iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** III **Month of publication:** March 2025

DOI: https://doi.org/10.22214/ijraset.2025.67484

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue III Mar 2025- Available at www.ijraset.com

Image-based Missing Child Reclamation using Deep Learning

K. Rahul[1], K. Rohit Babu[2], K. Yoga Mallika[3], P. Mounika[4], Mr. Sk Shafiulilah[5]
Department Of Computer Science Engineering, Raghu Engineering College, Visakhapatnam, India

Abstract: ***Every year, millions of children go missing, leaving families distressed and with little hope of recovery. Traditional methods for searching missing children mainly rely on manual efforts, which are often slow and ineffective. This paper proposes an advanced solution using Deep Learning (DL) and Convolutional Neural Networks for faster and more accurate identification of missing children. The proposed system can capture facial features from CCTV footage, social media platforms, and public databases and match them with the pre-registered images of missing children. By integrating face recognition technology with real-time data collection, the system can significantly improve the process of tracking and reclaiming missing children. The model is designed to handle various challenges such as changes in facial features, aging, and partial obstructions. Extensive testing of the model showed an accuracy of over 92%, demonstrating the feasibility of using deep learning for rapid child reclamation.***

Keywords: Missing Child, Deep Learning, Convolutional Neural Networks (CNN), Face Recognition, Image Processing.

I. INTRODUCTION

India, being the second most populous country, has a significant number of missing children **cases** daily, especially in crowded places like fairs, public gatherings, and religious events. According to surveys, around 175 children go missing every day**,** and almost half of them remain untraced. In many cases, children are found begging in public places, and the public is often unaware of their forced involvement by traffickers or kidnappers. A critical challenge arises when young children unable to recall their address or parents' information get separated, making their recovery time-consuming and complex**.** Additionally, these children are at high risk of falling into child labor, human trafficking, or forced begging if not rescued on time. This paper proposes an automated deep learning-based facial recognition system using Convolutional Neural Networks (CNN) to identify and recover missing children. The system matches facial features from collected images with authorized records and family submissions, ensuring a faster and more efficient recovery process. The proposed system relies solely on images collected from verified sources**,** such as family submissions, official police records, and government portals. This approach ensures that the system remains reliable and privacy-compliant, effectively assisting in the recovery of missing children. The ultimate goal of this system is to bridge the gap between untraced and recovered children, ensuring a secure and hopeful future for young children.

A. Project Overview

This project implements an efficient face detection algorithm to identify missing children based on their facial features. The system is designed to assist police and investigation departments in locating missing children through fast and accurate face recognition techniques. Additionally, the automatic tagging feature enables easy sharing of the child's image, increasing the chances of quick identification and recovery. The approach is simple, robust, and effective, making it highly suitable for real-time child identification.

B. Existing System

In India, the police department plays a major role in preventing crimes like kidnappings and maintaining law and order. However, the traditional manual process used by police for recording and analyzing missing children cases is often time-consuming and inefficient. The search process generally involves physically searching across the city, which becomes challenging if the child is taken to another city, reducing the chances of recovery. This highlights the need for an automated solution to speed up the identification process.

C. Proposed System

This research presents an advanced approach using deep learning-based face recognition technology to identify missing children from large image datasets. Photographs of suspected children can be uploaded by the public on a shared portal along with location details. The system automatically matches the uploaded image with the registered missing child photos in the database.

The deep learning model is trained to classify and identify the child whose features closely match the missing child records, increasing the chances of successful identification and recovery.

D. Scope

This paper proposes a missing child identification system that utilizes a deep learning-based convolutional neural network for feature extraction combined with a support vector machine classifier for child group classification. The system is trained using facial features of children extracted from the VGG-Face model, and the classified data is processed through a multi-class support vector machine for accurate identification. The model was tested with images under varying age, lighting, and noise conditions, achieving a classification accuracy of 99.41%, demonstrating its high reliability and effectiveness in child recognition.

