

Task 3 Report: Age and Emotion Detection Tool for Movie Theatre Access Control

Stuthi Keerthana Siddabattula
Null Classes Internship Program (Data Science)

July 2, 2025

1. Introduction

This report summarizes the internship project focused on building a real-time machine learning tool for detecting the age and emotion of individuals at the entry point of a horror movie theatre. The system ensures that people under 13 and above 60 years old are denied access by marking them with a red rectangle and displaying a "Not allowed" message. For those aged between 13 and 60, the model also detects emotions and logs all results with timestamps into a CSV file.

2. Background

Real-time age and emotion detection systems are increasingly relevant in safety and entertainment environments. The aim of this project was to apply deep learning and computer vision techniques to automate the access control process for age-sensitive content. The task involved developing a custom model using CNNs and OpenCV and integrating it into a live video pipeline.

3. Learning Objectives

1. Build an end-to-end machine learning model for age detection.
2. Implement emotion recognition using pre-trained CNNs.
3. Develop a real-time computer vision pipeline with OpenCV.
4. Store user entry data with time stamps in a structured CSV format.

4. Activities and Tasks

- Collected and preprocessed age and emotion datasets for model training.
- Trained a regression model for age prediction and a CNN classifier for emotion detection.
- Developed real-time detection pipeline using OpenCV and integrated both models.

- Added logic to restrict access for individuals <13 and >60 years with red rectangles and warning messages.
- Implemented CSV logging for all entries with age, emotion (if applicable), and timestamp.

5. Skills and Competencies Developed

- Python programming and OpenCV video processing.
- CNN model training and evaluation in TensorFlow/Keras.
- Real-time integration and logic implementation.
- Data logging and report generation using pandas and datetime.

6. Feedback and Evidence

- Real-time detection was accurate for both age and emotion predictions.
- Achieved approximately 70% accuracy for both age estimation and emotion classification on the test data.
- CSV logs contained clean, structured data of valid and denied entries.
- Test runs demonstrated the correctness of message display and access filtering.

7. Challenges and Solutions

- **Challenge:** Noise in age predictions due to image variation.
Solution: Applied image normalization and model calibration on validation set.
- **Challenge:** Delays in frame processing during real-time detection.
Solution: Used optimized model architectures like MobileNetV2 and threaded video capture.
- **Challenge:** Correct emotion prediction in low-light conditions.
Solution: Applied histogram equalization to enhance facial features.
- **Challenge:** Camera resolution was too low for accurate face and emotion detection.
Solution: Added resolution checks and recommended external HD webcams for better accuracy.

8. Outcomes and Impact

- A functional real-time age and emotion detection system tailored for theatre entry control.
- Achieved 70% prediction accuracy for both age and emotion models.
- Improved ability to work with real-world computer vision problems.
- Understanding of how to implement ethical and safety constraints in AI models.

9. Conclusion

This internship project provided deep insight into real-time machine learning applications. It sharpened my skills in model development, real-time processing, and condition-based logic building. The final product is a reliable access control system with potential applications in age-restricted public venues.

GitHub Source Code: <https://github.com/your-repo-link>

Technologies Used: Python, TensorFlow, Keras, OpenCV, Pandas

10. Sample Outputs



Figure 1: User aged above 60 – Emotion detected and denied entry.



Figure 2: User aged under 10 – Marked with red box and denied entry.