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FLOWER RECOGNITION

MIDTERM

17 April, 2025

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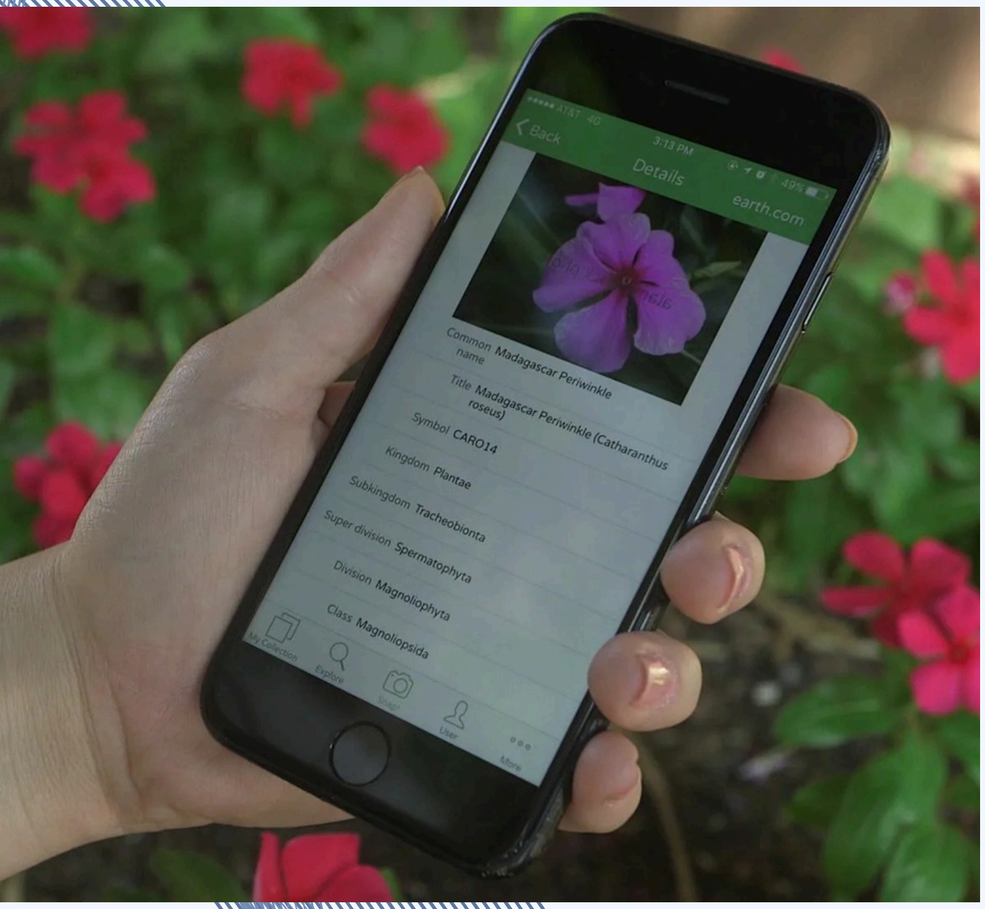
INTRODUCTION



Flowers play an important role in nature, culture, and everyday human life. They are not only visually pleasing but are also used in medicine, gardening, landscape design, and scientific research. However, identifying different types of flowers can be a challenging task, especially for untrained individuals.

🌸 **Flower Recognition App** is an intelligent application designed to recognize flower species in real time using a webcam. Leveraging computer vision and deep learning technologies, the app identifies the flower's name, evaluates image quality, provides voice feedback, offers care tips, and allows users to search for flowers manually or add new entries to the database.

