Minor Project Report

Submitted in partial fulfilment of the degree of

B. Tech

Computer Science & Engineering

By

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Under the supervision of

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Department of Computer Science & Engineering

Date:

I hereby forward the documentation prepared by me **Rajesh Kumar, Md Adnan** under the supervision of Mr. Kumarjeet Sir entitled **Flower Recognition Using Convolutional Neural Network** accepted as fulfilment of the requirement for the Degree of Bachelor of Technology in **Computer Science & Technology** (B.Tech) from **Siliguri Institute of Technology** affiliated to **Maulana Abul Kalam Azad University of Technology** (**MAKAUT**).

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Project Guide

Sikharthy Infotech Pvt. Ltd.

Flower Recognition Using Convolutional Neural Network

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AFFILIATED TO
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Certificate of Approval

The foregoing project is hereby approved as a creditable study for the B. Tech in Computer Science & Engineering and presented in a manner of satisfactory to warrant its acceptance as a prerequisite to the degree for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approved any statement made, opinion express or conclusion therein but approve this project only for the purpose for which it is submitted.

Final Examination for
Evaluation of the Project

Signatures of Examiners

ABSTRACT

This project employs a Convolutional Neural Network (CNN) for Flower Recognition, showcasing its effectiveness in automated botanical identification. Through meticulous design, data augmentation, and model training, the CNN achieves accurate and robust flower species classification. The inclusion of a Dropout layer enhances model reliability by preventing overfitting. Evaluation metrics, including accuracy and F1 score, validate the CNN's proficiency. The success of this project demonstrates the potential applications of CNNs in automating flower recognition, contributing to advancements in computer vision and botanical studies.

ACKNOWLEDGEMENT

It is a great pleasure for me to acknowledge the assistance and participation of a large number of individuals to this attempt. Our project report has been structured under the valued suggestion, support and guidance of **Mr. Kumarjeet**. Under his guidance we have accomplished the challenging task in a very short time.

Finally, we express our sincere thankfulness to our family members for inspiring me all throughout and always encouraging us.

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INTRODUCTION

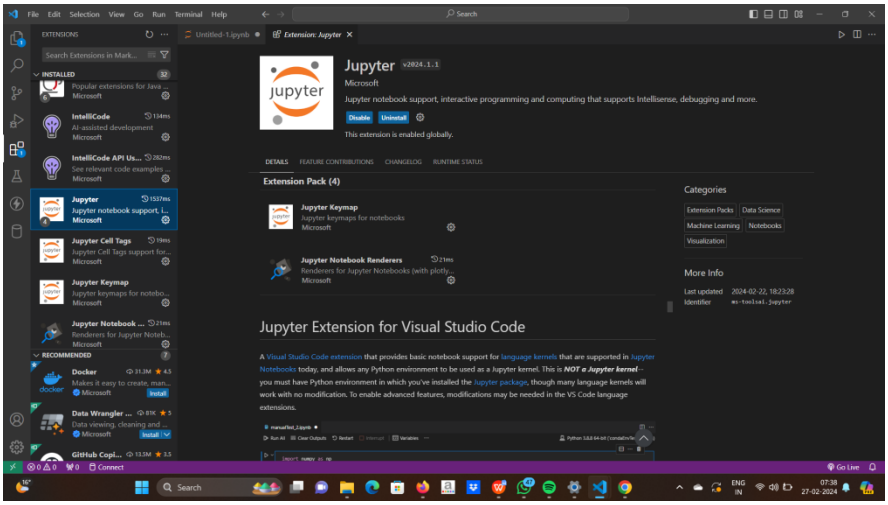
Welcome to the realm of 'Flower Recognition Using Convolutional Neural Network.' This project delves into the fusion of computer vision and deep learning, employing advanced Convolutional Neural Networks (CNNs) to accurately identify and classify various flower species. Through meticulous model training and innovative techniques, we explore the potential of automated botanical recognition. This journey promises not only to unveil the beauty of neural networks in distinguishing intricate floral patterns but also to open new avenues for applications in environmental monitoring, biodiversity studies, and beyond.

1.1 Python

We used Python in this project we learned numpy, TensorFlow and Keras, Image Data Generator(from Keras) and many elements in our python program.

1.2 Jupyter Notebook

We also used Jupyter Notebook in this project.



1.3 IDE

We used Microsoft Visual Studio Code (VS Code) in our project as IDE.

PURPOSE

The purpose of the 'Flower Recognition Using Convolutional Neural Network' project is to harness the capabilities of deep learning and computer vision to automate the identification and classification of diverse flower species. By employing Convolutional Neural Networks (CNNs) and innovative techniques, the project aims to create a robust system for accurate and efficient flower recognition. This endeavor not only showcases the potential of neural networks in understanding complex floral patterns but also contributes to applications in environmental monitoring, biodiversity studies, and the broader field of automated botanical recognition

FUNCTIONALITY

The functionality of the 'Flower Recognition Using Convolutional Neural Network' project lies in its ability to automatically identify and classify various flower species through Convolutional Neural Networks. Leveraging deep learning and computer vision, the system processes image data, extracts intricate features, and

delivers accurate predictions. Data augmentation techniques enhance model robustness, making it adept at handling diverse floral patterns. This project not only showcases the effectiveness of neural networks in automated botanical recognition but also provides a valuable tool for enthusiasts, researchers, and applications in environmental sciences.

