

DETECTION OF SENSATION IN TODDLERS USING DEEP LEARNING TECHNIQUES

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ABSTRACT:

In today's digital parenting world, it is typically the responsibility of women to care for newborns, which presents a challenge and raises questions about the baby's safety, health, and comfort, among other issues. This paper proposes a distance-based image processing baby surveillance system for the purpose of ensuring the safety of infants and keeping an eye on their activities while their parents are busy. The device recognizes the baby's movement, tears and current cries and system sends a message to a specific user via email with text and images any abnormalities of the infant activity is discovered. Videos captured by the Raspberry Pi B+ module are processed using the used camera is a MIC to detect image processing is utilized when sobbing to detect infant movements and bed border in real time conditions. The hardware necessary to install OS Raspbian initially in addition to all of the other packages, such as Numpy, Virtual Environment, and OpenCV. The Haar classifier is used to train the face detection algorithm for both favourable facial pictures and unfavourable body images. The likelihood of the infant tumbling out of bed will be reduced with the assistance of this system. Additionally, this system is able to be utilized while in hospitals the infant is dozing, reducing nurses' stress. The proposed system will make these obstacles easier to overcome, relieve parent stress, and, most importantly, keep the baby safe, healthier, and comfortable while he sleeps.

INTRODUCTION

In India, both parents have to work to meet the financial needs of their children and take care of them, so these families have more responsibility and stress, especially for the women in the connection. This issue needs to be addressed in order to possibly develop a non-contact-based child monitoring framework that makes use of picture handling for face identification. This framework would allow parents to screen their children using information they received via email. Using a PC, picture handling is used to break down and control the pictures. In addition, this framework makes use of ongoing PC vision library. The Module for the Raspberry Pi 3B+, which is unquestionably a PC that is valued by Visa, is used. A faster 64-bit, 1.4 GHz, quad-core, and 1 GB Slam processor powers this module. The writing offers a variety of methods for child checking. The Raspberry Pi-based savvy child checking framework was developed by Symon et al. [1]. The framework differentiates the sound and movement of the child. In this framework, a video of the child's current position is also displayed on a screen. A secure framework for child monitoring was

proposed by Rameesa et al. [2]. in front of a Pi camera and a Raspberry Pi computer.

The website allows users to access this framework online. Shreelatha et al. [3] developed a high-level child screen framework that monitors the child's development, temperature, and humidity. In addition, the system provides a log of the child's movement and rest cycles so that parents can monitor their children from a distance. Patil and Mhetre develop a child observation model based on the GSM network. The system monitors the internal temperature, beat rate, and development of the child and transmits these data to parents via the GSM network[4]. A framework was presented by Ziganshin et al. [5] that made use of an excellent Wearable technology and an Android software. the child's temperature, location, and heartbeat are monitored by this wearable device, which also generates an alarm in the event of an abnormality in the application. Using GPS, speed increase sensors, and a flexible GIS (Geographic Data Framework), Saranyaet [6] developed a child monitoring framework for Android phones to identify the child's health zone. When both parents are working, child checking is actually a difficult situation. We have devised a strategy for programming a framework that can provide parents with an answer for excluding from their place of employment. These are the main goals of this framework: develop a non-contact, Web of Things-based child monitoring system to prevent a child from tumbling from the bed, which can result in an unexpected death. for the purpose of checking on the child at the clinics. The message will be sent as an email so that the child can quickly notify the guardians or watchman in the event that it is discovered that the child is getting closer to the bed's limits. The proposed framework is based on observing a child's activities from afar. The sensor, equipment the unit is made up of the cloud server and the parent's application majority of it. The framework is based on the Raspberry Pi3 B+, a web-based single -board computer. Each and every peripheral that the RPi module communicates with is either associated wired or remote. The RPi mod- ule will be utilized headless, without a console, mouse, or other input device. The RPi module's GPIO pins will be connected to a different keypad with three buttons and a Drove. Utilizing cutting -edge technology, this task is helpful for occupied parents to guarantee the care and safety of their children. Work will be done to identify the child's crying, movement, and live spilling from the support position. The showcase unit displays the positions and exercises of infants in real time, allowing parents to maintain continuous child observation. Utilizing cutting- edge technologies is essential because the two guardians of today often have to work outside and cannot typically screen the child in person. This framework incorporates and records a variety of child cries. A child's cry can be broken down into three major categories, in particular, after careful investigation: Agony, hunger, and depletion In the event that the child's cry cannot be heard, the fourth type of trigger is also created.? In order to get a better idea of the child's cry, a detailed examination of the case is done. A speech signal changes quickly. As a result, in Discourse Handling, the signs are broken up into outlines where a few tests are examined. To understand a child's cry, various strategies for element extraction can be used. Shrewd Picture Handling Child Checking Framework Utilizing cutting-edge technology, this task enables occupied parents to guarantee the care and well-being of their children. carried out work to distinguish the child's movement, cry, and live gushing from a support position. The

