Department of Computer Science and Engineering
Vimal Jyothi Engineering College
Chemperi

MISSING CHILD DETECTION

MEMBERS:

AMAL ROY (VML21CS046)
ALAT JOSEPH (VML21CS033)
ANTO JOSEPH (VML21CS059)
ARLIN PHILIP SHYJAN (VML21CS067)

GUIDE:

Ms. NEETHU MATHEW

OUTLINE

ABSTRACT

- Machine learning is an application of Artificial Intelligence where we give machines access to data and let them use that data to learn for themselves.
- Child missing is one of the main problem that we face today.Many methods are being used for missing child recovery.
- Machine's can be trained to recognize unique facial features of missing children from images . By comparing these features with a database of known missing children, the system can help identify potential matches, aiding in the search and recovery process.

- When a child goes missing, especially if they cannot communicate or provide their address, they face significant challenges.
- Without the ability to share their name, address, or contact details, reuniting them with their families becomes more difficult. This situation can lead to delays in locating them and ensuring their safety.
- Our user-friendly online platform enables individuals to easily upload images of potential missing children they encounter. These images undergo thorough processing using facial recognition algorithms, extracting essential facial features and patterns. Meanwhile, law enforcement agencies maintain a comprehensive database containing crucial information about missing children, including photographs and pertinent details.

- Develop a web-based portal that utilizes facial recognition technology to aid in the identification and location of missing children.
- Citizens who encounter a child who might be missing can submit a photo through the portal. The system can then analyze it for matches with reported missing children.

PROBLEM DEFINITION

- The NCRB's annual report 'Crime in India' for the year 2022 was released 3 December. The data shows that 83,350 children were reported missing that year. The current process for locating missing children is often time-consuming and relies heavily on traditional methods like witness reports .

- Developing the portal for missing child detection is crucial to avoid delays in locating children and ensuring their safety.

- Reporting Missing Children: The portal can provide a user-friendly platform for authorized personnel and public to report missing children quickly and efficiently
- Rate of success: Increase the rate of successful recoveries of missing children by X within Y timeframe.
- Community Building:The project can foster a sense of community by encouraging people to look out for each other's children.

1.2D-3D Facial Image Analysis for Identification of Facial Features Using Machine Learning Algorithms With Hyper-Parameter Optimization for Forensics Applications
2.Deep Learning Based Multi Pose Human Face Matching System
3.SegTex: A Large Scale Synthetic Face Dataset for Face Recognition
4.3D face recognition: A comprehensive survey in 2022

2D-3D Facial Image Analysis for Identification of Facial Features Using Machine Learning Algorithms With Hyper-Parameter Optimization for Forensics Applications

- **PROBLEM STATEMENT**:
  The main goal of the framework proposed in this paper is to recognize faces by employing 2D images of faces to approximate a 3D face mesh using 468 landmarks of media pipe framework.

- **TECHNOLOGY USED**:
  XG Boost,The digital library (DLIB),A multi-task cascaded convolutional network(MTCNN),media pipe.

- **ADVANTAGES**:
  Estimates 468 landmarks in real-time to improve the accuracy of the face recognition system (FRS)

- **DISADVANTAGES**:
  The challenges identified are recognition of face images such as identical twins and look-alikes

- **PROBLEM STATEMENT**:
  Paper deals with the problem of conventional face recognition struggling
  with images taken from different angles. It proposes a deep learning
  solution to improve accuracy in such cases.
- **TECHNOLOGY USED**:
  YOLO-V5,CNN,Computer Vision
- **ADVANTAGES**:
  Improved Face Recognition Accuracy,Real-Time Processing
- **DISADVANTAGES**:
  Computational Complexity,Data Privacy Concerns

- **PROBLEM STATEMENT**:
  The importance of synthetic datasets in the field of face recognition and emphasize the need for innovative dataset creation methods to address the challenges of data diversity and quality.
- **TECHNOLOGY USED**:
  Generative Adversarial Networks (GANs),Deep Learning Models,OpenCV.
- **ADVANTAGES**:
  Diverse and Realistic Dataset,Performance Improvement
- **DISADVANTAGES**:
  Complexity,Data Augmentation

