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# Lab Project Report

**Course Title:** Artificial Intelligence
**Course Code:** CSE-3636
**Project Title:** AI Image Classifier

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**Sem/Sec: 6CF**

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# AI Image Classifier — Project Report

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## Introduction

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The rapid advancement of artificial intelligence and deep learning has revolutionized computer vision, enabling machines to interpret and classify visual data with remarkable accuracy. Among the various tasks in computer vision, **image classification** is a foundational problem with widespread applications — from medical diagnosis to autonomous vehicles.

This project explores the power of deep learning-based image classification by building an intuitive web application using the **MobileNetV2** model, a lightweight yet efficient convolutional neural network pre-trained on the ImageNet dataset. The goal is to provide users with a simple platform where they can upload any image and instantly see what the AI model predicts the image to contain.

By combining a pre-trained AI model with a streamlined user interface powered by **Streamlit**, this project demonstrates how complex AI capabilities can be made accessible and visually appealing, even to non-technical users.

## What We Did

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We developed a responsive, web-based **AI Image Classifier** that enables users to upload any image and receive predictions about the object(s) depicted. The system uses a deep learning model, **MobileNetV2**, to return the top-3 class predictions along with confidence scores. The predictions are displayed dynamically with a visually engaging UI, including styled cards, background imagery, and hover effects. The application is designed to be fast, accurate, and easy to use, making cutting-edge AI accessible with just a few clicks.

## Why We Did It

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Image classification lies at the core of many real-world AI applications, from facial recognition and medical diagnostics to content filtering and robotics. This project was designed to:

- **Demonstrate AI in Action**: We aimed to showcase how pre-trained deep learning models can be leveraged to solve visual recognition tasks in a real-time web environment.

- **Build an Engaging Experience**: By integrating AI with a modern interface, we hoped to create an intuitive and interactive tool that educates users and highlights the practical potential of AI.

- **Gain End-to-End Project Experience**: This project allowed us to explore every step of deploying an AI system — from model selection and preprocessing to frontend development and user experience design.

## Tools Used

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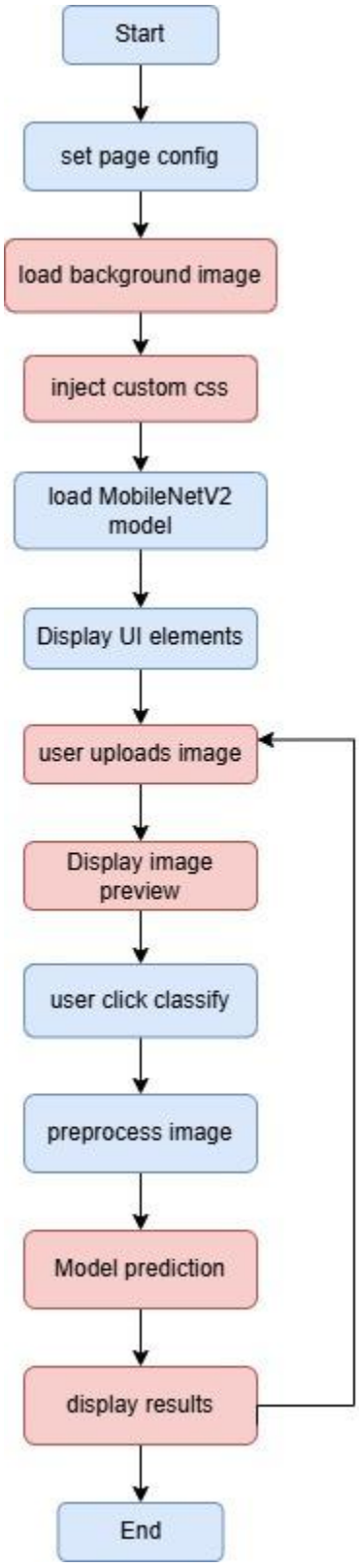
**Frontend Tools**

- **Streamlit**: A Python framework for building interactive web apps. It allowed us to create the entire interface, handle user inputs, and display results in real time with minimal boilerplate code.
- **HTML/CSS (Injected)**: We used custom styling to enhance the layout and design. Elements like card hover effects, custom fonts, background overlays, and responsive columns made the app visually appealing.
- **Pillow (PIL)**: This Python library handled image rendering, formatting, and compatibility with Streamlit, enabling us to display uploaded images smoothly and in the correct aspect ratio.

**Backend Tools**

- **TensorFlow & Keras**: We used these frameworks to load the pre-trained MobileNetV2 model, which is trained on over 1 million images from the ImageNet dataset and capable of recognizing 1,000+ object categories.
- **OpenCV (cv2)**: This library was crucial for image preprocessing, such as resizing to 224x224 pixels and converting from RGBA to RGB to ensure the model input met expected formats.
- **NumPy**: Used for efficient numerical operations, such as handling image matrices and expanding dimensions for batch processing.
- **Base64**: We used base64 encoding to embed a local background image directly into the CSS. This ensured seamless loading and portability without relying on external image hosting.

