

Original Article

Missing Child Identification System using Deep Learning with VGG-FACE Recognition Technique

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Abstract - In India, countless children are reported missing every year. Among the missing child cases, a large percentage of children remain untraced. The enhancement of missing child identification is the adoption of the child from the remaining children database after a period (like using a pattern matching algorithm or the other) Child welfare Centre is responsible for checking the parent's authenticity. In Adoption customers, after logging in to the parents, registered parents have to fill in the same child details that were filled in the registration form of the parents.

Keywords - Missing child, Adoption, Deep learning model, Upload photographs, Pattern matching algorithm.

1. Introduction

The public can upload photographs of a suspicious child into a common portal with landmarks and remarks. The photo will be automatically compared with the repository's registered photos of the missing child. Classification of the input child image is performed, and the photo with the best match will be selected from the database of missing children. For this, a deep learning model is trained to correctly identify the missing child from the missing child image database provided, using the facial image uploaded by the public.

1.1. Purpose

The usage of Deep Learning algorithms has reduced the need for human labor, such as manual feature extraction and data reconstruction for classification purposes.

1.2. Scope

The proposed (CNN) system combines Convolutional Neural Network with a Support Vector Machine classifier to develop an Application. An application for Intelligent System for Missing Child Adoption using Machine Learning. Thus, to evaluate the performance of the proposed system, several experiments are conducted on our dataset.

1.3. Existing work

Mostly missing child cases are reported to the police. For various reasons, the child missing from one region may be found in another region or another state. So even if a child is found, it is difficult to identify them from the reported missing cases. No Framework to upload and provide child adoption.

1.3.1. Limitations

- But unfortunately, a large number of children go missing every year in India for various reasons,

including abduction or kidnapping, run-away children, trafficked children, and lost children.

- No System for Child Adoption.

1.4. Proposed Work

A New ML Framework which provides Search of Missing Children. The framework provides the adoption of children to needy persons. The framework provides interaction between parents and missing children.

1.4.1. Contributional works

- Comparatively an easy, inexpensive, and reliable method compared to other offline systems.
- Methods for recognition and adoption with ML Features.
- Missing child identification is proposed, which employs principal component analysis.

2. Software Requirement Analysis and Specifications

2.1. Related work

The earliest methods for face recognition commonly used computer vision features such as HOG, LBP, SIFT, or SURF [2-3]. However, features extracted using a CNN network for facial representation perform better face recognition than handcrafted features. In [4], missing child identification is proposed, in which an employee's principal component analysis using Eigenvectors is used for the face recognition system. Find Face is a website that lets users search for members of the social network VK by uploading a photograph [5]. Find Face employs a facial recognition neural network algorithm developed by N-Tech Lab to match faces in the photographs uploaded by its users against faces in photographs published on VK, with a reported accuracy of



70 percent. The “Tuanyuan,” or “reunion” in Chinese, an app developed by Alibaba Group Holding Ltd., helped Chinese authorities recover hundreds of missing children [6]. the app has allowed police officers to share information and work with the public. It consists of a national portal storing details of a missing child along with the photo. Whenever a child

missing is reported, along with the FIR, the concerned officer uploads the missing child's photo into the portal. The public can search for any matching child in the database for the images with them. The system will prompt the most matching cases. Once the matching is found, the officer can get the child's details.