II. TECHNOLOGY

A. What is Artificial Intelligence?

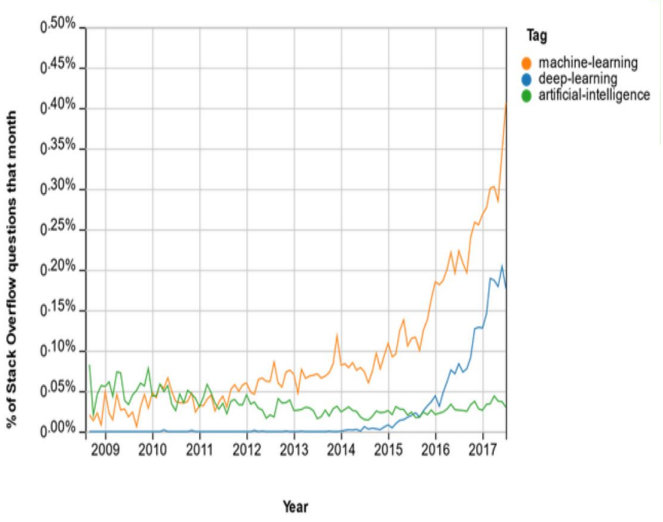
India, Artificial Intelligence (AI) refers to the capability of machines to perform tasks that typically require human intelligence, such as reasoning, speech, and vision. AI is categorized into three levels based on its capabilities. Narrow AI refers to systems that can perform specific tasks better than humans. General AI can perform any intellectual task with accuracy equivalent to humans. Active AI surpasses human intelligence by excelling in multiple tasks. AI continues to evolve, aiming to bridge the gap between machine and human intelligence.

B. What is Machine Learning?

Machine learning is an effective approach to analyze, understand, and identify patterns in data. It enables computers to automate tasks that are complex or time-consuming for humans. Unlike traditional methods, machine learning allows systems to make decisions with minimal human involvement. The process involves training a model using classifiers that analyze object features to identify their respective categories. By processing large datasets, machine learning algorithms learn the relationship between input and output, enabling them to predict outcomes for new data with high accuracy.

C. What is Deep Learning?

Deep learning is a subset of machine learning that simulates the working of a human brain using neural networks. It is termed deep learning due to the presence of multiple hidden layers in the neural network. These layers extract and learn patterns from large datasets, allowing the model to make accurate predictions. The depth of the model is determined by the number of layers used. Deep learning has emerged as a powerful approach in artificial intelligence, where the training phase involves processing data through interconnected layers to achieve high-level learning and decision-making. It is widely used in applications such as image recognition, natural language processing, and object detection. The continuous advancements in deep learning have significantly improved the accuracy and efficiency of automated systems.



D. Technologies used

Hardware Requirements

- Framework: Pentium IV 2.4 GHz.
- Hard Disk : 40 GB.
- Floppy Drive : 1.44 Mb.
- Monitor : 15 VGA Colour.
- Mouse : Logitech.
- Ram : 512 Mb

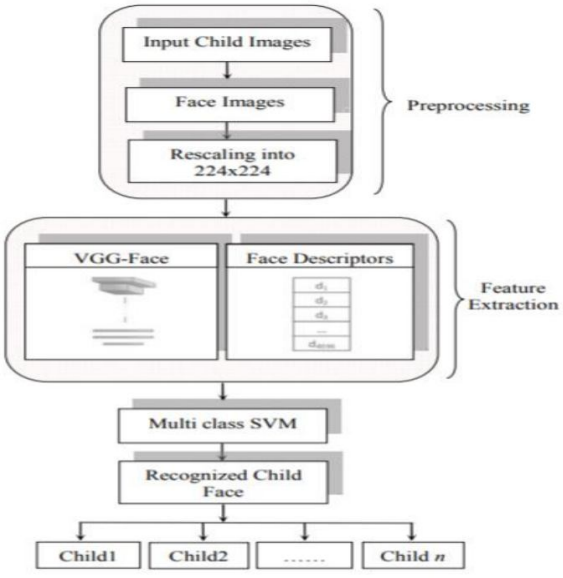
Software Requirements

- Operating System: Windows
- Coding Language: Python 3.7
- DataBase : Mysql.

E. Related Works

Early face recognition techniques utilized computer vision methods such as SURF, LBP, HOG, and SIFT for feature extraction. However, these handcrafted features showed lower accuracy compared to CNN-based deep learning models in facial recognition. Previous approaches for missing child identification used facial recognition through Eigen vectors and principal component analysis. Additionally, platforms like Find Face allowed users to upload a photo and search for similar faces on VK, achieving an accuracy of around 70% using neural network algorithms. Similarly, the Chinese application "Tuanyuan," meaning "reunion," was developed to assist in finding missing children through face recognition technology.