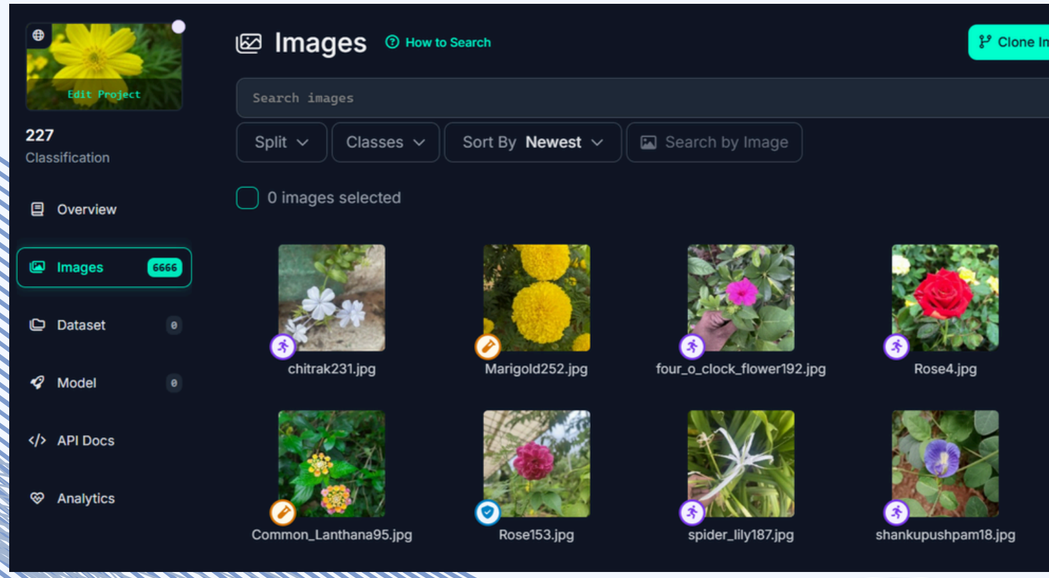
🎯 **The goal of the project** is to create an accessible and user-friendly tool for nature enthusiasts, students, and researchers that can instantly recognize flowers and deliver helpful information about them.

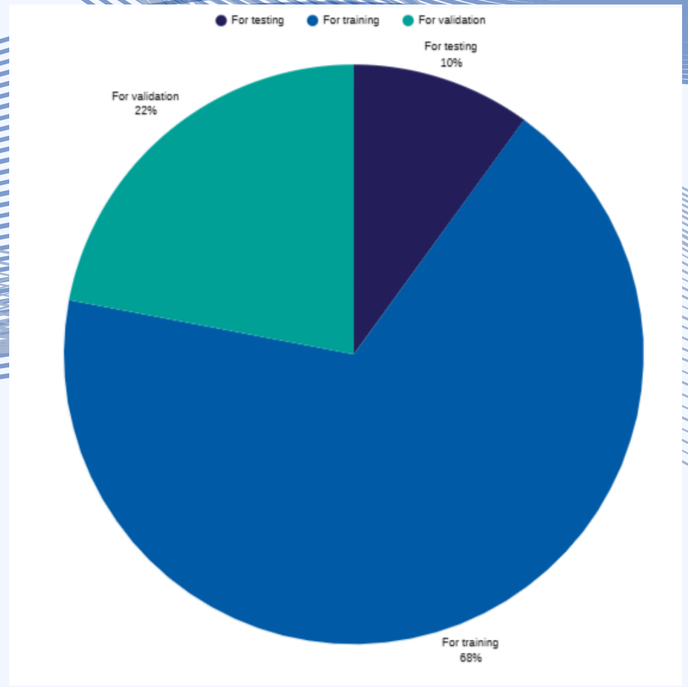
MODEL AND DATASET

For the flower recognition model, a dataset with images of various flower species was used, available on the Roboflow platform. This dataset includes images of 23 different flower types, enabling the model to train on a diverse set of samples and achieve high accuracy in real-world conditions.

The model is trained based on the MobileNetV2 architecture for efficient real-time operation with limited computational resources. During training, the model uses flower images resized to 128x128 pixels, balancing speed and prediction accuracy.

The dataset includes not only images but also class labels for each flower, making it suitable for image classification tasks. This allows the system to accurately identify the plant species and provide users with useful care recommendations.





TECHNOLOGIES USED

The Flower Recognition Application integrates a variety of powerful technologies to provide accurate, real-time plant identification and care tips:

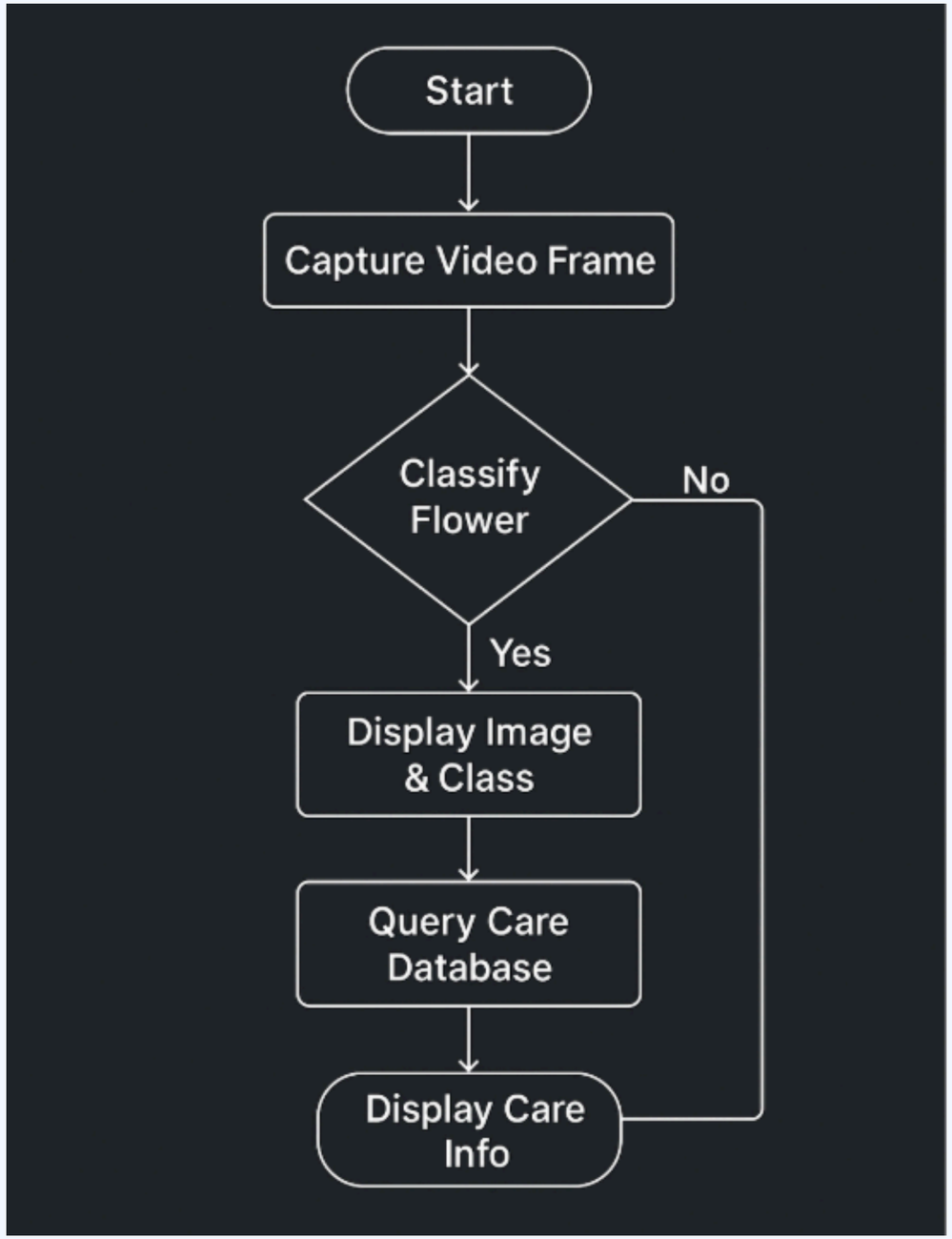
- Python: The core programming language for developing the application and integrating the different modules.
- PyQt5: Used for building the graphical user interface (GUI), ensuring a smooth and responsive experience for the user.

- OpenCV: Employed for real-time image processing, capturing video feed, and preparing images for model predictions.
- TensorFlow: A deep learning framework used to train and deploy the MobileNetV2 model, which enables the flower classification based on image data.

- SQLite: A lightweight database used for storing and managing plant care information, allowing users to add and retrieve care tips for various plants.
- pyttsx3: A text-to-speech engine used to provide voice feedback to the user, offering spoken plant identification and care instructions.
- Web Browser Integration: The application also allows users to open Wikipedia links for more detailed plant information via integrated web browser calls.