**Flowchart:**


Start
set page config
load background image
inject custom css
load MobileNetV2 model
Display UI elements
user uploads image
Display image preview
user click classify
preprocess image
Model prediction
display results
End

## Screenshots

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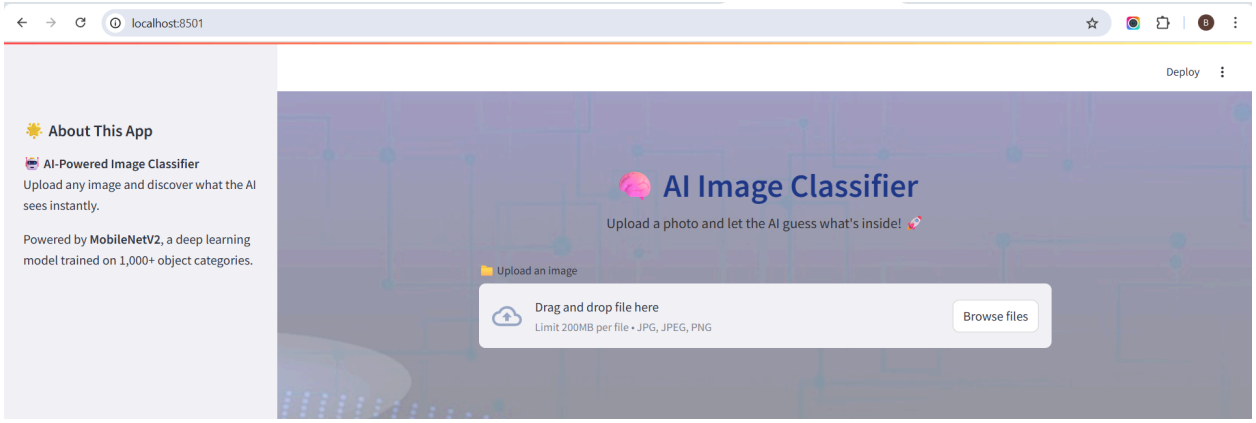
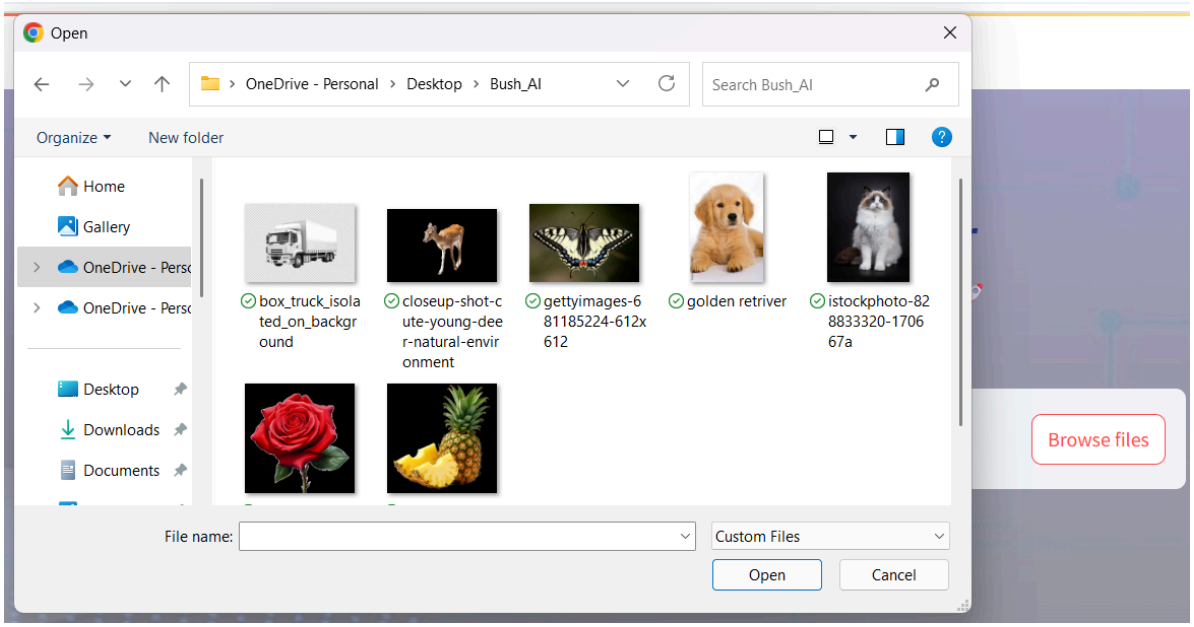
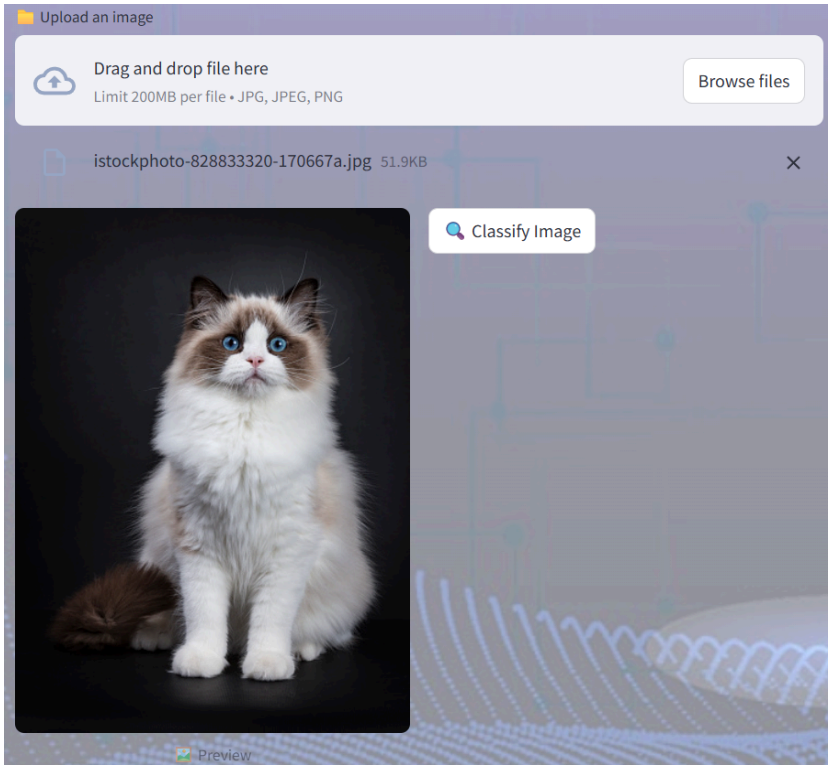
- ➢ In your project's terminal, run the command: **streamlit run your_file_name.py**.
- ➢ Open your project using the **localhost address** displayed in the VSCode terminal.
- ➢ Click the **Browse Files** button.