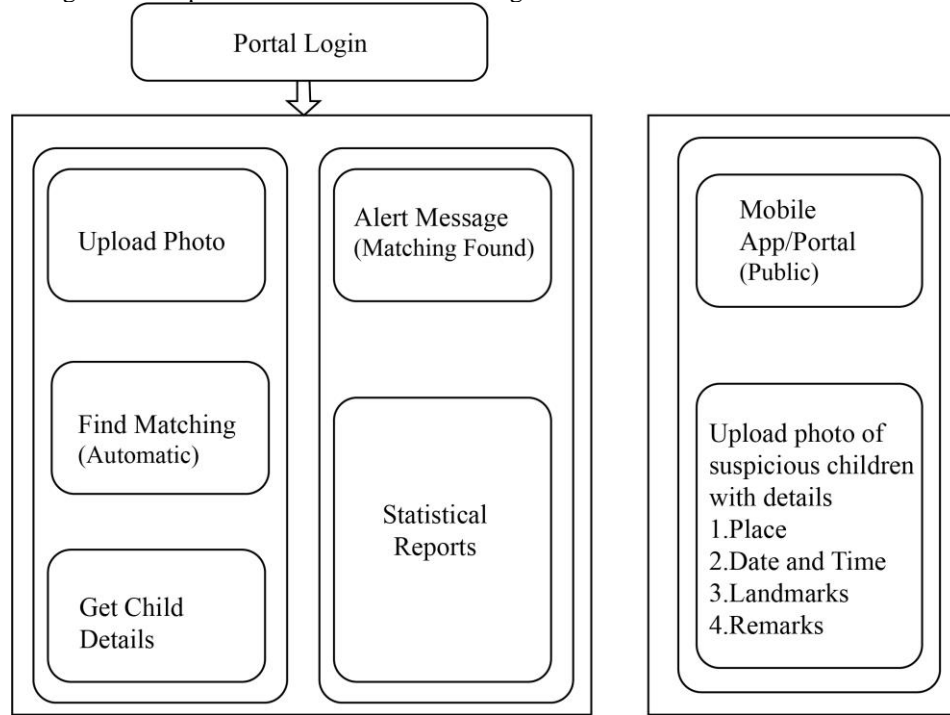


Fig. 1 System Architecture

2.1.1. System Architecture

User constraints

User Constraints for the project are analyzed in this phase, and the business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis, the feasibility study of the proposed system is to be carried out.

a) Hardware Requirements

Processor : I3 or higher

Speed : 2.9 GHz

RAM : 4 GB (min)

Hard Disk : 160 GB

b) Software Requirements

Operating system : Windows 7 Ultimate

Coding Language: Python

Back-End : Django-ORM

Designing : Html, CSS, javascript

Data Base : MySQL (WAMP Server)

3. System Design

System design involves the architectural and detailed design of the system. Architectural design involves

identifying software components, decomposing them into processing modules and conceptual data structures, and specifying the interconnections among components.

Detailed design is concerned with how to package processing modules and implement the processing algorithms, data structures and interconnections of standard algorithms, the invention of new algorithms, and the design of data representations and packaging software products. Two kinds of approaches are available:

- Top-down approach
- Bottom-up approach

3.1. UML Diagrams

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in object-oriented software engineering. The standard is managed and was created by the Object Management Group. The unified modeling language allows the software engineer to express an analysis model using the modeling notation governed by a set of syntax, semantic and pragmatic rules. A UML system is represented using five different views that describe the system from a distinctly different perspective.

3.1.1 Class Diagram

A Class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the

structure of a system by showing the system's classes, their attributes, and the relationships between the classes.

