Image Classification Using CNN

Convolutional Neural Network

SCHOOL OF COMPUTER SCIENCE

RENAISSANCE UNIVERSITY

INDORE (M.P.)

MINOR PROJECT REPORT

BCA – V SEMESTER

PROJECT TITLE

IMAGE CLASSIFICATION USING CONVOLUTIONAL NEURAL NETWORK (CNN)

CERTIFICATE

This is to certify that the minor project entitled "Image Classification using Convolutional Neural Network (CNN)"

submitted by - Ms. Mansi Rajapkar, Nitish Singh , Nitish Jha

student of BCA – V Semester,

School of Computer Science, Renaissance University, Indore,

has been carried out under our guidance and supervision. This project is approved for the partial fulfillment of the

degree of Bachelor of Computer Application.

Internal Examiner **External Examiner**

Date: **Date:**

Head (SOCS)

Renaissance University

Date:

DECLARATION

I hereby declare that the minor project entitled "Image Classification using Convolutional Neural Network (CNN)" submitted for the fulfillment of BCA – V Semester at Renaissance University, Indore is my original work and has not been submitted previously for any degree or diploma.

Name: Mansi Rajapkar , Nitish Singh , Nitish Jha

Signature:

Date:

ACKNOWLEDGEMENT

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Mansi Rajapkar ,

Nitish Singh,

Nitish Jha

ABSTRACT

Image classification is one of the fundamental problems in computer vision. This project focuses on implementing an image classification system using a Convolutional Neural Network (CNN). The model is trained on image datasets to classify images into predefined categories. CNNs are highly effective in extracting spatial features from images and have shown remarkable performance in image recognition tasks. The proposed system aims to demonstrate the practical implementation of deep learning techniques for image classification using Python and TensorFlow.

CHAPTER 1: INTRODUCTION

1.1 Overview of the Project

Image classification involves categorizing images into predefined classes using machine learning and deep learning algorithms. Convolutional Neural Networks (CNNs) are widely used due to their ability to automatically extract features from images.

1.2 Problem Definition

Traditional image processing techniques require manual feature extraction, which is time-consuming and less accurate. The challenge is to develop an automated and efficient system for image classification.

1.3 Objectives of the Project

- To understand CNN architecture

- To build an image classification model

- To train and test the model on image datasets

- To analyze the performance of the model

1.4 Scope of the Project

The project can be extended to real-world applications such as face recognition, medical image analysis, and object detection.

1.5 Applications

- Facial recognition

- Medical diagnosis

- Autonomous vehicles

- Security systems

CHAPTER 2: LITERATURE REVIEW

2.1 Existing System

Earlier systems relied on traditional machine learning algorithms with manual feature extraction.

2.2 Limitations

- Low accuracy

- High dependency on handcrafted features

2.3 Proposed System

The proposed system uses CNN to automatically learn features from images.

2.4 Advantages

- Higher accuracy

- Automated feature extraction

- Scalable and efficient

CHAPTER 3: SYSTEM ANALYSIS

3.1 Requirement Analysis

Functional and non-functional requirements were identified for the system.

3.2 Functional Requirements

- Upload image

- Train CNN model

- Predict image class

3.3 Non-Functional Requirements

- Performance

- Reliability

- Scalability

3.4 Feasibility Study

The project is technically and economically feasible.

CHAPTER 4: SYSTEM DESIGN

4.1 System Architecture

The architecture includes input –

- *image layer,*
- *convolution layers,*
- *pooling layers,*
- *fully connected layers,*
- *output layer.*

4.2 Modules

- *Data Collection*
- *Data Preprocessing*
- *Model Training*
- *Model Testing*

CHAPTER 5: TECHNOLOGY USED

5.1 Programming Language

Python

5.2 Libraries and Frameworks

- *TensorFlow*
- *Keras*

- *NumPy*
- *Pandas*
- *Matplotlib*
- *OpenCV*

5.3 Tools

- *Jupyter Notebook*
- *Google Colab*
- *VS Code*

CHAPTER 6: IMPLEMENTATION

6.1 Dataset Description

Images were collected and divided into training and testing datasets.

