

FACE RECOGNITION SYSTEM

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CONTENT

01

Introduction

02

Project Overview

03

Technical Phases

04

Conclusion

INTRODUCTION

This project builds a robust facial recognition system in 3 phases:

1. Face Detection

2. Embedding Generation

3. Classifier Training

Our goal: accurate and efficient face recognition system with a Streamlit app.

02 PROJECT OVERVIEW

FACIAL RECOGNITION GOALS

- Design a face recognition system that balances accuracy, speed, and scalability.
- Improve identification in real-world conditions.
- Test multiple models and deploy the best.
- Make it interactive for users via an app.

PROJECT STRUCTURE

- The project is organized into three main phases:

Phase 1: Face Detection using HAAR cascade algorithms

Phase 2: Embedding Generation through the VGG16 model

Phase 3: Classifier Training to identify faces accurately

- Each phase builds on the last for a coherent and progress.

03 TECHNICAL PHASES

PHASE 1: FACE DETECTION

In this phase, face detection is achieved using :

- HAAR Cascade Classifier from OpenCV.
- Preprocessing: normalize and resize images to 160x160 for consistency.
- Saving detected faces for later use.

PHASE 2: EMBEDDING GENERATION

Face embeddings are generated using the VGG16 model, a deep learning architecture pretrained on ImageNet.

This phase focuses on converting detected facial images into numerical representations. These embeddings capture essential facial features crucial for accurate identification.

PHASE 3: CLASSIFIER TRAINING

This phase involves training various machine learning classifiers, including SVM, KNN, and Random Forest, on the generated face embeddings.

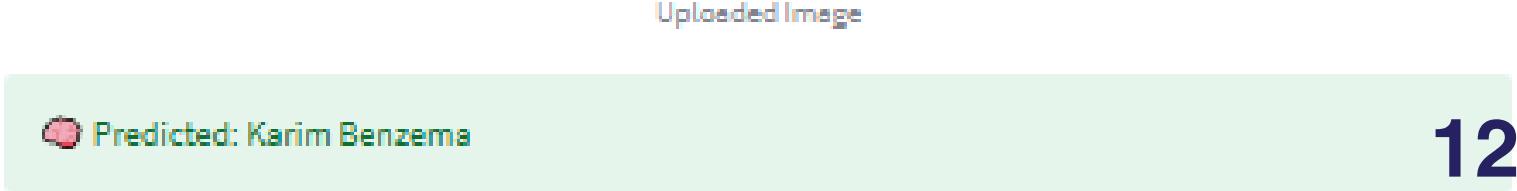
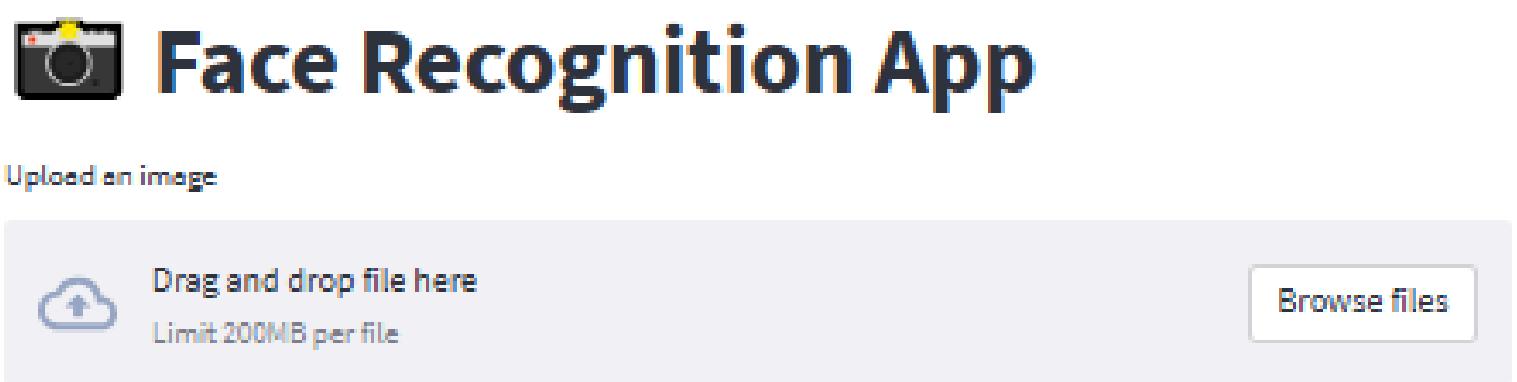
The selection of algorithms is based on their performance metrics, ensuring the highest accuracy and efficiency in recognizing faces.

