Original Article
ISSN (Online): 2582-7472

ShodhKosh: Journal of Visual and Performing Arts
March 2024 5(3), 1457–1462

SEARCHING MISSING PEOPLE BASED ON FACE RECOGNITION USING AI IN VIDEO SURVELLIANCE SYSTEM

S.Sowmiya[1], S.Akash[2], M.Sanjay Kumar[3], Sankar Raja.K[4], S.Arun[5]

[1] Faculty, Department of Computer Science and Engineering, Mahendra Engineering College, Mallasamudram,Namakkal , Tamilnadu, India.
[2, 3, 4, 5] Student, Department of Computer Science and Engineering, Mahendra Engineering College, Mallasamudram,Namakkal , Tamilnadu, India.

DOI
10.29121/shodhkosh.v5.i3.2024.4705

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

Finding missing persons based on face recognition using AI is a promising approach that can significantly improve the speed and accuracy of missing person searches. The system involves using AI algorithms to match facial images of missing persons with real-time video footage from surveillance cameras. This paper proposes a method for finding missing persons using face recognition technology in video surveillance systems. The system involves collecting data about the missing person, building a database of facial images, and using AI algorithms to match those images with real-time video footage. Artificial intelligence (AI) is a field of computer science that aims to develop intelligent machines that can perform tasks that typically require human intelligence. This includes tasks such as visual perception, speech recognition, decision-making, and language translation. AI systems are designed to learn from data, using machine learning algorithms that allow them to improve their performance over time. Deep learning, a subset of machine learning, has emerged as a powerful technique for training artificial neural networks with many layers, enabling AI systems to recognize complex patterns and make accurate predictions. The system can be implemented in public spaces, such as airports and train stations, to quickly identify and locate missing persons. The proposed system has the potential to significantly improve the speed and accuracy of missing person searches, thereby increasing the likelihood of successful reunions. Finding missing persons based on face recognition using Convolutional Neural Network (CNN) algorithm is a popular approach that has shown promising results. CNN is a deep learning algorithm that is widely used for image recognition and classification tasks, making it suitable for face recognition.

Keywords: Artificial intelligence, Convolutional neural network, Deep learning, Face detection, Image recognition

1. INTRODUCTION

Artificial Intelligence has become a potent instrument in multiple fields, such as data analysis, natural language processing, and computer vision. Using AI's capabilities allows for the automation and enhancement of the search process, producing results that are more accurate and efficient. AI can be extremely helpful in locating missing people by detecting possible sightings, evaluating pertinent data, and supporting search teams and law enforcement in their work. Facial identification and analysis are one important area where artificial intelligence can have an impact. It takes cooperation between several agencies and groups to find missing people, as it is a difficult and complex undertaking. By analysing vast amounts of data and offering insights that can speed up and improve the efficiency of missing person searches, artificial intelligence (AI) has the potential to be a useful tool in this process. Facial recognition, natural language processing, predictive modelling, autonomous drones, geographical analysis, behavioural analysis, collaborative filtering, and machine learning are just a few of the ways artificial intelligence (AI) can be used to locate missing people. Using patterns and data analysis, these AI-powered methods can assist in finding possible leads and

ranking search engine optimization efforts. But it's crucial to combine artificial intelligence (AI) with conventional search and rescue methods, and to make sure that AI systems respect human rights and privacy and are open, transparent, and accountable. AI and human investigators can enhance the efficiency of missing person searches and give families and loved one's closure by cooperating. Apart from the aforementioned methods, artificial intelligence can also be employed in different ways to locate those who have vanished. AI algorithms, for instance, can be used to analyse meteorological and environmental data, like temperature, wind direction, and precipitation, to forecast missing people's likely locations. AI algorithms, for instance, can be used to analyse meteorological and environmental data, like temperature, wind direction, and precipitation, to forecast missing people's likely locations. Similar to this, artificial intelligence (AI) can be used to analyse social media data in order to spot patterns or anomalies that can point to the missing person's location or to find people who might be able to provide information. In addition, AI may be utilized to trace the movements of possible suspects or missing people by analysing data from security cameras and other sources. This can be especially helpful when there isn't much information on the missing individual or when the search area is big and challenging to cover. The basic flow chart is shown in fig 1