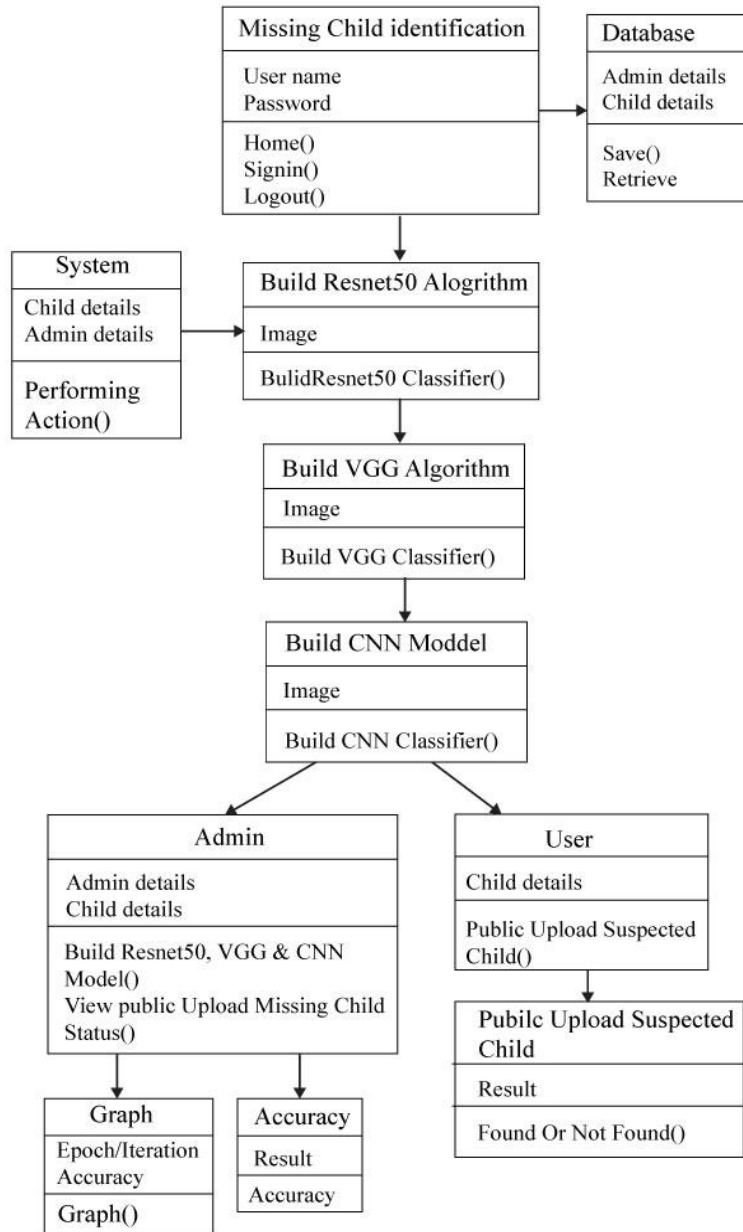


Fig. 2 Class diagram for overall project

3.1.2 Sequence Diagram

A Sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how

processes operate with one another and in what order. Sequence diagrams are sometimes called Event-trace diagrams, event scenarios, and timing diagrams.

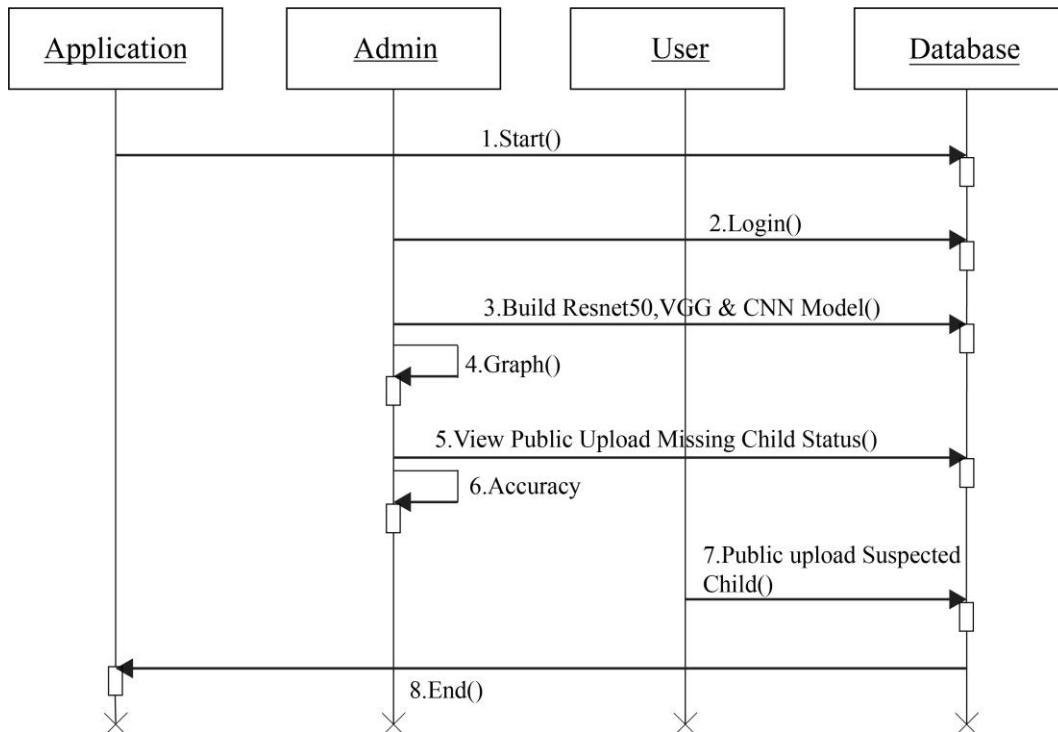
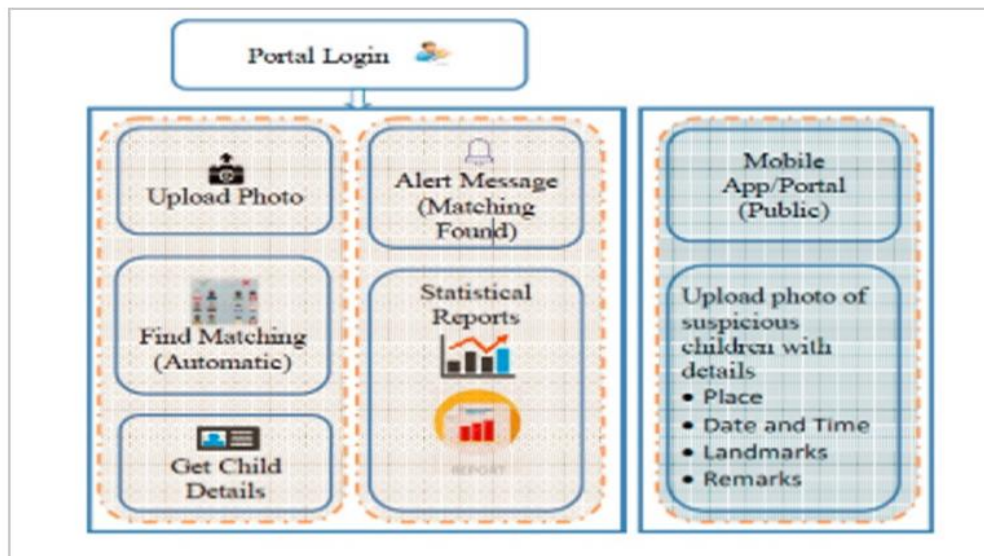


Fig. 3 Sequence diagram for overall project

4. Results and Discussion

4.1. Sample screens

As requested added the below modifications shown on the screens.



In the above screen, you can click on the ‘Adoption Rules’ link to get the page below.

Parents Signup Screen

| | |
|-----------------------------------|--|
| Username | <input type="text" value="kumar"/> |
| Password | <input type="password" value="....."/> |
| Parents Name | <input type="text" value="Narendar Kumar"/> |
| Age | <input type="text" value="25"/> |
| Occupation | <input type="text" value="Government Employee"/> |
| Contact No | <input type="text" value="9998886661"/> |
| Email ID | <input type="text" value="kumar@gmail.com"/> |
| Address | <input type="text" value="9-4-138/9 Grammer colony, Ameerpet, Hyderabad"/> |
| Identity Proof Certificate | <input type="button" value="Choose File"/> 112.jpg |
| Child Age | <input type="text" value="1-5"/> |
| Child Colour | <input type="text" value="Fair"/> |
| | <input type="button" value="Submit"/> |

In the above screen, enter the required child details and then press the ‘Submit’ button to get below screen.

The screenshot shows a web browser window with the URL 127.0.0.1:8000/ParentRegisterAction. The page displays a dashboard with several options: Upload Photo, Alert Message (Matching Found), Mobile App/Portal (Public), Find Matching (Automatic), Statistical Reports, and Upload photo of suspicious children with details (Place, Date and Time, Landmarks, Remarks). Below the dashboard is the 'Parents Signup Screen' form, which is now empty. A blue text notification at the top of the form says 'Signup process completed'. The form fields are the same as in the previous screenshot. The Windows taskbar is visible at the bottom.

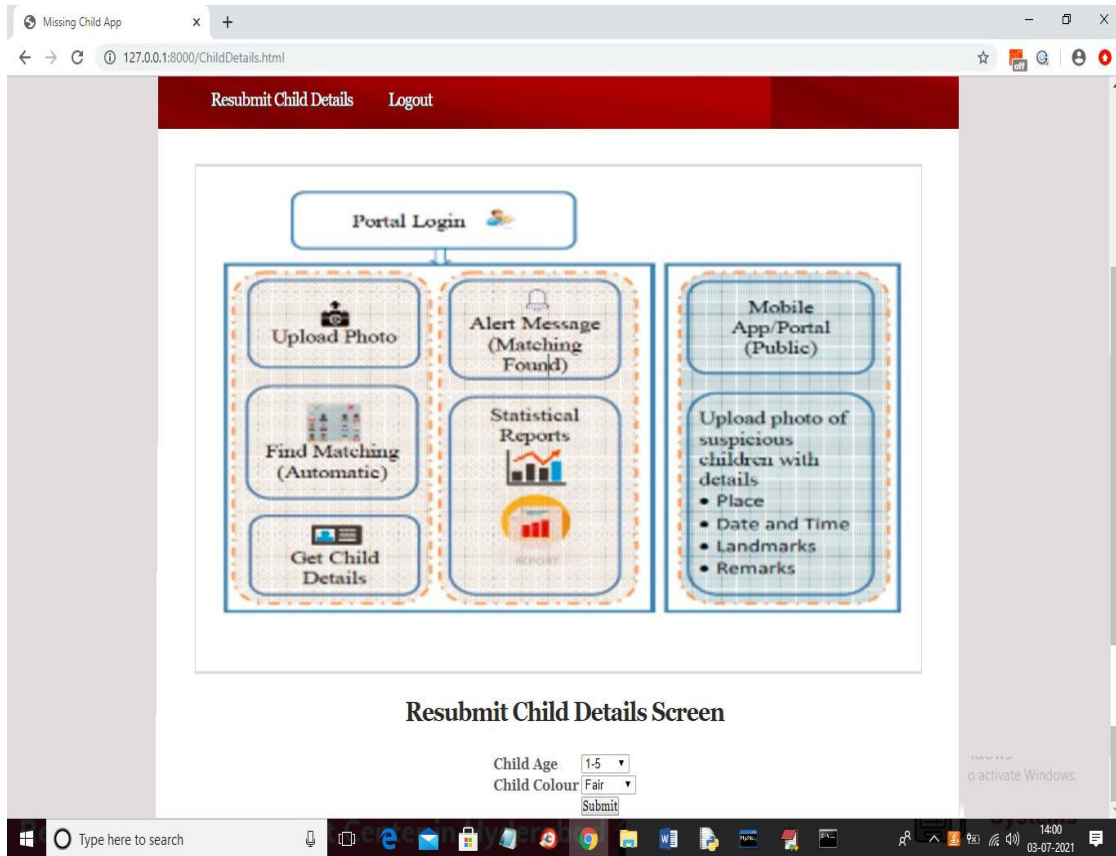
In the above screen, in the blue text, we can see the signup process completed and now click on the ‘Parent Login’ link to get below screen.



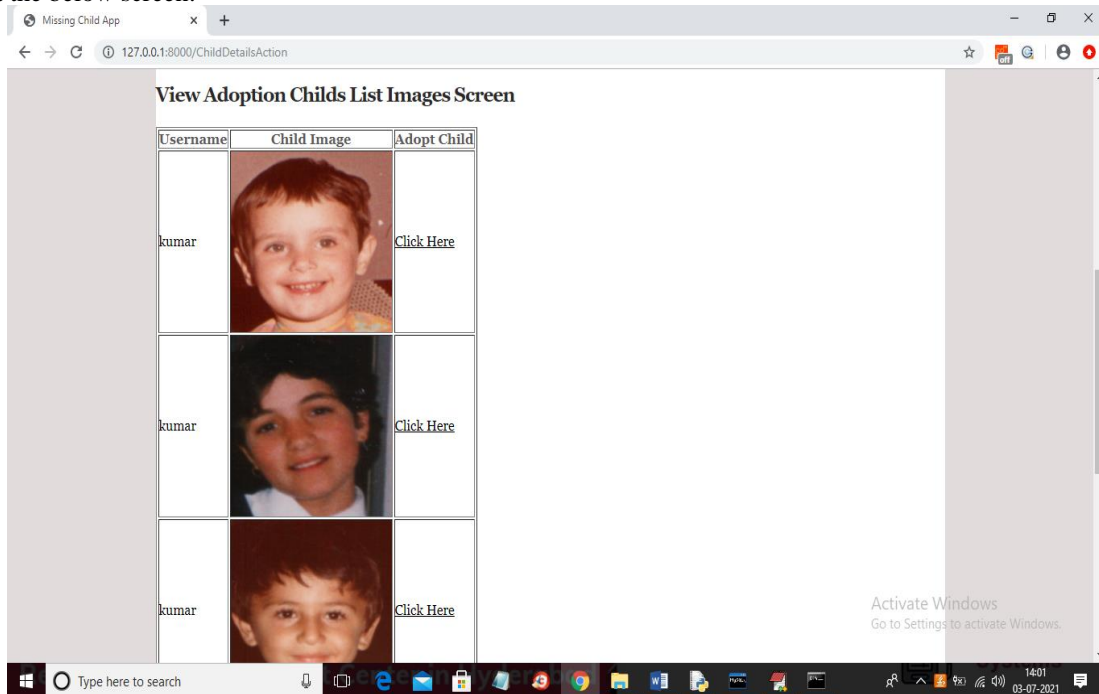
In the above screen, the parent is logged in, and after login, they will get the below screen.



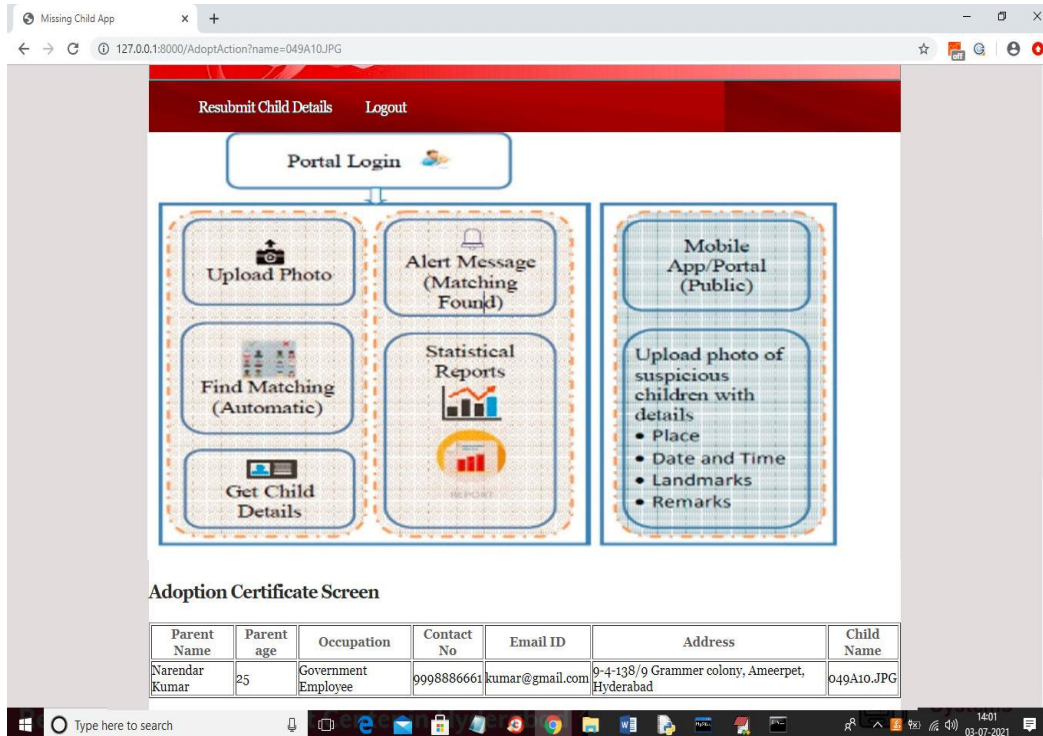
In the above screen, parents now click on the 'Resubmit Child Details' link to get the below screen.



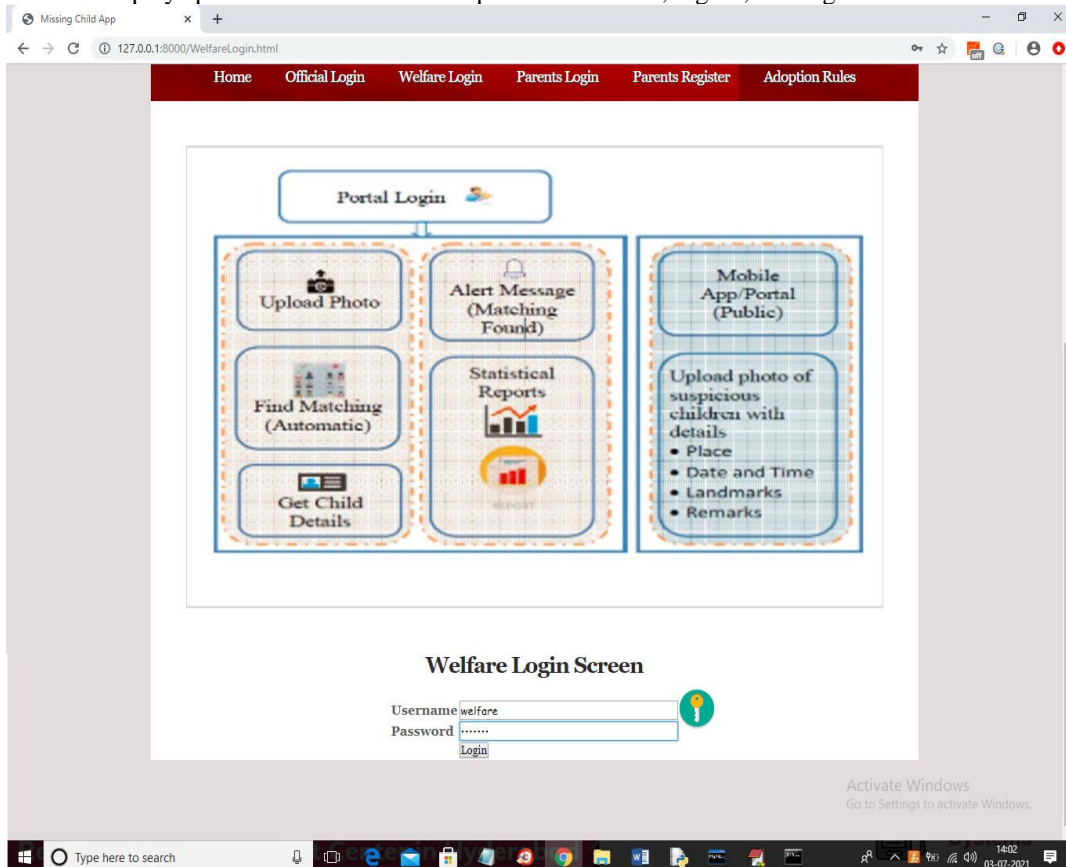
In the above screen, select the child details given at registration time and apply the match pattern; if the pattern matches, you will get the below screen.



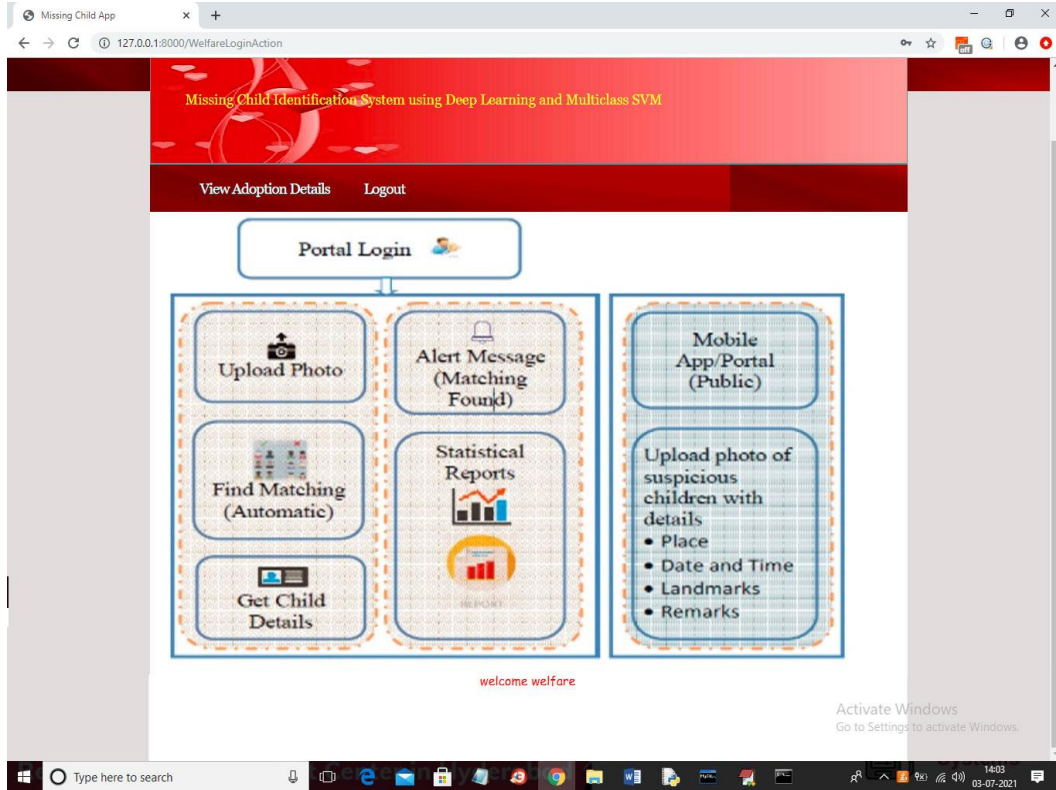
In the above screen, a parent can view all child's details and then click on the 'Click Here' link to adopt the child to adopt a child and get the below certificate.



