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# Reduction of Swapping of Babies through Face Matching

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**ABSTRACT:** With the developing technologies worldwide, it has become easy to identify a person using various means one of which is Facial Recognition. It is one of the important technologies used worldwide for various purposes. One of these purposes may include reduction of swapping of babies through face matching, which has proven to be an asset to the medical field. In the recent years, we have been coming across many cases of infant's abduction, mixing, switching etc. There has been a rise in the number of cases globally and one way to prevent is by using reduction of swapping of babies through face matching System. This paper presents a comparison on different methods that are used in reduction of swapping of babies through face matching System. It also compares the efficiency and accuracy obtained by using these methods.

**KEYWORDS:** Newborn face recognition, infant identification, machine learning,

## I. INTRODUCTION

The swapping of newborn newborns is a difficulty that hospitals all across the globe encounter. Several studies in the United States have shown that around one million - five million new-born infants are exchanged by mistake each year. Aside from inadvertent swapping, there have been cases of baby abduction and illicit adoption [1]. Between 1983 and 2010, 270 incidents of new-born/infant abduction were documented in the United States, according to the National Center for Children who are missing or exploited [2]. Another research conducted in the United States by Gary et al. indicated that there is a 50% risk of inaccurate identification among the 34 newborns admitted to a neonatal critical care unit on any given day [3]. Several criteria have been developed by hospitals to guarantee that newborns are accurately identified. Although ID bands are placed on newborns' wrists and legs immediately after delivery, this has not prevented baby swapping. It is crucial to remember that these are just the examples that have been documented; there may be many more that are unreported or that the parents and children are unaware of. Various approaches for identifying newborns have been investigated in medical research. DNA and HLA typing are both very efficient and accurate technologies for determining a baby's identity. Because of the time and expense involved in processing a DNA or HLA sample, these techniques of verification are not viable for every infant. Foot and finger printing of the kid and mother is another procedure used by hospitals and approved by the FBI. According to a study, 90% of the mother's and fingerprints are gathered. Ink-based technologies are often used to acquire prints, which are subsequently printed on identity forms. The usefulness and reliability of utilizing footprints for new-born identification has been researched by scientists from both medical and computer science. Shepard et al. published the results of a footprint study on 51 newborns. Fingerprint specialists from the California State Department of Justice evaluated the footprints [5]. Experts were only able to identify 10 infants using the footprints. Pela et al. obtained similar findings after analyzing 1917 foot prints gathered by qualified employees at a hospital in Brazil. None of the photos included enough information to allow for proper identification [6]. These investigations indicated that using state-of-the-art capturing methods to identify newborns is problematic. Based on these findings, declared that although particular hospitals may choose to continue using foot printing or fingerprinting, universal adoption is no longer encouraged. Following the footprint, researchers investigated the use of additional biometric modalities such as fingerprint, palm print, and ear to authenticate the identification of newborn newborns. Although fingerprint and palm print identification are widely established modalities for recognizing people, did not provide satisfactory results when it came to identifying newborns.

Weingarten et al. created a novel high-resolution sensor for recording baby's foot and palm prints [7]. Two photos of 106 newborns were taken: one within 24 hours after delivery and one about 48 hours later. Foot prints and palm prints had identification accuracy of 67.7% and 83%, respectively, according to fingerprint specialists who evaluated the data. However, several studies have shown that capturing a newborn's finger/palm/footprint is difficult since it is difficult to keep their hands and legs immobile. Fields et al. [8] investigated the possibility of ear identification using a database of 206 newborns. They carefully analyzed the data and came to the conclusion that visually ears may be utilized to differentiate between two toddlers. No study has been conducted to examine the performance of automated identification/verification in all approaches for identifying new-borns. Face [9] and iris [10] recognition are two more biometric modalities that have been intensively researched for adults. Although iris identification in adults is quite accurate [10], capturing iris patterns in newborns is very challenging. To the best of our knowledge, automated facial recognition hospitals in the United States do baby foot printing within 2 hours after delivery. For new-borns, there is a new-born identification form on which the child's footprint has not been inspected. One explanation for this might be because newborns seem so similar to untrained adults that it is impossible to distinguish between them using facial biometrics. It has also been shown experimentally that those who have had less exposure to non-adult faces are less able to distinguish newborns [11]. If the performance of automated matching algorithms is sufficient, we believe that face recognition may be a pleasant and cost-effective method for identifying newborns. We investigated the application and performance of facial recognition to prevent baby swapping or to detect kidnapped babies in this study. We specifically offer a facial recognition system for detecting newborns. We created a database of 34 newborns to test the performance of the suggested method. The experimental findings indicate potential for utilizing facial recognition to prevent newborn swapping and abduction.

## II. LITERATURE SURVEY

**One Samarth Bharadwaj [1]**, Proposed a paper approach on preliminary study on face recognition using automatic face recognition or identifying new born. SURF and LBP based face recognition algorithm has been explained in this paper that extracts local texture features from different levels Gaussian smoothed images. This shows automatic face recognition of a new born is feasible. In future we plan to perform this technique in large scale. This study is done to check the efficiency or the technique by collecting the photos of the new born after a couple of months.

**Michael C. Frank [2]**, Proposed a paper approach on infant attention to faces across a variety of world contexts. This paper tells the infant performance in face perception experiments employing face stimuli in isolation. Future research must concentrate not just on the origins of early face preferences, but also on the processes behind the later development of attention to faces, in order to understand how newborns begin to comprehend the value of faces.