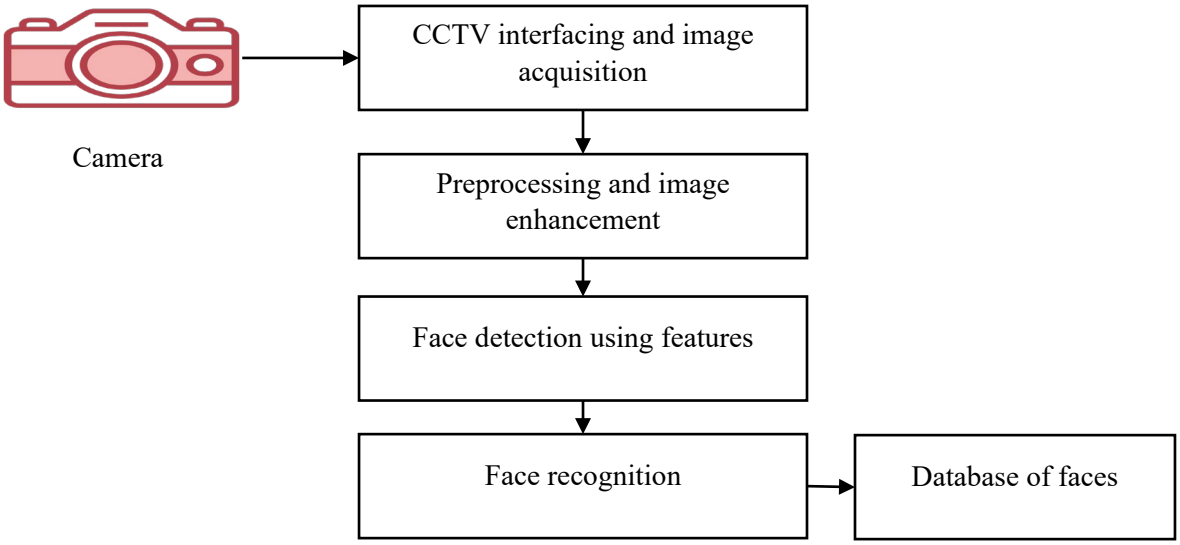

FIG 1: FLOW CHART FOR MISSING PERSON DETECTION USING AI

2. RELATED WORK

XIN NING, et.al,...[1] implemented person re-identification, as a technology for retrieving specific person images from cameras in multiple nonoverlapping areas, has pivotal applications in the security field, including target tracking and person retrieval. In such tasks, the image pixels of the person are too low to be identifiable through face recognition. Moreover, the images have rather intricate backgrounds, which are also accompanied by occlusions and variations in person's poses. As cameras with disparate orientations normally have dissimilar viewing angles, the difficulty of person recognition is also increased thereby. Hence, person re-identification has invariably been a challenging task. The performance of person re-identification, which is a subtopic of image recognition, largely depends on the representation of a person's features. In recent years, image recognition has entered a new stage owing to multilayer convolution-based deep learning methods. This paper reports a feature selection network that combines global and local fine-grained features to realize person reidentification. The proposed model explores more valuable features by weakening the salient features, and obtaining diverse fine-grained features after eliminating interference information. Through experiments, the state-of-the-art performance of the Feature refinement and filter network on the mainstream datasets for person re-identification is verifiedYIMING WU, et.al,...[2] proposed part-based approaches employ spatial and temporal attention to extract representative local features. While correlations between parts are ignored in the previous methods, to leverage the relations of different parts, we propose an innovative adaptive graph representation learning scheme for video person Re-ID, which enables the contextual interactions between relevant regional features. Specifically, we exploit the pose alignment connection and the feature affinity connection to construct an adaptive structure-aware adjacency graph, which models the intrinsic relations between graph nodes. We perform feature propagation on the adjacency graph to refine regional features iteratively, and the neighbour nodes' information is taken

into account for part feature representation. This paper proposes an innovative graph representation learning approach for video person Re-ID. The proposed method can learn an adaptive structure-aware adjacency graph over the spatial person regions. By aggregating the contextual messages from neighbors for each node, the intrinsic affinity structure information among person feature nodes is captured adaptively, and the complementary contextual information is further propagated to enrich the person feature representations Xiujun shu, et.al,…[3] contributed a novel Large-scale Spatio-Temporal (LaST) person re-ID dataset, including 10,862 identities with more than 228k images. Compared with existing datasets, LaST presents more challenging and high-diversity reID settings and significantly larger spatial and temporal ranges. This work studies large-scale spatio-temporal person reidentification. This task has much larger spatial and temporal spans than previous settings. Our major contribution is the large-scale benchmark dataset called LaST. It is the largest densely annotated re-ID benchmark and the first one to label clothes to date. By careful collection, the style of LaST is very similar to conventional re-ID datasets. Besides, we propose an simple but effective baseline that works well on such challenging person re-ID setting. Specifically, the mAP is directly optimized during training and achieves competitive performance compared with current methods. By conducting extensive experiments, we demonstrate that LaST has good generalization ability in both short-term and cloth-changing scenarios. We believe that there is still much room for improvement in the large-scale spatio-temporal settings. By releasing LaST, we expect this dataset to catalyze research in the re-ID community and propel the maturation of re-ID techniques in real-world applications.