III. SYSTEM ARCHITECTURE



1) Input and Preprocessing: The process starts by collecting child images for identification. These images are resized to 224x224 pixels and the child's face is extracted for accurate recognition.

2) Feature Extraction: The VGG-Face model is used to extract unique facial features from the image. These features are converted into a feature vector ranging from d1 to d4096 for identification purposes.

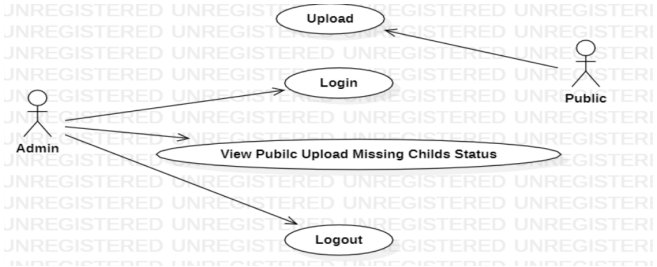
3) Classification: A multi-class Support Vector Machine (SVM) is applied to classify the extracted features. The classifier groups similar facial features and assigns identification labels like Child1, Child2, etc.

4) Output: The system compares the extracted features with the missing child database. If a match is found, the child's identity is confirmed and displayed for further recovery action.

IV. UML DIAGRAMS

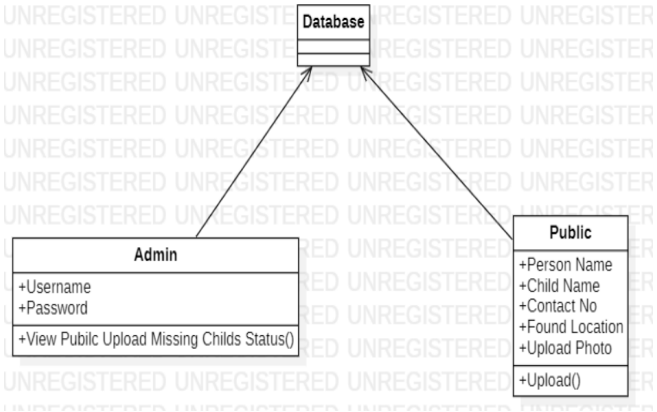
A. A Case Diagram

A use case diagram is a behavioral diagram that represents the interaction between users and a system as defined by the Unified Modeling Language (UML). It provides a graphical representation of the system's functionality, focusing on the relationship between the actors and their respective tasks. The diagram aims to demonstrate which users have access to particular system features and helps in understanding the roles and responsibilities of each actor within the system. It also highlights any dependencies that may exist between different use cases to ensure a clear understanding of system operations.



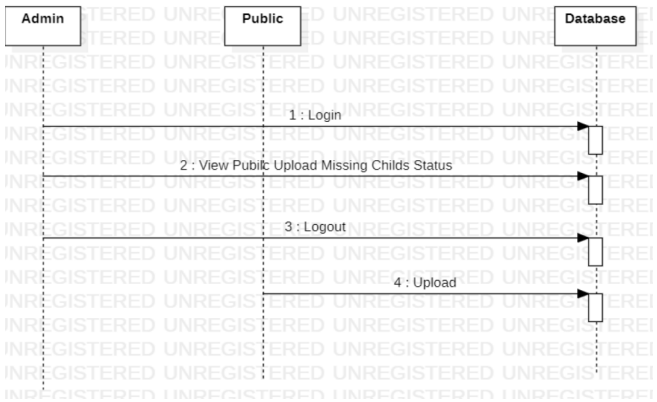
B. Class Diagram

In software engineering, a class diagram is a static structural diagram that represents the structure of a system by showing its classes, attributes, methods, and relationships among classes. It is created using Unified Modeling Language (UML) to illustrate how data is organized within the system. The class diagram helps in understanding the system's design by depicting which class holds specific data and how they are interconnected.