**Dinesh Goyal [3]**, Proposed a paper approach on Face Recognition of Newborns using HMM and SVD Coefficients, to study on automatic face recognition of new born babies. The Hidden Markov Model [HMM], with the combination of Singular Value Decomposition techniques returns a medium to solve one of the basic problems that has been prevailing in the country since past several years, and that is, swapping, infant abduction & missing etc.... In future the 2-D HMM and more complex models can improve the efficiency and performance of this method.

**Lacey Best-Rowden [4]**, A paper technique to automated face recognition was proposed. While automatic face recognition of young children may be a useful investigative tool (with a human in the loop) to help identify children who have been sexually exploited, the overall accuracies currently do not meet the requirements for most other applications which could benefit from automatic child acknowledgment, such as vaccination tracking and civil ID programs.

**I.W.R. Bushnell [5]**, Proposed a paper approach on mother's face recognition in newborn infants, this study explains about the ability of the newborns to rapidly process the sufficient information about their mother's face & to store the information in a stable memory by preferential looking. This might be due to increasing viewing experience allowing the face to be processed and discriminated more efficiently. The attraction element is significant because mother-stranger discrimination during the early months of life shows a preference for the mother, the 'familiar' stimuli.



Before and after the delivery, the mother is the major source of need fulfilment, and the newborn recognizes her voice. The complete research describes how a mother recognizes a newborn.

**Ruicong ZHI [6,]**, A paper technique on newborn pain detection by facial expression was proposed, employing dynamic hybrid descriptions. This research discusses the novel set of dynamic pain facial representations developed by combining temporal geometry and temporal appearance face aspects. The temporal sequence of frame-level features yields the face geometric configuration descriptors and head posture descriptors.

**Shrikant Tiwari[7]**, Proposed a paper approach on intelligent method used for facial recognition. This paper mainly explains the complex mechanism to identify infant using novel intelligent technique. The neural network divides classes using simply single lines, while the SVM divides classes using fuzziier boundaries. Furthermore, since the neural network is unable to construct a generalized mapping function that can properly classify all of the data with 40 classes, we may infer that SVM outperforms the neural network's performance by more than 10%.

**Sayana M S [8]**, In this paper, Different challenges occurred during these methods and also take more time for recognition. Automatic face recognition of newborn using convolutional neural network outperformed previous classification methods and provide better recognition accuracy. The Convolutional neural network also provide high accuracy than other feature extraction method

**Yumiko Otsuka [9]**, Proposed a paper approach on this article which explains that various characteristics of human face recognition already exist in infancy. While behavioural techniques have been very fruitful in revealing many aspects of face recognition ability during infancy, the use of multiple converging methodologies is likely to prove the best way to extend our knowledge.

**Mark Johnson [10]**, Proposed a paper approach on face perception as the ideal case study example for understanding the deeper principles underlying human neurodevelopment, It explains how face perception has been one of oldest battlegrounds for resolving key issues in human development. It suggests an intriguing alternative middle ground view in this polarized debate.

TABLE 1: Comparison Of On Different Paper

Sl. No	Authors	Description	Technique	Advantages
1	Samarth Bharadwaj	Face recognition for new borns: a preliminary study	Face recognition procedure based on SURF and LBP method	Automatic face recognition of newborn babies is achievable
2	Michael C. Frank	Development of infants attention of faces during first year	Face isolation method	Infants face the origin of early face preferences
3	Dinesh Goyal	An enhanced approach on Face Recognition of Newborns using HMM and SVD Coefficients	HMM and SVD methods are used reduce the block Size of image using image process	2-DHMM provides an improvement in efficiency and performance
4	Lacey Best-Rowden	Automatic face recognition of newborns, infants, and toddlers	Automatic Facial Recognition	It is useful in look of over young children and flexible





5	I.W.R. Bushnell	Mothers Face Recognition in new born infants	Visual performance	Mother recognition of infants
6	Ruicong ZHI	“Infants’ Pain Recognition Based on Facial Expression: Dynamic Hybrid Descriptions”	Using Dynamic hybrid description method.	Can identify the infant’s pains easily by this method.
7	Shrikant Tiwari	“Intelligent Method for Face Recognition of Infant”	Intelligent method	Can easily identify the infant using this technique.
8	Sayana M S	“A Review on newborn face Recognition using convolutional neural network”	CNN method is used.	Provides high accuracy than other methods.
9	Yumiko Otsuka	“Face recognition in infants: A review of behavioral and near-infrared spectroscopic studies”	Use of multiple converging methodologies.	Reveals various aspects of face recognition during infancy.
10	Mark Johnson	“Face Perception: A Developmental Perspective”	CONSPEC&CONLERN method is used.	Reveals the complex dynamics between babies & their abilities detect to analyze the signals from their faces

### III. CONCLUSION

This paper is based on "Reduction of swapping of babies through face matching", many cases on swapping babies in hospital, kidnapping etc is offence. The proposed model helps to overcome the problem and helps to identify their own baby. The facial identification of babies in the hospital creates confusion without any ID, through this implementation we can avoid the problem of kidnapping, swapping and is very essential for all the hospital in terms of security. This system is being implemented for new born babies

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