Jiaxu miao, et.al,…[4] focused on the occlusion problem in person reidentification (re-id), which is one of the main challenges in real-world person retrieval scenarios. Previous methods on the occluded re-id problem usually assume that only the probes are occluded, thereby removing occlusions by manually cropping. However, this may not always hold in practice. This paper relaxes this assumption and investigates a more general occlusion problem, where both the probe and gallery images could be occluded. The key to this challenging problem is depressing the noise information by identifying bodies and occlusions. We propose to incorporate the pose information into the re-id framework, which benefits the model in three aspects. First, it provides the location of the body. We then design a Pose-Masked Feature Branch to make our model focus on the body region only and filter those noise features brought by occlusions. Second, the estimated pose reveals which body parts are visible, giving us a hint to construct more informative person features. We propose a Pose-Embedded Feature Branch to adaptively re-calibrate channel-wise feature responses based on the visible body parts. Third, in testing, the estimated pose indicates which regions are informative and reliable for both probe and gallery images. Then we explicitly split the extracted spatial feature into parts Houjing huang, et.al,…[5] aims to predicted whether two images from different cameras belong to the same person. With large-scale datasets, as well as improved feature extraction and metric learning methods, recent years have seen great progress in this task. However, due to degraded image quality, pose and view point variation, etc., it still remains a tough problem. We reckon that the increased diversity between part features in turn spans a larger and more discriminative space for identification. Through Grad-cam visualization on MGN, we also discover that the proposed method helps ReID model to emphasize on more regions on human body. We believe that it reduces the risk of overfitting to salient body regions and facilitates learning comprehensive ReID features. Extensive ablation experiments are also conducted to analyze key factors of the proposed method, including part granularity in segmentation supervision, structure of the segmentation head, impact on each part, etc. To be complete, we also confirm that the improvement in ReID is generalizable across domains. Generally speaking, it is desirable for a ReID model to capture discriminative features that well represent body regions, in order for accurate identification. From this perspective, we believe that the awareness of body parts should be an underlying capability of the model. However, in most existing methods, the model is merely supervised by identity labels. We argue that these models may be short of part sensitivity. To enhance such ability of a ReID model, we propose to train ReID with an additional task of part perception. Concretely, we connect a lightweight segmentation head to the backbone and supervise it with part labels, during the training of a normal ReID model.

3. BACKGROUND OF THE WORK

Reports of missing persons worldwide have increased significantly in the past recent years, from roughly 450,000 in 1990 to about 10,000,000 this year. The increase was driven in part by the ever-growing population. The numbers indicate that more people are becoming victims each day. An astounding 2,300 Americans are reported missing every day, including both adults and children. More recently, the abductions of children and adults have reawakened public concern about missing people. In most parts of the world, the police and non-governmental organizations working with missing people have recently reviewed their policies and are planning to improve coordination of their work. People end

up missing in different scenarios. The circumstances that may lead adults or children to become missing people are often complex and multi-layered. The missing phenomenon is best understood as a continuum in which a break in contact may be either intentional or unintentional. Some people make a conscious decision to leave, albeit often not in circumstances of their own choosing, while others may drift apart from family members over time. Some may never have intended to be missing, and indeed may not conceptualize their experience in these terms, while others may be forced apart through the actions of others. Some of the causes entailed herein are natural disasters, psychological complications, abduction and domestic conflicts. Manual System for finding missing person have very long procedure and takes more time. More time is required for launching an FIR (First Information Report) in police station. Also, time required for finding lost person is more. Also, during manual process amount of manpower for searching lost person is less. Some existing application does not show the proper information about the Missing person, which is difficult to find out missing person. Some missing person related website only shows the database of missing person.