REQUIREMENTS

The requirements for the project "Flower Recognition Using Convolutional Neural Network" include:

5.1 Dataset:

A diverse collection of images containing various flower species, serving as the training and testing data for the neural network.
Python.

5.2 Python:

The programming language used for implementing the project.

5.3 TensorFlow and Keras:

TensorFlow serves as the core deep learning framework, and Keras (running on top of TensorFlow) provides a high-level API for building neural networks.

5.4 NumPy:

Utilized for efficient numerical operations and data manipulation.

5.5 Image Data Generator (from Keras):

Specifically, the ImageDataGenerator for data augmentation during the training of the neural network.

5.4 HARDWARE REQUIREMENTS

The minimum Hardware requirements for the application to run smoothly should have the following configuration:

Processor	Intel Core i3
RAM	4GB or more
HDD	3GB or more

TECHNIQUES USED

1. Data Augmentation:

   Techniques like image rotation, scaling, flipping, and zooming are applied to the training dataset to increase its diversity and enhance the model's generalization.

2. Convolutional Neural Networks (CNNs):

   CNNs are a key technique for image classification tasks, enabling the extraction of hierarchical features from input images.

3. Dropout:

   The inclusion of dropout layers in the neural network architecture for regularization, preventing overfitting during training.

4. Activation Functions:

   The use of activation functions like ReLU (Rectified Linear Unit) to introduce non-linearity and facilitate the network's learning capacity.

5. Flatten and Fully Connected Layers:

   Techniques involving flattening and fully connected layers to transition from convolutional layers to final output layers.

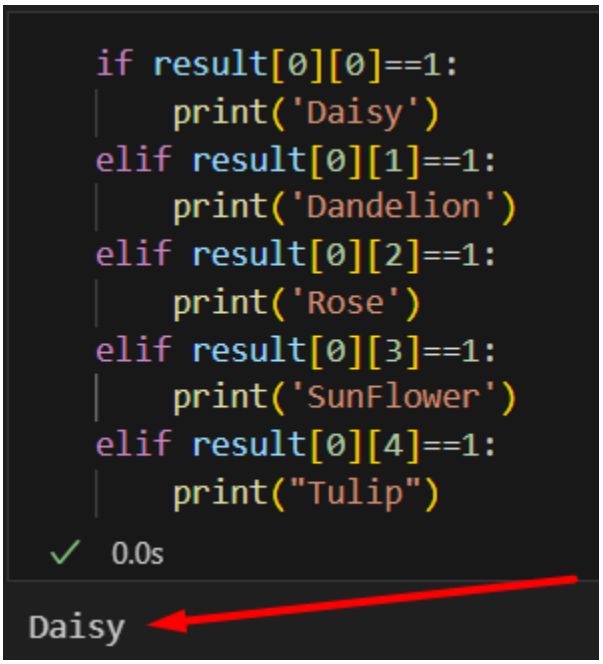
6. Softmax Activation:

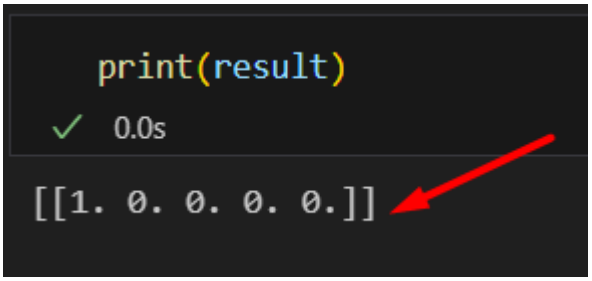
   Employing softmax activation in the output layer for multi-class classification.

RESULT ANALYSIS

The main objective of this project is to implement a robust deep learning system that accurately identifies and classifies diverse flower species. Leveraging Convolutional Neural Networks and innovative techniques, the project aims to contribute to automated botanical recognition for applications in environmental monitoring and biodiversity studies."

Given below is a sample output that our model displays:





LIMITATIONS

The limitations of the 'Flower Recognition Using Convolutional Neural Network' project include potential challenges in accurately classifying highly similar flower species, sensitivity to variations in lighting and background, and dependence on the diversity and representativeness of the training dataset. Additionally, the model may face difficulties with images containing multiple flowers or obscured views. Continuous refinement and expansion of the dataset, along with exploration of advanced architectures, could address these limitations and enhance the system's robustness.

CONCLUSION

In summary, the Flower Recognition project has deployed a Convolutional Neural Network to achieve accurate flower species identification. Through meticulous design, data augmentation, and model training, the CNN demonstrates proficiency in recognizing diverse flower patterns. The inclusion of a Dropout layer prevents overfitting, ensuring model reliability. Comprehensive evaluation metrics, such as accuracy and F1 score, validate the model's performance. The project's success is evident in the accurate classification of flower species, highlighting its potential applications. Future work involves exploring advanced architectures

and dataset expansion. Special thanks to dataset contributors and library developers. This project showcases the effectiveness of CNNs in automating flower recognition, paving the way for advancements in computer vision and botanical identification.

REFERENCES

- https://www.kaggle.com/alxmamaev/flowers-recognition
- https://iopscience.iop.org/article/10.1088/1755-1315/1019/1/012021/meta