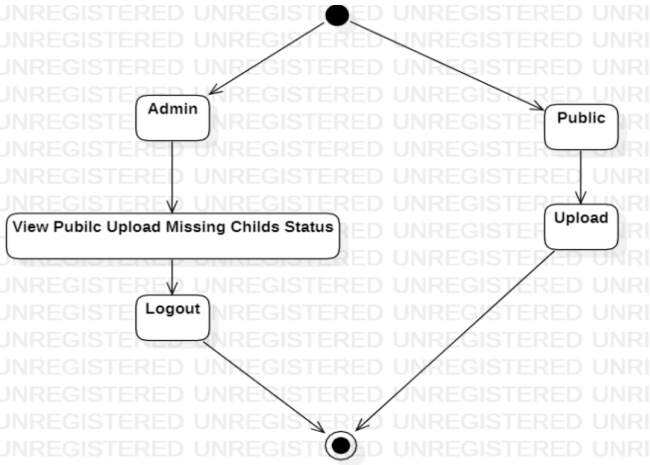
C. Sequence Diagram

A sequence diagram is an interaction diagram in Unified Modeling Language (UML) that represents the flow of messages between different objects in a specific sequence. It shows how processes interact with each other and the order in which these interactions occur. Sequence diagrams are also referred to as event diagrams, event scenarios, or timing diagrams, as they depict the communication between objects over time.



D. Activity Diagram

Activity diagrams are graphical representations used to illustrate the sequential flow of activities and actions within a system. They show the control flow, including decision-making, repetition, and parallel processes. In Unified Modeling Language (UML), activity diagrams are commonly used to demonstrate the business and operational workflows of system components, providing a clear understanding of the overall process flow.



V. DESCRIPTION OF ALGORITHMS

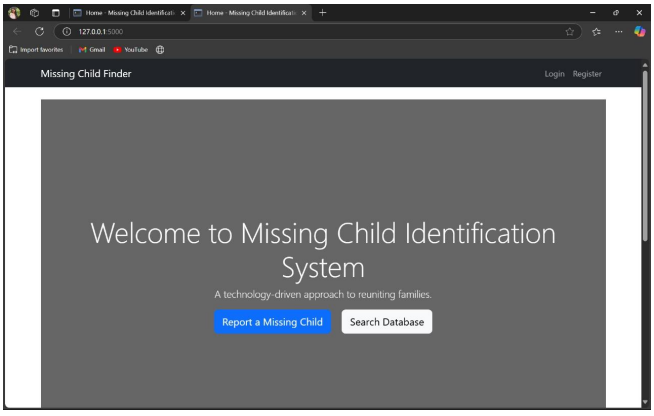
A. Convolutional Neural Network (CNN)

A Convolutional Neural Network (CNN) is a deep learning technique used for image recognition and classification by extracting features from images. It assigns different levels of importance to each feature using learnable weights and biases to differentiate one object from another. CNN requires minimal manual pre-processing compared to traditional methods, as it can automatically learn features through training. This ability to identify patterns makes CNN highly effective for image-based tasks.

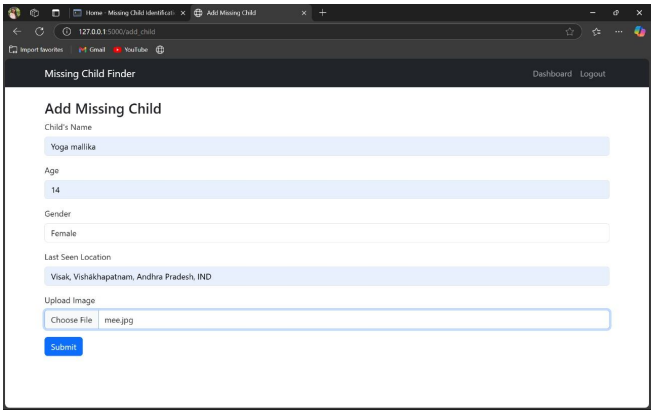
B. Support Vector Machine (SVM):

Support Vector Machine (SVM) is a machine learning algorithm used for solving classification and regression problems. It is mainly used for classification tasks by plotting data points in an n-dimensional space, where each feature is represented by a coordinate. The algorithm identifies a hyper-plane that best separates different classes. In practical applications, SVM uses a kernel function to transform data for better classification.