4. PROPOSED METHODOLOGY

In today's world, where kidnapping and human trafficking never fails to grab the headlines, biometrics, especially facial aspects of the person become the most crucial assets to trace the person. Whenever suspicious people are found to be doing laborious tasks in places they should not be, it ignites a spark of doubt in the minds of common citizens that whether the person belongs to that occupation. But due to lack of resources or the proper means of acquiring knowledge about the same, the common citizens fail to turn into vigilant citizens of the nation. This leads to the sacrifice of thousands of people daily due to the sheer negligence of the citizens. If only each citizen had the authority or the privilege of saving these people, the world would have prospered with every citizen taking the charge of every nation. There is an urgency to stop the various cases of kidnapping, trafficking, prostitution and all other illegal activities where people are being forced without any hope of help. This project proposes a system that would help the police and the public by accelerating the process of searching using face recognition. When a person goes missing, the people related to that person or the police can upload the picture of the person which will get stored in the database. In proposed system detect and recognize the faces by using Eigen object detector algorithm with Deep learning. This can be done with the help of OpenCV with haar cascades which are present in the OpenCV integral. The images which are taken from the camera are detected with haarcascade frontal faces and eyes then trained with CNN algorithm, the trained faces are kept in a database first and equated to the trained images after comparing it will make a log of the system to the recognized persons in surveillance videos. Fig 2 shows the proposed work for missing person detection.

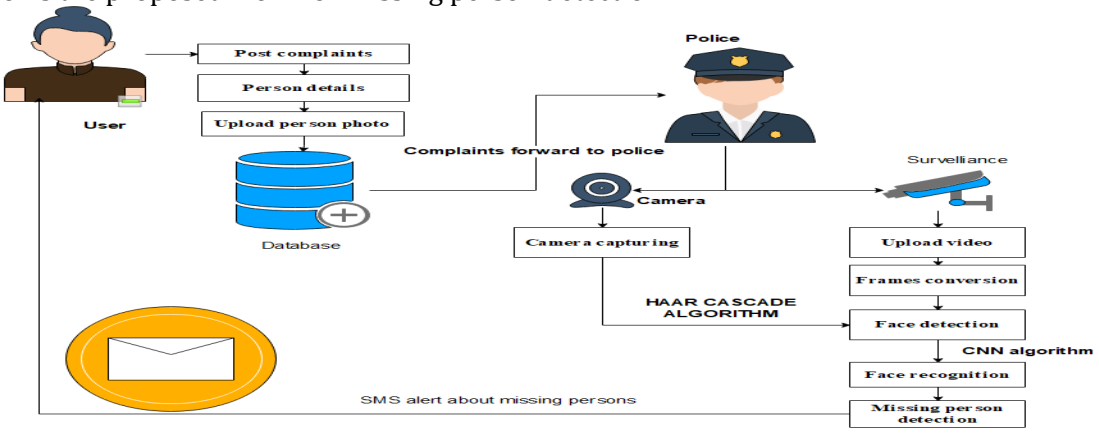

Fig 2: Proposed architecture

The extracted features of the face are called as a face print or feature vector or simply a template. It will compare the two faces by the similarities of their features. Here utilize the features of CNN for classifying images. CNN has multiple layers of functions to accurately classify the images with dataset. Based on the similarities the matching is calculated. Based upon the result of template matching the final decision is made to determine whether the suspect is identified or not.

CNN (Convolutional Neural Network) algorithm is a popular deep learning approach for image recognition tasks. Here is an overview of how CNN algorithm can be used for missing person detection using AI:

- Data collection: Collect visual data such as CCTV footage, satellite imagery, and social media posts that may contain images of the missing person or potential clues related to their whereabouts.

- Data preprocessing: Preprocess the collected data to ensure that it is in a format that can be used by the CNN. Resize the images, convert them to grayscale, and normalize them.
- Feature extraction: Use convolutional layers and pooling layers to extract low-level and high-level features from the images. These layers detect features such as edges, shapes, and textures.
- Training the model: Provide the CNN model with labeled images (i.e., images that are either of the missing person or not) and adjust the model's parameters to minimize the difference between the predicted and actual labels.
- Prediction: Use the trained CNN model to make predictions on new, unseen images. The CNN model can be used to detect the missing person or potential clues related to their whereabouts.
- Techniques to enhance accuracy and efficiency: Use data augmentation to artificially generate new images and increase the size of the training set. Use transfer learning to reuse pre-trained CNN models to improve the performance on a specific task.