- **PROBLEM STATEMENT**:
  Improving 3D face recognition involves refining data generation,
  preprocessing, network design, and loss functions to boost accuracy and
  performance.
- **TECHNOLOGY USED**:
  Convolutional Neural Networks (CNNs), PointNet and deep learning
- **ADVANTAGES**:
  3D images contain more reliable geometric (depth) features
- **DISADVANTAGES**:
  Complexity of data acquisition and processing, limited availability of
  large-scale databases

PAPER	PROBLEM STATEMENT	TECHNOLOGY USED	ADVANTAGE
2D-3D Facial Image Analysis for Identification of Facial Features Using Machine Learning Algorithms With Hyper-Parameter Optimization for Forensics Applications	The main goal of the paper is to recognize faces by employing 2D images of faces to approximate a 3D face mesh using 468 landmarks of media pipe framework.	XG Boost,DLIB, MTCNN,media pipe.	Estimates 468 landmarks in real-time to improve the accuracy of the face recognition system (FRS)
Deep Learning Based Multi Pose Human Face Matching System	Paper deals with the problem of conventional face recognition struggling with images taken from different angles.	YOLO-V5,CNN, Computer Vision	Improve Accuracy,Real-Time Processing

PAPER	PROBLEM STATEMENT	TECHNOLOGY USED	ADVANTAGE
SegTex: A Large Scale Synthetic Face Dataset for Face Recognition	The importance of synthetic datasets in the field of face recognition and emphasize the need for innovative dataset creation methods to address the challenges of data diversity and quality.	GANs,Deep Learning Models,OpenCV.	Diverse and Realistic Dataset, Performance Improvement
3D face recognition: A comprehensive survey in 2022	Improving 3D face recognition involves refining data generation, preprocessing, network design, and loss functions to boost accuracy and performance.	CNNs, PointNet and deep learning	3D images contain more reliable geometric (depth) features

REQUIREMENT SPECIFICATION

Functionality

- Admin uploads missing person pictures and configures system settings.
- User can upload suspected missing child photos from their smartphones.
- System performs facial recognition and sends notifications to admins for high-confidence matches.

Non-Functional Requirements

- Prioritize performance, scalability, and availability.
- Ensure robust security with user authentication.
- Design user-friendly interfaces for both admins and users.
- Implement secure data storage and consider data privacy regulations.

Technical Feasibility

- **Web Development Framework:** Utilizes a suitable web development framework for building the website's backend.
- **Face Recognition Technology:** Implements the deep learning components using PyTorch.

Operational Feasibility

- **Data Security:** Implements measures to ensure the security and privacy of user-uploaded images and data.
- **Scalability:** Designs the system to handle varying levels of user traffic and uploads.

Economic Feasibility

- Given that all software components are free of cost and no additional hardware or software is needed, the system minimizes expenses.
- Keeping costs down makes this project more affordable and realistic.

- User:User can easily snap and upload suspected missing child photos from their smartphones.
- Admins: Secure login, missing person upload with details, real-time high-confidence match notifications, and access to reports.
- Overall: Consistent UI, mobile-friendly, focuses on ease of use and efficient case management.
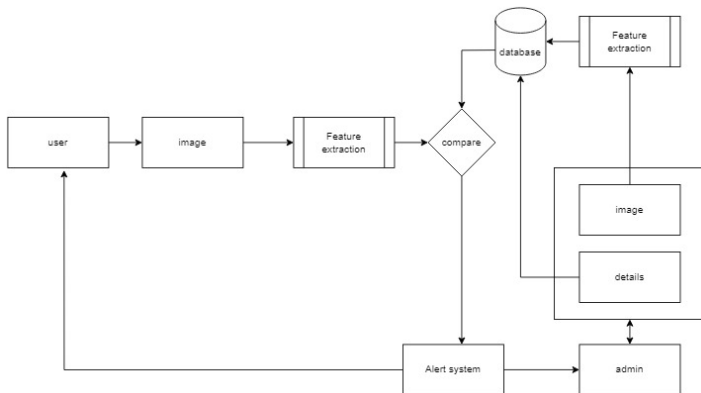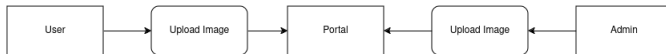
- ARCHITECTURE DIAGRAM
- DATA FLOW