METHODOLOGY

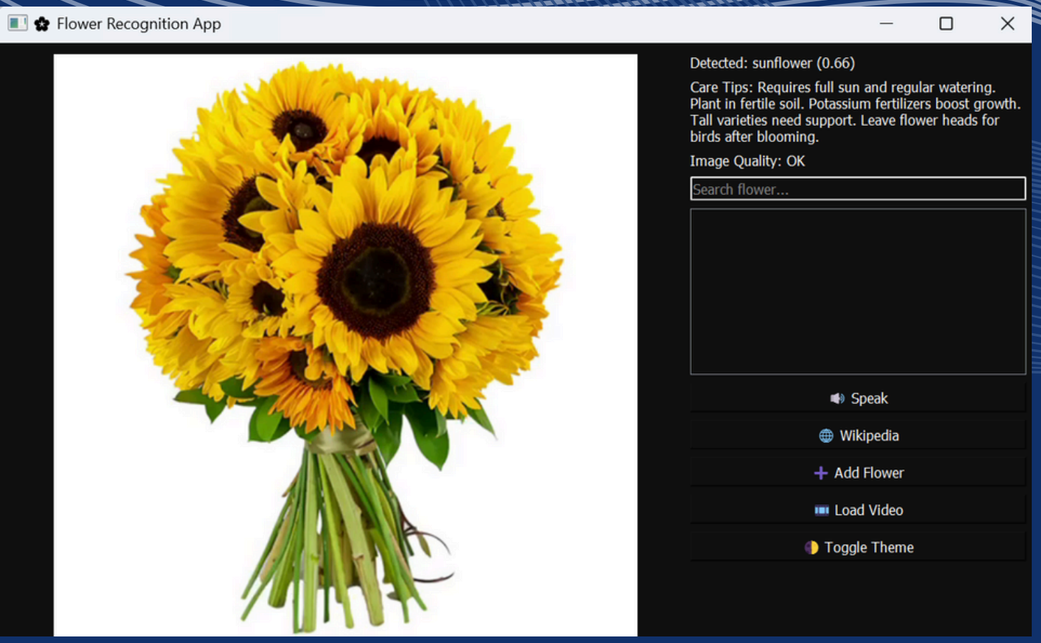
The methodology is based on a clear and structured approach to building the Flower Recognition App. First, a dataset of flower images was collected from Roboflow. These images were preprocessed by resizing, cleaning, and applying data augmentation to improve model performance. Next, we used a pre-trained MobileNetV2 model and fine-tuned it to recognize various flower types. The trained model was then integrated into a desktop application developed using PyQt5. The application captures real-time video from a webcam, identifies the flower, and displays its name along with care tips from an SQLite database. Users can also search for flowers or add new ones manually. Additional features like voice feedback, Wikipedia integration, light/dark themes, and image quality detection were added to enhance user experience and make the app more helpful and interactive.