By using a CNN algorithm for missing person detection, AI can help law enforcement agencies to efficiently and accurately process large amounts of visual data, which can help to find missing persons more quickly and increase the chances of a successful search and rescue operation. Fig 3 shows CNN algorithm for face recognition

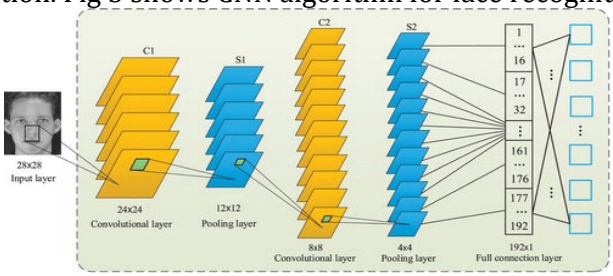

Fig 3: CNN framework for face recognition

5. EXPERIMENTAL RESULTS

Real-time datasets were used in this chapter. Face detection and recognition algorithms were used in this framework. And totally 10 samples are tested in framework. The performance can then be evaluated using accuracy measures. The accuracy metric is assessed as follows:

Accuracy=(TP+TN)/(TP+TN+FP+FN) *100

Fig 4 shows the graph, CNN algorithm provides improved accuracy rate in existing machine learning algorithms.

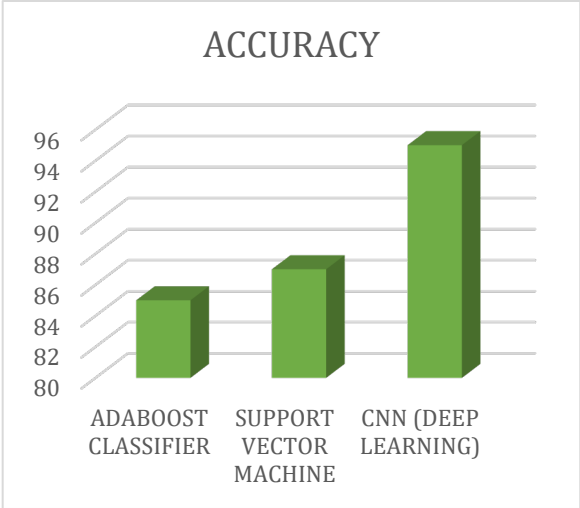

Fig 4: Performance graph

6. CONCLUSION

In conclusion, missing person detection using CNNs is a powerful tool that can help locate missing individuals by analysing images of them. The process involves collecting and pre-processing a dataset of images, building a deep learning model using a CNN, training the model, testing its accuracy, and deploying it for use in missing person detection. While this approach has several advantages, including its ability to accurately identify individuals in images even when there is partial occlusion or changes in lighting conditions, it also requires a large dataset for training, careful pre-

processing, and expertise in deep learning. With continued advancements in deep learning and computer vision, missing person detection using CNNs has the potential to become an even more effective tool for locating missing individuals.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

REFERENCES

Ning, Xin, et al. "Feature refinement and filter network for person re-identification." IEEE Transactions on Circuits and Systems for Video Technology 31.9 (2020): 3391-3402.
Wu, Yiming, et al. "Adaptive graph representation learning for video person re-identification." IEEE Transactions on Image Processing 29 (2020): 8821-8830.
Shu, Xiujun, et al. "Large-Scale Spatio-Temporal Person Re-identification: Algorithms and Benchmark." IEEE Transactions on Circuits and Systems for Video Technology (2021).
Miao, Jiaxu, Yu Wu, and Yi Yang. "Identifying visible parts via pose estimation for occluded person re-identification." IEEE Transactions on Neural Networks and Learning Systems (2021).
Huang, Houjing, et al. "Improve person re-identification with part awareness learning." IEEE Transactions on Image Processing 29 (2020): 7468-7481.
Zhou, Qinqin, et al. "Fine-grained spatial alignment model for person re-identification with focal triplet loss." IEEE Transactions on Image Processing 29 (2020): 7578-7589.
Zhou, Kaiyang, et al. "Learning generalisable omni-scale representations for person re-identification." IEEE Transactions on Pattern Analysis and Machine Intelligence (2021).
Sheng, Hao, et al. "Mining hard samples globally and efficiently for person reidentification." IEEE Internet of Things Journal 7.10 (2020): 9611-9622.
Yu, Zhengxu, et al. "Apparel-invariant feature learning for person re-identification." IEEE Transactions on Multimedia 24 (2021): 4482-4492.
Ding, Changxing, et al. "Multi-task learning with coarse priors for robust part-aware person re-identification." IEEE Transactions on Pattern Analysis and Machine Intelligence (2020).