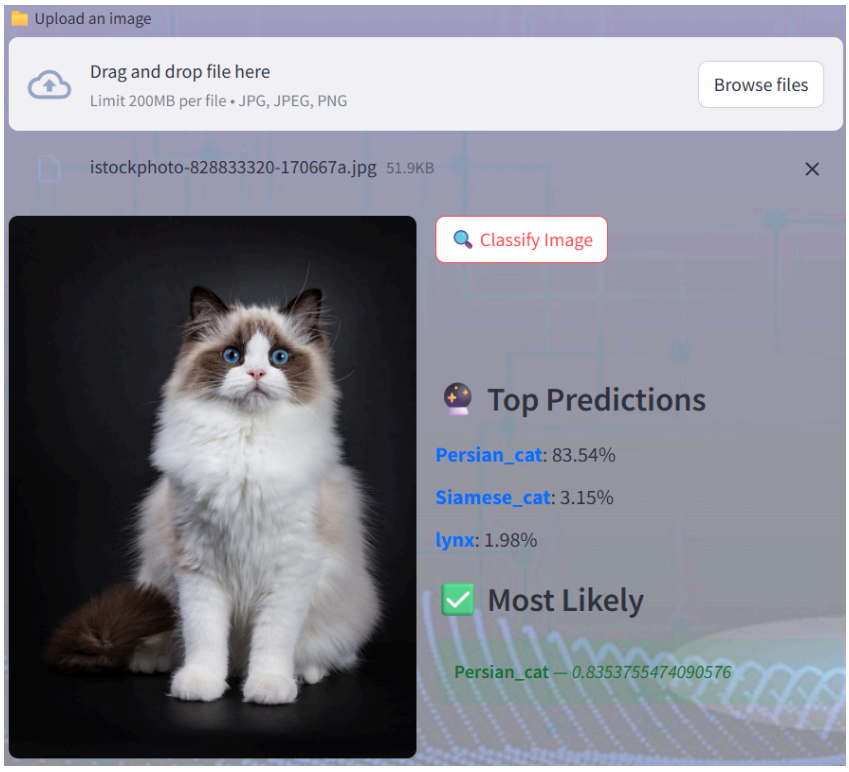

- ➢ Select an image.



➢ **Upload** the image.




➢ Click on the **Classify Image** button to proceed.



## Conclusion:

This project successfully demonstrates how deep learning can be used for real-time image classification through a user-friendly web app. Using the MobileNetV2 model with Streamlit, we built an intuitive platform that delivers accurate predictions with an engaging interface. It gave us hands-on experience in combining AI with frontend development and highlighted the practical impact of AI in everyday applications.