CLASSIFIER RESULTS

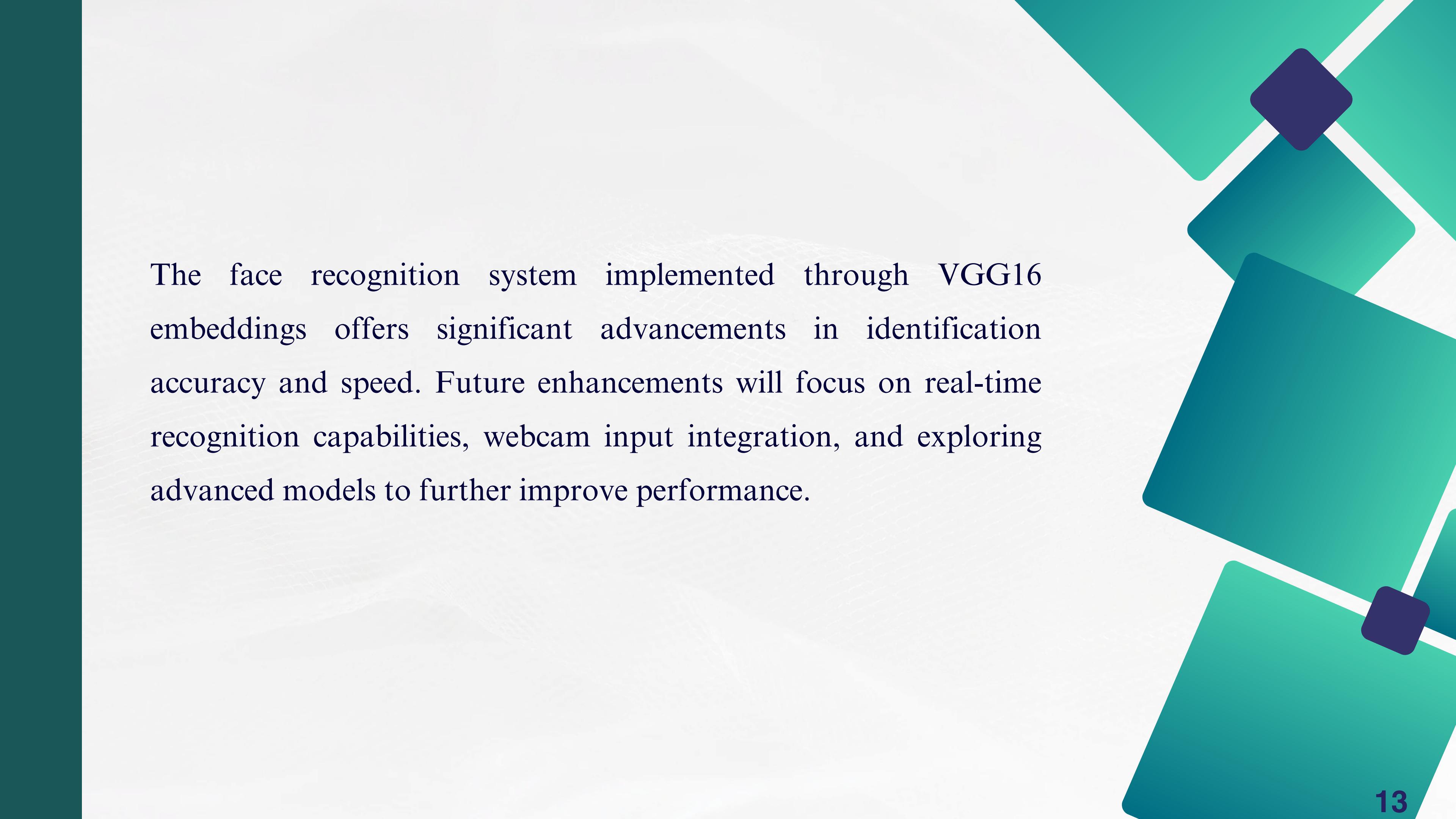
- The dataset is about a 160 pictures of 4 football players that splits into :
- Train embeddings:** 120 samples
- Test embeddings:** 40 samples
- Best Model:** SVM with 97% accuracy
- Saved embeddings and classifier for deployment