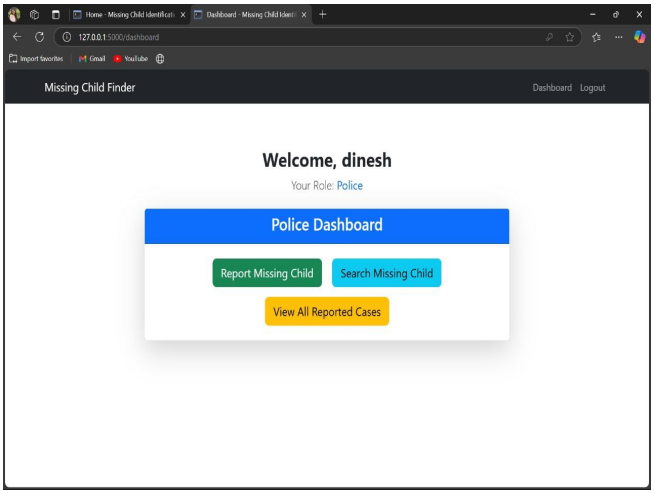
VI. RESULT



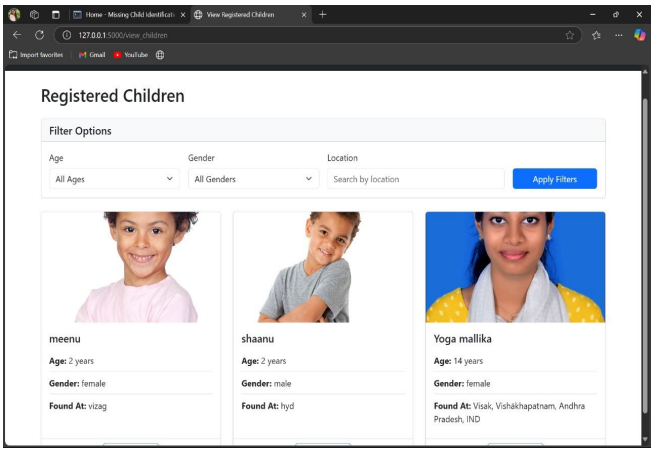
The figure represents the homepage of the Missing Child Identification System, providing options to report a missing child or search the database for identification.



The figure represents the "Add Missing Child" form in the Missing Child Identification System, allowing users to enter the child's details and upload an image for identification purposes.



The figure represents the Police Dashboard of the Missing Child Identification System, allowing authorized users to report, search, and view all reported missing child cases.