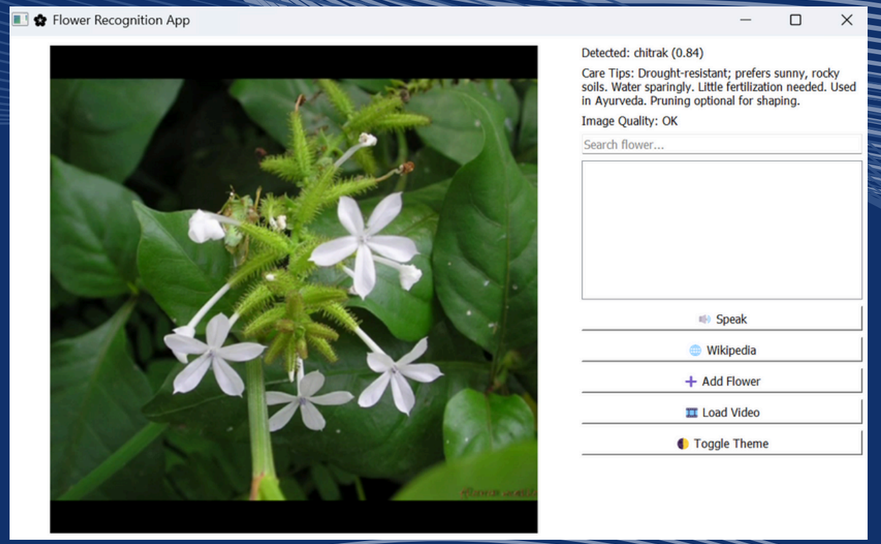


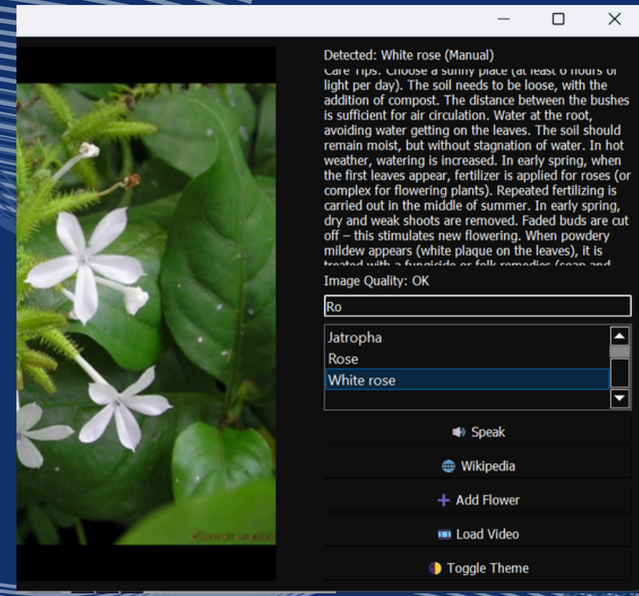
KEY FEATURES

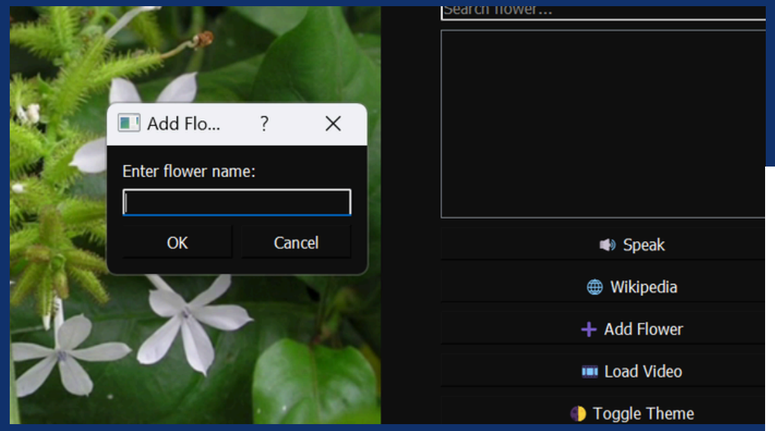
Feature	Description
💐 Real-Time Recognition	Detects flowers instantly using a webcam and a trained MobileNetV2 model.
🔊 Voice Feedback	Speaks the flower name aloud for a more interactive experience.
📚 Care Tips from Database	Shows personalized care advice from an internal SQLite database.
🌐 Wikipedia Integration	Opens the flower's Wikipedia page for extra information.
🌙 Light/Dark Theme	Lets the user switch between light and dark mode.
🖼️ Image Quality Detection	Alerts the user if the image is too blurry for recognition.
➕ Add Custom Flowers	Users can add their own flowers and care instructions.
🔍 Search Function	Quickly find flowers with case-insensitive and partial name matching.

