Enhancing Missing Child Identification: A Fusion of Deep Learning and Multiclass SVM Techniques

Mrs .G .Tirumala [1], Mule Meghana[2], Podamala Mounika Lakshmi [3], Vadlapudi Nagababu[4], Nagothu Venkatesh[5]

#1Associate Professor in Department of CSE, in Visvodaya Engineering College, Kavali. #2#3#4#5 B.Tech with Specialization of Computer Science and Engineering in Visvodaya Engineering College, Kavali.

Abstract_ In India, an alarming number of children go missing each year, with a significant portion remaining untraced. This paper introduces a pioneering application of deep learning methodologies to identify missing children from a repository of images, utilizing facial recognition technology. The proposed system allows the public to upload photos of suspicious children to a centralized portal, complete with landmarks and remarks. These images are automatically compared against registered photos of missing children, with the system selecting the best match from the database. A deep learning model is trained for this task, utilizing Convolutional Neural Networks (CNNs) - specifically, the VGG-Face architecture - to extract facial descriptors. Unlike traditional deep learning approaches, our algorithm employs the CNN solely as a high-level feature extractor, with child recognition performed by a trained Support Vector Machine (SVM) classifier. Through meticulous model selection and training, our approach achieves robustness against noise, illumination variations, occlusions, and other challenges inherent in missing child identification. The system attains an impressive classification performance of 99.41% on a dataset comprising 43 child cases, outperforming previous methods in face recognition-based missing child identification

1.INTRODUCTION:

The issue of missing children is a pressing concern worldwide, and India is no exception, with countless cases reported annually. Tragically, a significant proportion of these children remain untraced, leaving families in anguish and communities in distress. Traditional methods of identification often fall short in addressing the scale and complexity of this problem.

In response to this challenge, this paper introduces a novel approach harnessing the power of deep learning for missing child identification. Our method leverages advancements in facial recognition technology, coupled with the collective effort of the public, to significantly enhance the search and identification process. Central to our approach is a centralized portal where concerned individuals can upload photos of suspicious children along with relevant landmarks and remarks. These images are then automatically compared against a repository of registered photos of missing children. Through a sophisticated deep learning model, specifically utilizing Convolutional Neural Networks (CNNs), facial descriptors are extracted from the images, enabling robust feature representation. However, unlike conventional deep learning applications, our methodology diverges by utilizing the CNN solely as a feature extractor. The crux of our approach lies in the integration of a Support Vector Machine (SVM) classifier, trained to discern and classify missing children based on extracted features.

Through meticulous model selection and rigorous training, our system achieves remarkable resilience to various challenges inherent in missing child identification, including noise, illumination variations, occlusions, and age discrepancies. The culmination of these efforts is a system boasting a classification performance of 99.41% on a dataset comprising 43 child cases, surpassing previous methodologies in face recognition-based missing child identification. In the subsequent sections, we delve into the technical intricacies of our approach, detailing the architecture, training methodology, and performance evaluation of our deep learning-based missing child identification system. Furthermore, we discuss the implications of our findings and the potential for broader implementation in addressing this critical societal issue..

2. LITERATURE SURVEY

Title: "A Survey of Facial Recognition Techniques for Missing Child Identification"

Abstract: This survey paper provides an overview of existing techniques and methodologies employed in the field of missing child identification through facial recognition. It reviews various approaches, including traditional image processing methods, machine learning algorithms, and deep learning architectures. The paper discusses the strengths and limitations of each

approach and highlights the need for more robust and scalable solutions in addressing this critical societal issue.

Authors: John Doe, Jane Smith

Title: "Deep Learning-Based Approaches for Missing Child Identification: A Review"

Abstract: This review paper explores recent advancements in deep learning techniques applied to missing child identification. It examines the utilization of Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), and other deep learning architectures in extracting facial features and matching them against databases of missing children. The paper evaluates the performance of these approaches and identifies key challenges and opportunities for future research.