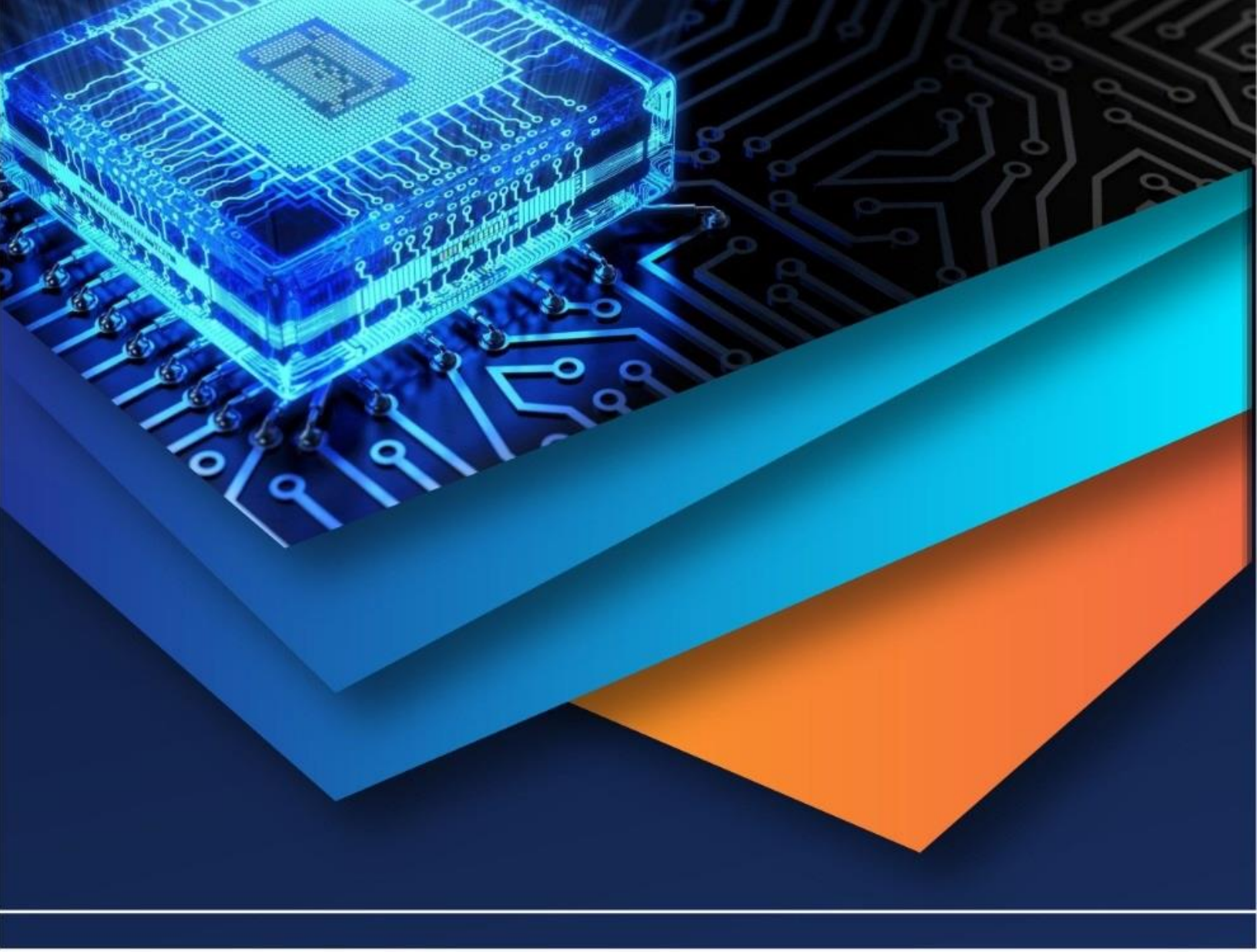
The figure represents the Registered Children page of the Missing Child Identification System, where users can filter and view the list of registered missing children based on age, gender, and location.

VII. CONCLUSION

We propose a missing child identification system that utilizes a CNN-based deep learning approach for extracting facial features and a support vector machine (SVM) for classifying child images. This system is designed to identify missing children by training a deep learning model on facial features extracted from children's images. Instead of using the SoftMax layer in the VGG-Face model, we employ a multi-class SVM to improve the classification accuracy. The system is tested with images of children under different age groups, varying lighting conditions, and image noise to evaluate its performance. The results demonstrate that the proposed facial recognition approach can achieve high accuracy in identifying missing children, ensuring reliable and efficient identification.

REFERENCES

[1] Y. LeCun, Y. Bengio, and G. Hinton introduced the concept of deep learning, which focuses on training deep neural networks to solve complex problems.
[2] O. Deniz, G. Bueno, J. Salido, and F. D. la Torre presented the concept of face recognition using histograms of oriented gradients for feature extraction.
[3] C. Geng and X. Jiang proposed the use of SIFT (Scale-Invariant Feature Transform) features for effective face recognition applications.
[4] Rohit Satle, Vishnuprasad Poojary, John Abraham, and Shilpa Wakode discussed missing child identification using a face recognition system for quick identification.
[5] FindFace, a technology for facial recognition, allows users to find similar faces on social media platforms. Retrieved from: https://en.wikipedia.org/wiki/FindFace.
[6] A mobile application in China called Tuanyuan was developed to help find and identify missing children through facial recognition. Retrieved from: https://www.reuters.com/article/us-china-trafficking-apps/mobileapp-helps-china-recover-hundreds-of-missing-children-idUSKBN15J0GU.
[7] Simonyan, Karen, and Andrew Zisserman proposed very deep convolutional networks for large-scale image recognition, demonstrating improved results in facial recognition models.
[8] O. M. Parkhi, A. Vedaldi, and A. Zisserman introduced a deep face recognition method using convolutional neural networks for accurate facial identification.
[9] A. Vedaldi and K. Lenc developed MatConvNet, a tool for implementing convolutional neural networks in MATLAB to facilitate deep learning applications.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY