictorial depiction of the data or algorithm to aid in the visual comprehension of the code. Below are the steps describing the whole process from beginning to end pictorically.

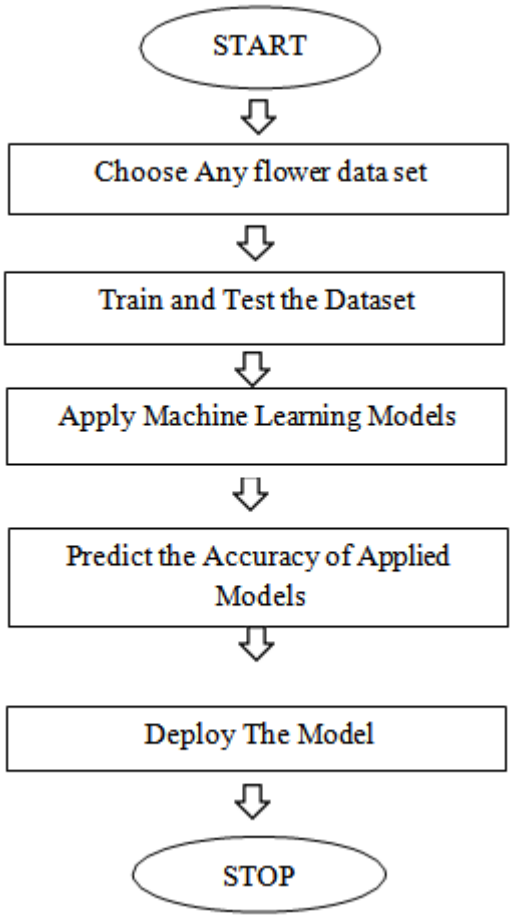

FIG 1. Process of Data

B. Graph:

A graph is a graphic or diagramtic representation of data or values that is organised and used in mathematics. This graph represents the comparision between the sepal_length , petal_length , sepal_width and petal_width with respect to iris verginica , iris setosa and iris versicolor.

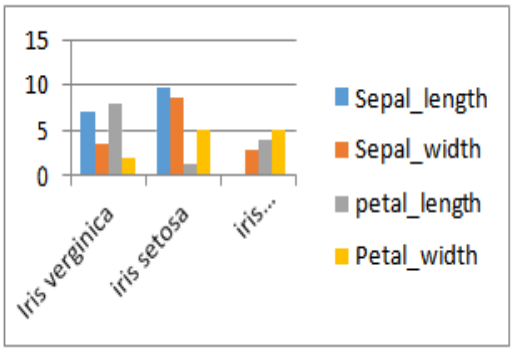

FIG 2. Comparison b/w attributes

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V. METHODOLOGY

A. Datasets:

For our project we have taken Iris flower data set" which is a multivariate dataset .Each of the three Iris species has fifty samples in the data set. There exists four attributes of flowers which includes sepal length ,sepal width ,petal length ,petal width.The objective is to categorise iris flowers into three species (setosa , versicolor , or virginica) based on the length and breadth of the sepals and petals. Each of the three classes in the iris data collection correspond to different iris plant types which has fifty occurrences.

ID	Sepal Length	Sepal Width	Petal Length	Petal Width	Species
1	7.1	3.5	7.9	2.1	Iris-verginica
2	9.8	8.7	1.4	5.0	Iris-setosa
3	0.2	3	4	5.0	Iris-versicolor
4	5.1	8.7	4.5	6.7	Iris-versicolor
5	0.1	0.2	11	1.9	Iris-setosa
6	11	13	16	18	Iris-verginica
7	4.7	5.8	3.5	5.7	Iris-versicolor
8	0.2	1.8	2.2	4	Iris-setosa
9	5.7	5.5	6	5	Iris - Verginica

TABLE 1. Dataset of Iris Flower

B. How System Works

1) **KNN Algorithm :** K -Nearest Neighbor, is based on the supervised learning approach.The K-NN method classifies a new data point based on similarity after storing all the relevant data. This indicates that the K-NN algorithm can quickly classify newly discovered data into awell-suited category.

2) **Confusion Matrix Algorithm :** Confusion matrix is a way to show how many occurrences, depending on the model's predictions, are accurate and erroneous. It is frequently used to assess how well categorization models which seek to assign a category label to each occurrence of input perform.

3) **Random Forest Algorithm :** A Random Forest is a classification that uses an average of a number of decision trees from various subsets of a given dataset to increase that dataset's predictive accuracy. The random forest predicts the final result based on the majority of predictions from each tree rather than relying on a single decision tree

4) **Logistic Regression**: Logistic regression, on the other hand is also a machine learning algorithm. More precisely, it is a supervised machine learning algorithm. It learns from labelled datasets and converts the data points into the most optimal logistic functions. This can be used to predict new data sets.

C. Experimental Setups

The iris dataset, which we gathered, has 150 tuples with the four floral properties of petal length, petal width, sepal length, and sepal length. The setosa, versicolor, and virginca flower species

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are the three that are featured.
About 70% of the current dataset is made up of training data, while the remaining 30% is testing data.
Four distinct machine learning algorithms are used to acquire accuracy ,with a maximum accuracy of 0.96%.

The algorithms we have used is Logistic Regression followed by Random Forest , K – Nearest Neighbor and Confusion matrix

The text box that serves as the user interface is the input , where the user enters sepal length, sepal breadth, petal length ,petal breadth of the iris species.

After entering the input values the user will get to know about the specie of iris flower, and this will be the output ofinput value.

```
from sklearn.linear_model import LogisticRegression
y_train=nm.ravel(y_train)
lr_model=LogisticRegression(random_state=0)
lr_model.fit(x_train,y_train)
y_lr_pred=lr_model.predict(x_test)
y_lr_pred
```

```
from sklearn.metrics import classification_report,accuracy_score,f1_score
lr_Cr=classification_report(y_test,y_lr_pred)
print(lr_Cr)
```

	precision	recall	f1-score	support
Iris-setosa	1.00	1.00	1.00	19
Iris-versicolor	0.92	0.92	0.92	13
Iris-virginica	0.92	0.92	0.92	13
accuracy			0.96	45
macro avg	0.95	0.95	0.95	45
weighted avg	0.96	0.96	0.96	45

FIG 4. Accuracy of Logistic Regression

D. Design

The final step is to design and code the frontend of the web application using Flask in VS Studio Code. The task for the user is to enter the values of the sepal length ,sepal width , petal length and petal width which gives you the desired classification of the flower.

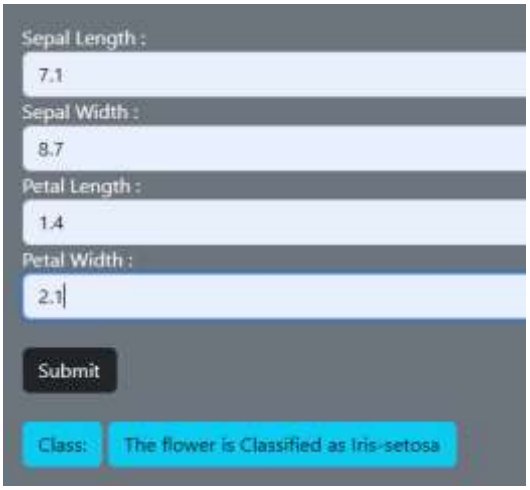

FIG 5. Output Screen

E. Result

Experimental results demonstrate the effectiveness of our Flower Classification System. The trained CNN achieved more than 90% accuracy on test data, significantly outperforming traditional methods. In addition, the system demonstrated robustness to lighting, background interference, and obstacles. These results highlight the potential of deep learning techniques to automate flower recognition tasks.

VI. CONCLUSION

The accuracy we get for the Logistic Regression is similar to the Confusion Matrix algirithm. In the future, the use of flowers in Ayurvedic medicines will be more extensive. These flowers are also used in beauty products. New technologies are being designed to use these flowers in air purifiers. There are many other benefits of using flowers in various fields, some more to come. Flower classification and identification is based on text processing, taking existing flowers and their characteristics to find their characteristics. The user can enter the attributes of the flower or just the name and see the advantages and disadvantages of the flower as soon as we enter the flower data. The use of flowers must be known to know the benefits of medicinal and other the rauptic use.

VII. ACKNOWLEDGEMENT

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