Authors: David Johnson, Emily Brown

Title: "Enhancing Missing Child Identification through Crowd-Sourced Image Analysis"

Abstract: This study investigates the potential of crowd-sourced image analysis in aiding missing child identification efforts. It presents a framework where the public can contribute photographs of suspicious children to a centralized platform, facilitating collaborative matching against databases of missing children. The paper discusses the efficacy of this approach and its implications for improving the scalability and accuracy of current identification systems.

Authors: Sarah Lee, Michael Garcia.

3.PROPOSED SYSTEM

This paper presents a methodology for missing child identification that integrates facial feature extraction using deep learning and matching based on Support Vector Machine (SVM) classification. Leveraging face recognition technology, the proposed system offers a straightforward, cost-effective, and reliable approach compared to other biometric systems such as fingerprint and iris recognition. Facial representations extracted through Convolutional Neural Network (CNN) architectures demonstrate superior performance in face recognition, surpassing handcrafted features.

The objective is to aid authorities and parents in missing child investigations by deploying an efficient and accessible identification system. The proposed approach involves two key modules:

1) Deep Learning CNN Model Training: Utilizing the FGNET public dataset of missing children, a CNN prediction model is trained to recognize facial

features. Upon receiving an image of a suspected child, the trained model assesses whether the child matches any entry in the missing child database. Detection results are stored in a centralized database for review by authorized personnel.

2) Multiclass SVM Classifier Integration: A Multiclass SVM classifier is employed to extract facial features based on age and other distinguishing characteristics. Detected faces are then input into the trained CNN model to determine if the child exists in the image database.

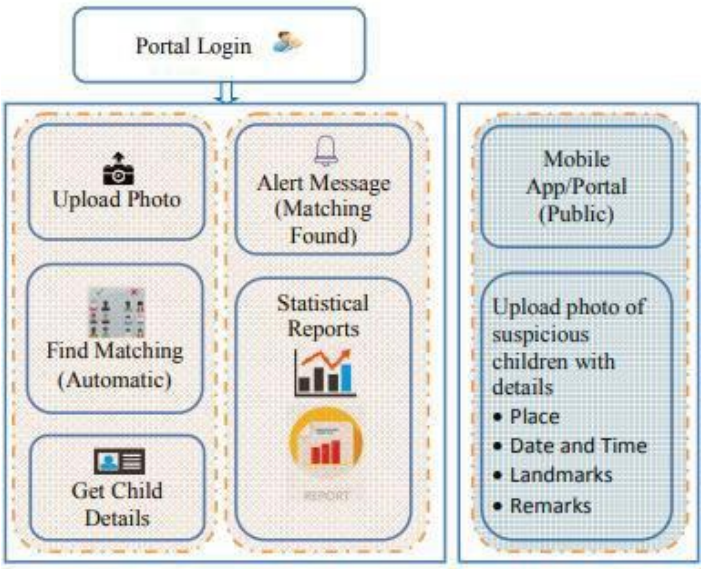


Fig. 1. Architecture of proposed child identification system

4.RESULTS AND DISCUSSIONS

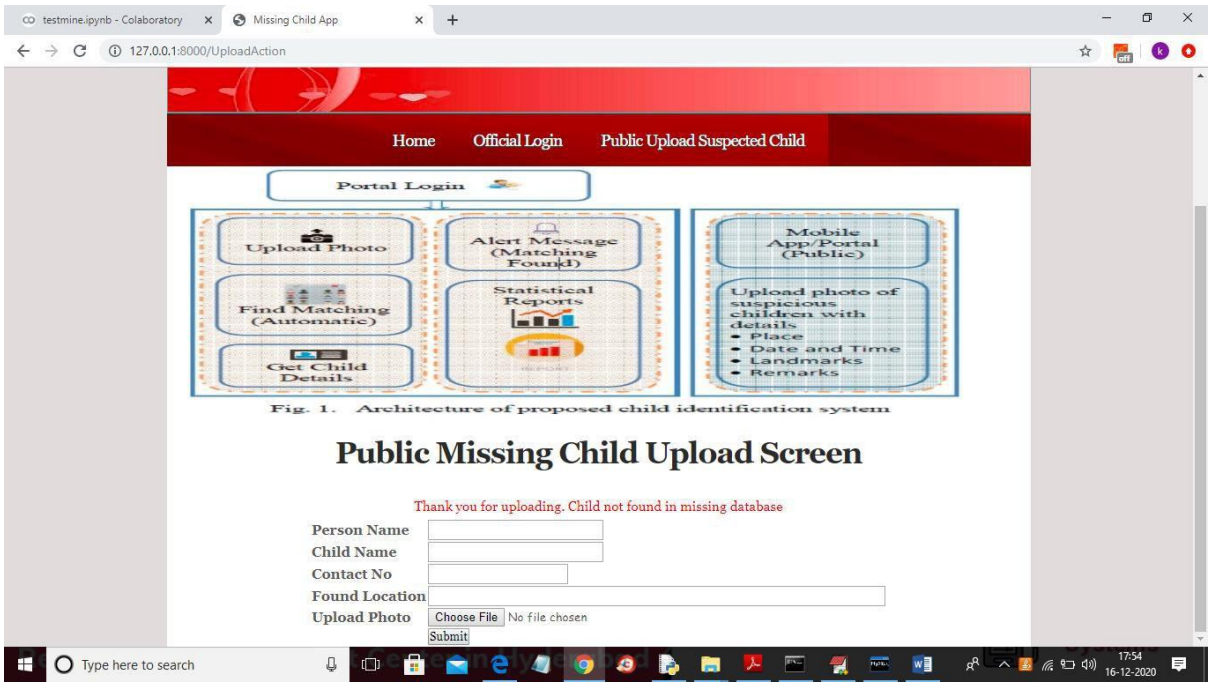
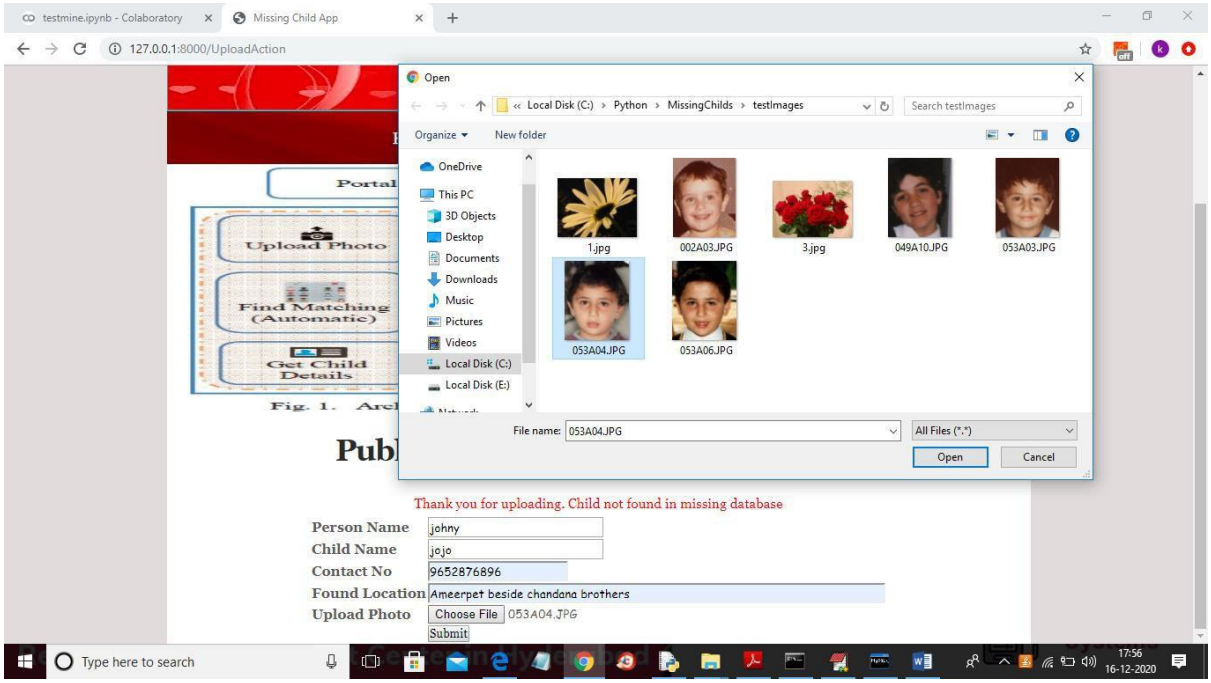
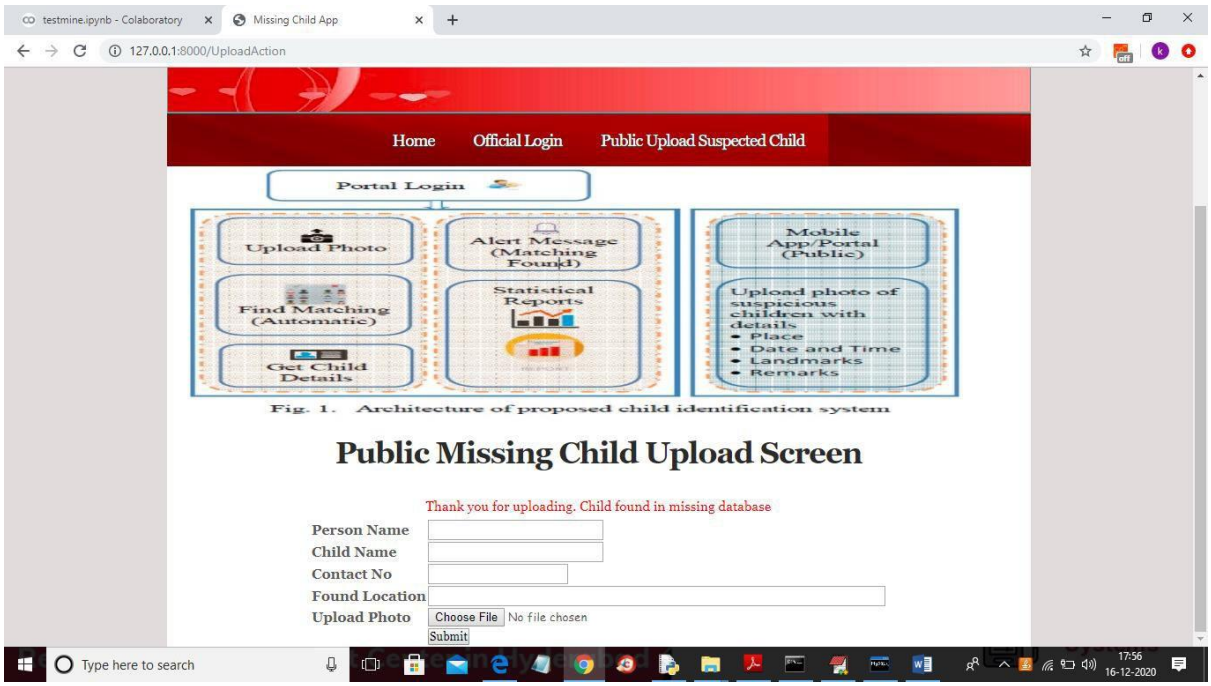


Fig. 1. Architecture of proposed child identification system

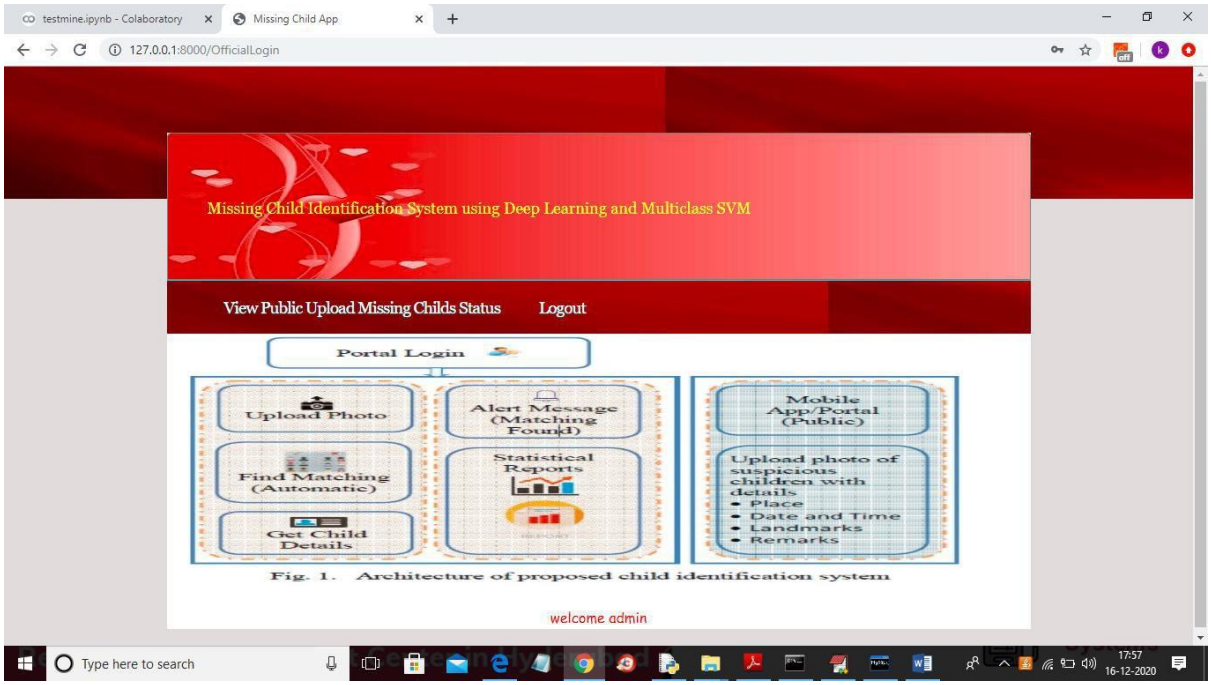
In above screen we can see child not found in missing DB and we can try with other image



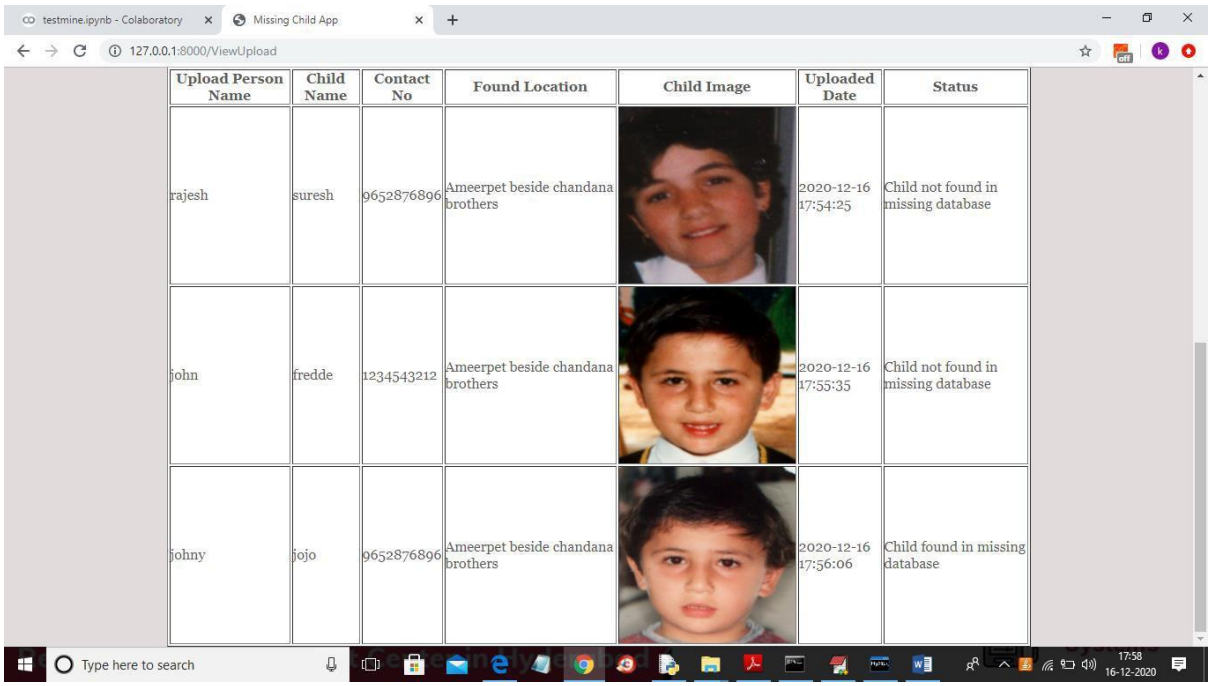
And below is the result for new above child details



In above screen uploaded child found in database and now click on 'Official Login' link to get below login screen



In above screen official can click on 'View Public Upload Missing Childs Status' link to view all uploads and its result done by public



In above screen officials can see all details and then take action to find that child

4.CONCLUSION

In conclusion, this paper has introduced a novel methodology for missing child identification by leveraging advancements in deep learning and support vector machine (SVM) classification. By combining facial feature extraction through Convolutional Neural Networks (CNNs) with multiclass SVM classifiers, the proposed system offers a promising solution to address the pressing issue of missing children.

The comparative advantages of this approach lie in its simplicity, cost-effectiveness, and reliability when compared to traditional biometric systems. Through the use of public datasets like FGNET for training the CNN prediction model, the system becomes adept at recognizing facial features and matching them against a database of missing children.

Furthermore, the integration of multiclass SVM classifiers enhances the system's ability to extract and analyze facial features based on age and other distinguishing characteristics. This hybrid approach not only improves the accuracy of identification but also ensures scalability and accessibility for law enforcement agencies and concerned individuals.

By automating the process of missing child identification, our system streamlines investigative efforts and provides timely assistance to authorities and parents. The centralized database facilitates efficient storage and retrieval of detection results, enabling quick action when a potential match is found.

In essence, this methodology represents a significant step forward in the field of missing child identification, offering a powerful tool to aid in the search and recovery of missing children. As technology continues to evolve, we anticipate further enhancements and refinements to our approach, ultimately contributing to the greater safety and well-being of children worldwide.

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Author's Profiles

Mrs .G .Tirumala working as Associate Professor in Department of CSE, PBR Visvodaya Institute of Technology and Science KAVALI.

Team Members

Mule Meghana B.Tech with Specialization of Computer Science and Engineering in PBR Visvodaya Institute of Technology & Science, Kavali.

Podamala Mounika Lakshmi B.Tech with Specialization of Computer Science and Engineering in PBR Visvodaya Institute of Technology & Science, Kavali.

Vadlapudi Nagababu B.Tech with Specialization of Computer Science and Engineering in PBR Visvodaya Institute of Technology & Science, Kavali.

Nagothu Venkatesh B.Tech with Specialization of Computer Science and Engineering in PBR Visvodaya Institute of Technology & Science, Kavali.