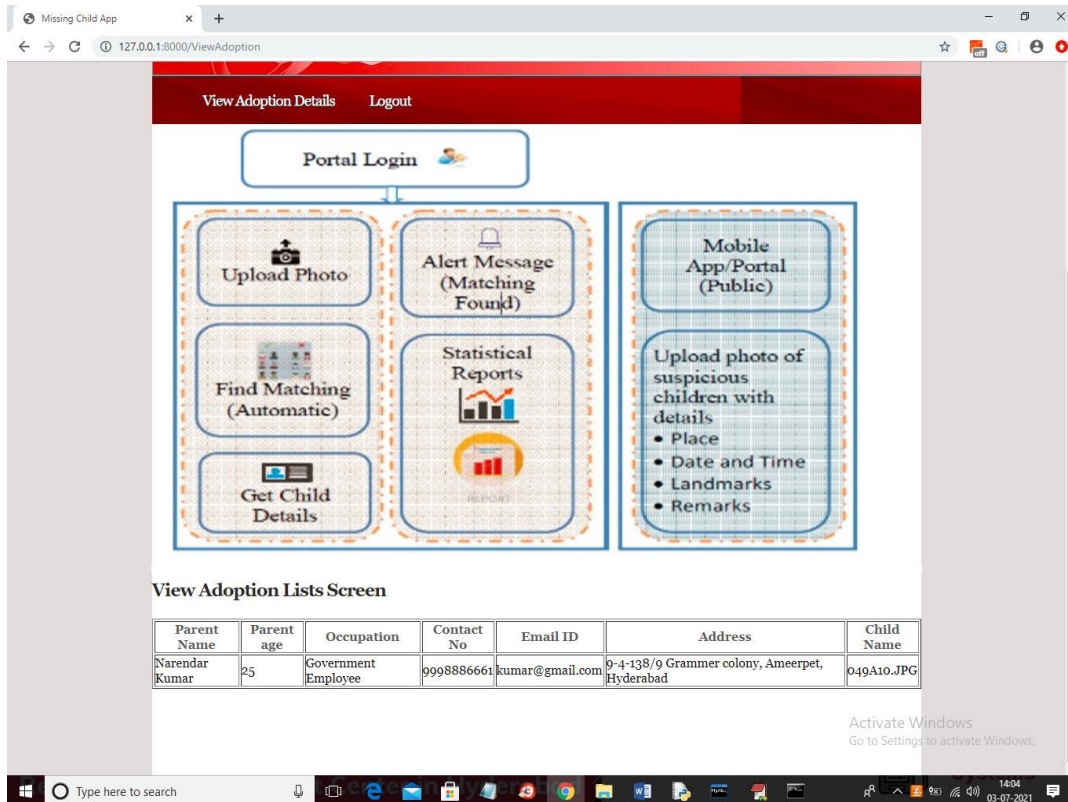
The above screen displays parent details with the adopted child's name, logout, and login as welfare.



In the above screen, you can login as welfare by giving your username and password as 'welfare,' and after login will get the below screen.



In the above screen welfare, people can click on the ‘View Adoption Details’ link to view all parent's details who adopted a child.



The above screen welfare shows parent details with contact no and email and child names who adopted the child.

5. Conclusion

A missing child identification system is proposed, combining the powerful CNN-based deep learning approach for feature extraction and support vector machine classifier to classify different child categories. This system is evaluated with the deep learning model, trained with feature representations of children's faces. By discarding the softmax of the VGG-Face model and extracting CNN image features to train a multi-class SVM, it was possible to achieve superior performance. The performance of the proposed system is tested using photographs of children with different lighting conditions, noises, and images at different ages. The classification achieved a higher accuracy of 99.41%, showing that the proposed face recognition methodology could be used for the reliable identification of missing children. In the missing child project, the student was asked to implement RESNET 50 and VGG 16 and compare their accuracy with CNN.

Appendix– 1

Url Listing

- www.google.co.in
- www.python.org
- www.w3schools.com
- www.pythontutorial.com

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Reference Books

- Python Crash Course 2nd Edition - this is a basic-level book for beginners.
- Learning Python 5th Edition - this book is a practical learning book for basic to advanced levels.
- Python Cookbook - this book is for advanced programmers interested in learning about modern python development tools.
- Automating Boring Stuff With Python - In this book, you will learn to write programs in python.
- Head First Python - this book covered the fundamental of python.

Think python - the basics of programming concepts and cover advanced topics like data structure and object-oriented design.

Appendix – 2

Glossary

- GUI: Graphical User Interface
- UML: Unified Modeling Language
- API: Application Programming Interface
- HTML: Hyper Text Markup Language
- URL: Uniform Resource Locator
- ODBC: Open Database Connectivity

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