Figure: Level 0

Figure: Level 1
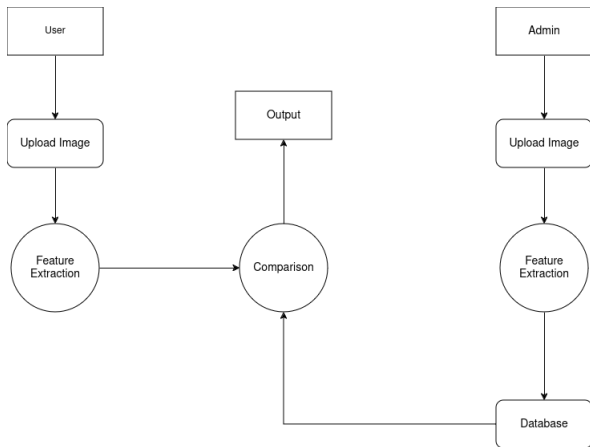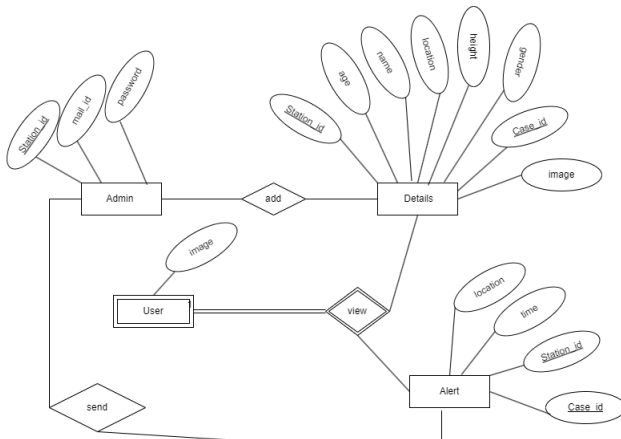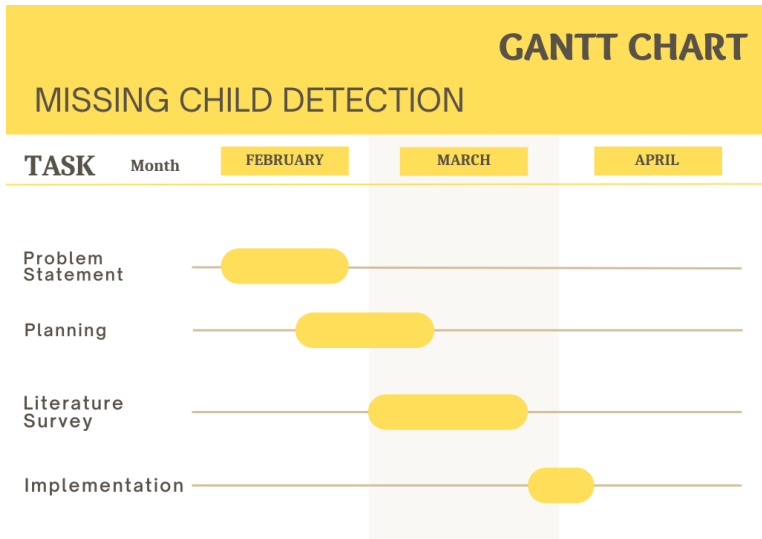
Figure: Level 2

- Child detection portal has the potential to be a game-changer in addressing the missing child problem. By empowering the public, assisting law enforcement, and facilitating faster recoveries, it can bring hope and peace to countless families facing this devastating situation.

- With future expansion, the portal's facial recognition technology could be used to scan databases of missing children from other countries. This can be crucial in cases of international child trafficking or abduction.

[1] Laudwika Ambardi, Sungeun Hong, and In Kyu Park. "SegTex: A Large Scale Synthetic Face Dataset for Face Recognition". In: *IEEE Access* 11 (2023), pp. 131939–131949. DOI: 10.1109/ACCESS.2023.3336405.

[2] Yaping Jing, Xuequan Lu, and Shang Gao. "3D face recognition: A comprehensive survey in 2022". In: *Computational Visual Media* 9.4 (2023), pp. 657–685.

[3] Gangothri Sanil et al. "2D-3D Facial Image Analysis for Identification of Facial Features Using Machine Learning Algorithms With Hyper-Parameter Optimization for Forensics Applications". In: *IEEE Access* 11 (2023), pp. 82521–82538. DOI: 10.1109/ACCESS.2023.3298443.

[4] Muhammad Sohail et al. "Deep Learning Based Multi Pose Human Face Matching System". In: *IEEE Access* 12 (2024), pp. 26046–26061. DOI: 10.1109/ACCESS.2024.3366451.