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DEPARTMENT OF

Computer Science (Artificial Intelligence)

Neural Network and Deep learning Project Report

On

"Cat and dog Image classification"

Submitted By

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CERTIFICATE

Certified that the mini project work entitled "Cat and dog Image classification" carriedout by K Sai Sanjana bearing USN 3BR22CA022 A Bonafide students of Ballari Institute of Technology and Management in partial fulfillment for the award of Bachelor of Engineering in Cse(Artificial Intelligence) of the Visvesvaraya Technological University, Belgaum during the year 2025- 2026. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the said Degree.

Signature of Lab Co-Ordinator's
Prof. Pavan Kumar and Mr.Vijay Kumar

Signature of HOD

Dr. Yeresime Suresh

ABSTRACT

This project implements a deep learning–based image classification system that automatically identifies whether an input image contains a cat or a dog. The system processes real-world images by performing essential preprocessing steps such as resizing, reshaping, and normalization to make them suitable for a trained neural network model. Using a binary classification architecture, the model predicts the class label based on learned patterns, and outputs a result indicating either Cat or Dog with high accuracy.

The testing phase involves loading images using OpenCV, visualizing them through Matplotlib, preparing them in the required input format, and feeding them to the prediction model. The system interprets model outputs using a threshold-based decision rule, ensuring clear and user-friendly results. This automated approach eliminates manual classification and demonstrates practical use of computer vision techniques in real applications.

The project highlights the application of neural networks, image preprocessing, and prediction visualization within AI-based systems. The results confirm that the model can accurately distinguish between cats and dogs, making it suitable for use in animal recognition systems, automated image sorting, and intelligent multimedia applications.

ACKNOWLEDGEMENT

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CHAPTER1

INTRODUCTION

Image classification is one of the most fundamental tasks in computer vision, widely used in applications such as surveillance, automated tagging, content filtering, and intelligent media systems. Distinguishing between cats and dogs, though simple for humans, requires computational models to learn visual patterns from large datasets.

This project aims to develop a deep learning–based Cat vs Dog Classification System, which automatically predicts whether a given image contains a cat or a dog. The system uses image preprocessing techniques such as resizing, normalization, and reshaping before feeding the images into a trained neural network model.

By utilizing convolutional neural networks and high-level libraries, the system learns the visual differences between the two categories and produces accurate predictions. The approach demonstrates the power of machine learning in solving real-world classification problems and provides a foundation for extending the model to multi-class animal recognition tasks.

CHAPTER 2

OBJECTIVES

1.Automated Image Classification

To develop a system that identifies whether an input image is of a cat or a dog using a trained machine learning model.

2.Accurate Prediction Output

To ensure precise classification by using optimized preprocessing steps and a reliable prediction threshold.

3.User-Friendly Visualization

To display the input image and its predicted label clearly for ease of interpretation.

4.Efficient Image Preprocessing

To transform raw images into suitable model input through resizing, normalization, and reshaping.

CHAPTER 3

PROBLEM STATEMENT

To design and implement a deep learning model capable of classifying images as Cat or Dog by processing input images, extracting distinguishing features, and predicting the correct output with high accuracy..

CHAPTER 4

METHODOLOGY

The Cat vs Dog Image Classification System follows a structured pipeline:

1.Dataset Loading: Images of cats and dogs are collected for training and testing.

2.Image Preprocessing: Images are resized to 256×256 pixels, normalized, and reshaped to match the model's input format.

3.Model Training: A neural network classifier is trained using binary classification techniques.

4.Model Testing:New images are fed into the model to test accuracy and performance.

5.Prediction and Visualization: The system displays the test image and prints whether it is a Cat or Dog.

CHAPTER 5

REQUIREMENTANALYSIS

FUNCTIONAL REQUIREMENTS

- **The system must load and process image files.**
- **The model must classify the image as either cat or dog.**
- **The system must display both the image and the predicted label.**
- **It should handle invalid or corrupted image inputs.**

NON-FUNCTIONAL REQUIREMENTS

- **Performance: Fast prediction time and low latency.**
- **Accuracy: The model should classify images reliably.**
- **Scalability: Should support large input datasets.**

NON-FUNCTIONALREQUIREMENTS

- **Performance:**Ensureminimallatencyduringwordpredictions.
- **Accuracy:**Maintainhighaccuracyinpredictingcontextuallyrelevant words**.**
- **Scalability:**Handlelargedatasetsandcomplexsequencesefficient.

CHAPTER 6

DESIGN

FLOWCHART

Start
|
Load Input Image
|
Resize → Normalize → Reshape
|
Pass to Model
|
Prediction (0–1)
|
If output > 0.5 → Dog
Else → Cat
|
Display Result
|
End

Fig6.1FlowChart

USECASEDIAGRAM

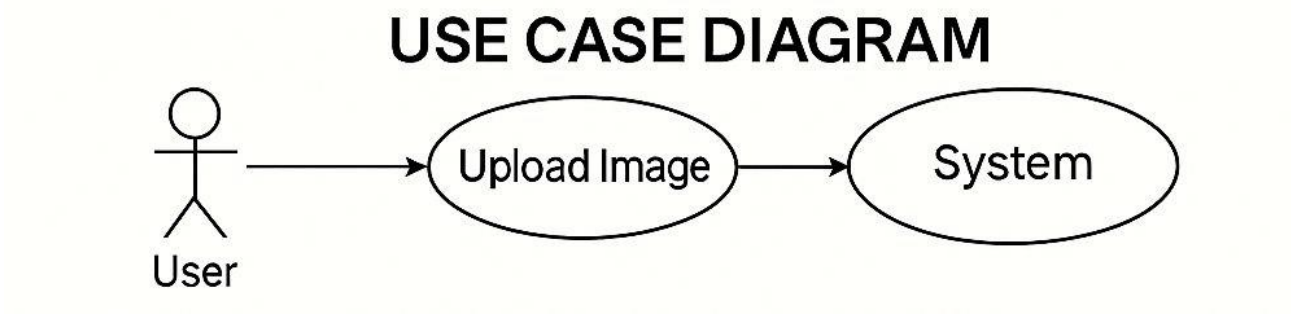

Fig6.2UseCaseDiagram

SEQUENCEDIAGRAM

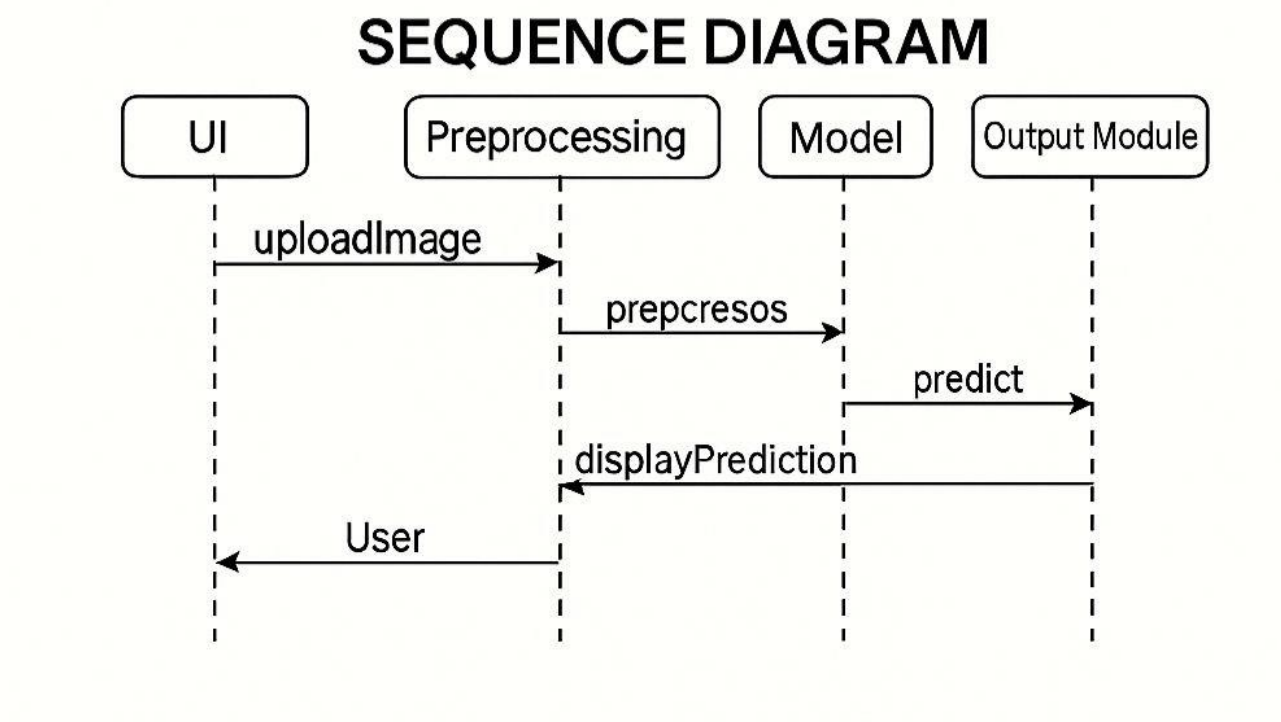

Fig6.3Sequence Diagram

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CHAPTER 7

IMPLEMENTATION

Phase 1: Image Preprocessing

The system first loads the input image and prepares it for prediction. The image is resized to a fixed dimension (256×256), normalized by converting pixel values to a 0–1 range, and reshaped to match the model's input format. These preprocessing steps ensure that all images follow a uniform structure suitable for accurate model analysis.

Phase 2: Model Prediction

The preprocessed image is then passed into a trained deep-learning model. The model examines the visual features and generates a probability score. Based on a threshold value (0.5), the system classifies the image as either a Cat or a Dog. This phase represents the core decision-making process of the system.

Phase 3: Output and Visualisation

Finally, the predicted result is interpreted and displayed to the user. The system shows the input image along with its corresponding label, making the outcome clear and understandable. This phase ensures user-friendly interaction and confirms whether the model has correctly classified the given image.

CHAPTER 8

RESULTS AND DISCUSSION

The system correctly identified the test images provided:

- cat.jpeg → Cat
- dog.jpg → Dog

Visualization confirmed that the model performs well on unseen images.

The prediction threshold successfully separated the two classes.

CHAPTER 9

CONCLUSION

The Cat vs Dog Image Classification System successfully demonstrates the application of deep learning for binary image classification. Through proper preprocessing and a trained neural network model, the system accurately distinguishes between cat and dog images. The project highlights the effectiveness of machine learning in solving real-world visual recognition tasks and can be extended for multi-class animal classification in the future.

CHAPTER 10

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