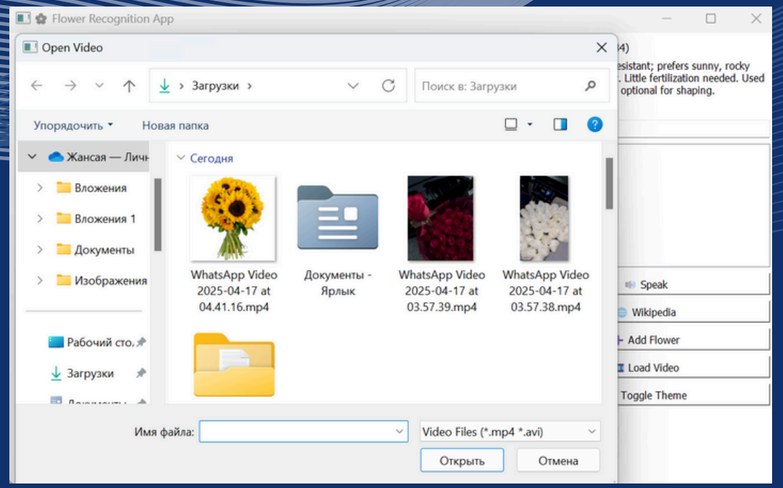
APPLICATION SHOWCASE











CONCLUSION

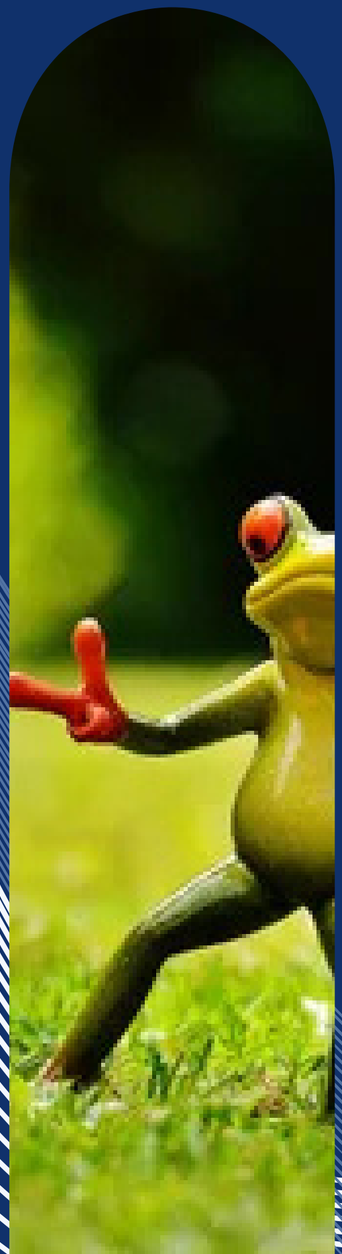
The flower recognition application demonstrates the practical integration of computer vision and deep learning technologies in everyday tasks. By using a pre-trained MobileNet model, the app can accurately identify various types of flowers in real time through a webcam or uploaded image. It not only displays the name of the flower but also provides detailed care tips retrieved from a local database.

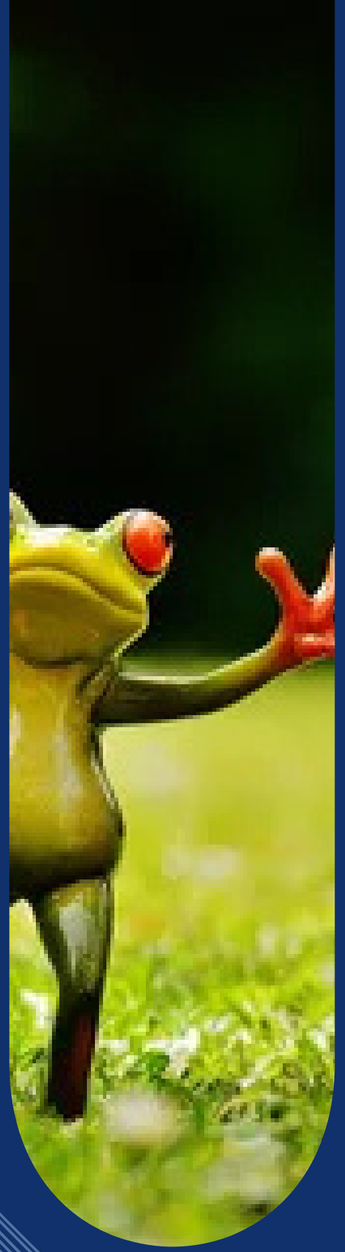
The app enhances the user experience with extra features such as voice feedback, blurry image detection, dark/light theme switching, and a built-in search system with partial and case-insensitive matching. It also allows users to add their own custom flower data, making it adaptable and expandable.

Thus, this project shows how artificial intelligence can be applied in user-friendly and educational tools, helping users to learn more about plants while promoting interest in technology and nature.

REFERENCES

1. Brownlee, J. (2019). Deep Learning for Computer Vision. Machine Learning Mastery.
2. Chollet, F. (2017). Deep Learning with Python. Manning Publications.
3. TensorFlow Documentation. (n.d.). Retrieved from: For your attention
4. OpenCV Documentation. (n.d.). Retrieved from: For your attention
5. Roboflow Dataset – Flower Classification. (n.d.). Retrieved from: For your attention
6. SQLite Documentation. (n.d.). Retrieved from: For your attention
7. Wikipedia. (n.d.). List of Flowering Plants. Retrieved from: For your attention
8.





THANK YOU

FOR YOUR ATTENTION