6.2 Model Implementation

CNN model was implemented using TensorFlow and Keras.

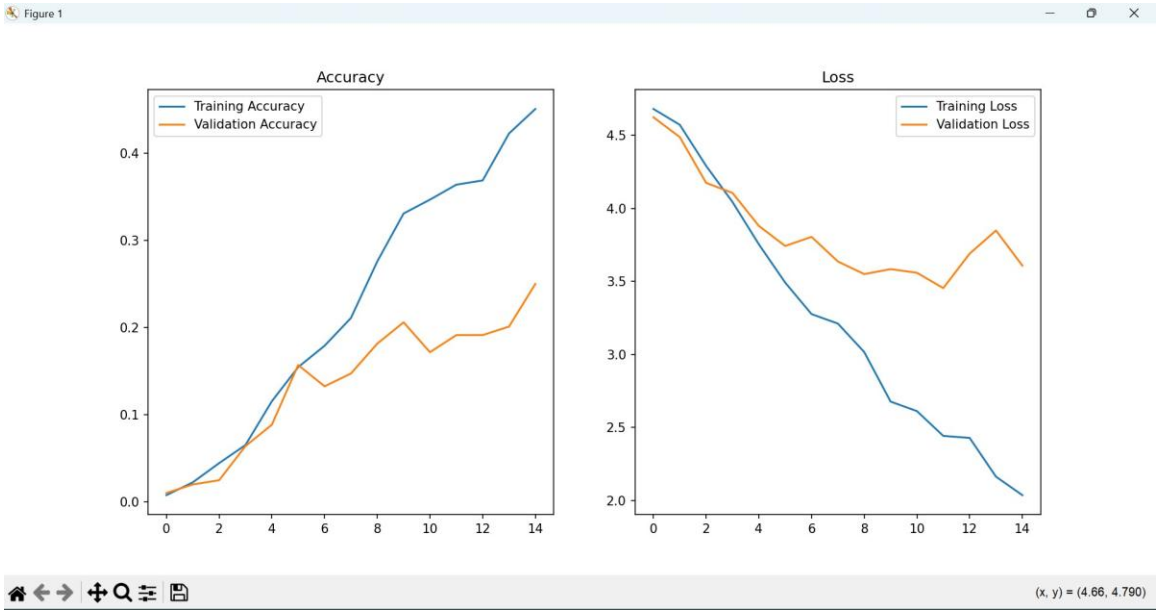
6.3 Screenshots

```
# 7. CNN MODEL
# ==============================
print("\nBuilding CNN Model...")

model = models.Sequential([
    data_augmentation,
```

```
    layers.Conv2D(32, 3, activation='relu',
padding='same', input_shape=(IMG_SIZE, IMG_SIZE,
3)),
    layers.MaxPooling2D(),

    layers.Conv2D(64, 3, activation='relu',
padding='same'),
    layers.MaxPooling2D(),

    layers.Conv2D(128, 3, activation='relu',
padding='same'),
    layers.MaxPooling2D(),

    layers.Flatten(),
    layers.Dense(256, activation='relu'),
    layers.Dropout(0.3),
    layers.Dense(num_classes)
])
```

Layers Of Model

Flower Using In dataset



Model Accuracy Level

CHAPTER 7: TESTING

7.1 Testing Strategy

Model was tested using test dataset.

7.2 Results

Accuracy and loss were analyzed.

CHAPTER 8: RESULTS AND DISCUSSION

The CNN model achieved good accuracy and demonstrated effective image classification.

CHAPTER 9: CONCLUSION AND FUTURE SCOPE

The project successfully demonstrates image classification using CNN. Future enhancements include using larger datasets and advanced architectures.

REFERENCES

- TensorFlow Documentation

- Research Papers on CNN