STREAMLIT APP

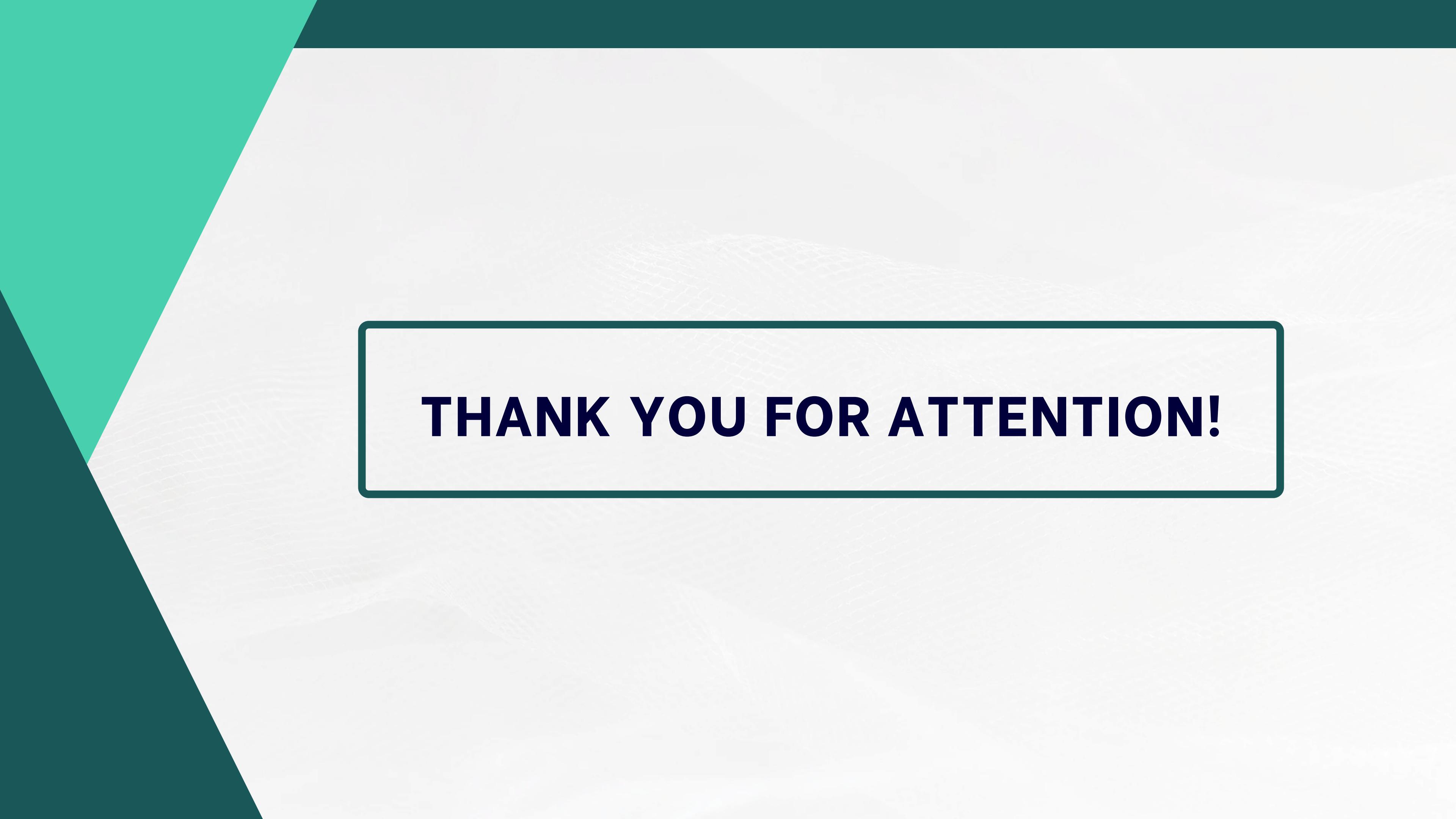
The developed Streamlit app facilitates easy access to the facial recognition system. It showcases the model's performance and accuracy metrics, demonstrating successful implementation using technologies such as Python, OpenCV, Keras, and Scikit-learn.



04 CONCLUSION



The face recognition system implemented through VGG16 embeddings offers significant advancements in identification accuracy and speed. Future enhancements will focus on real-time recognition capabilities, webcam input integration, and exploring advanced models to further improve performance.



THANK YOU FOR ATTENTION!