clear-view unit displays the infant's position and activities in real time, allowing parents to keep an eye on their children continuously. It is essential to make use of cutting-edge technology because today's parents often have to work outside and it is often impossible to screen the child in person. This framework incorporates various child cries and takes them into consideration. A thorough investigation can classify a child's cry into three distinct categories, specifically: drained, miserable, and cruel. In the event that the child's cry cannot be heard, a fourth kind of trigger is also created. In order to conduct a more thorough investigation of the child's scream, a case-by-case investigation is completed.

Individually, the face and cover concealed discovery. On a variety of sensible dolls, they depict the green areas of the identified body parts and the skeleton in various lighting conditions. For moving debris, the various handling steps are displayed. The face and eye milestone recognition for alert identification in green for situations in which the eyes are open and closed in two distinct light conditions. When the eye is open, the EAR in this case is 0.43, while when the eye is closed, it is 0.17. A child-friendly screen device is developed that, as a result, distinguishes between faces that are covered, faces that are not covered, constant movement, and conspicuous using advanced learning and picture handling calculations. The calculations are carried out in a framework that is based on microcontrollers and communicates with a camera. The results show that they run smoothly and have little idle time.

Multi-Box

Multi-Box, a technique for quick class-independent bounding box coordinate recommendations, developed by Szegedy, serves as inspiration for bounding box regression as used by SSD. Interestingly, The Multi-Box research makes use of a convolutional network in the Inception fashion. The 1x1 convolutions displayed below assist As the number of dimensions will decrease in dimensionality reduction, decrease (But, "width" and "height" will continue to be the same). Moreover, the Multi-Box loss function integrated two significant components that were transferred to SSD: Loss of confidence: This indicates the degree of the network's confidence in the objectivity of the computed bounding box. This loss is computed using categorical cross-entropy.

TensorFlow

TensorFlow is an open-source library for numerical computing and large-scale machine learning. TensorFlow uses a common idea to connect several deep learning models and algorithms (also known as neural networking). It provides an approachable frontend API for the application development tools of the framework by utilizing Python. A tensor can be created from input data or a computation's output. All operations in TensorFlow are carried out within a graph. A series of successive computations is what makes up the graph. A connection exists between each operation, which is known as an op node. The operations and connections between the nodes are depicted on the graph. However, the values are not displayed. The tensor, or a means by which data can be added to the operation, is the edge of the nodes.

MOTIVATIONS AND PROBLEM STATEMENT

Everyone, including parents, is busy in their professional lives under fast-paced conditions. They leave the house early and return before dinnertime. All but the mothers are employed. As a result, they lack the time necessary to care for their children. A nanny to assist parents with their children would not be available to everyone. The mothers still have to simultaneously run the home and look after their kids after working long hours. It's possible that parents won't have enough time in the middle of the night to rock or comfort their infant back to sleep. According to studies on the subject, babies sleep better when they are gently rocked or swung effect of rocking,

because the gentle rocking they experienced while pregnant. Most commercially currently available automated cradles are made to continuously rock. Though, the baby may experience nausea and discomfort as a result of the rocking motion. As a result, using Another issue is the robotic cradle. used to soothe the infant to sleep in the wee hours.

RESEARCH CONTRIBUTIONS

Using Node MCU as the microcontroller and Arduino IDE, we developed and manufactured a baby surveillance system for an intelligent cradle to address these issues. A cradle is the part of this system that is movable when a cry is detected by the sound sensor. A tiny fan is fastened to the top of the cradle for ventilation. The MQTT's sensors or a remote-control server can be used to turn on the swinging cradle and a small fan. The crib now has a Wi-Fi camera installed outside for real-time vision monitoring. Parents may check in on and communicate with their infant using the built-in mobile app that is included with the Wi-Fi camera. In this research, a smart cradle newborn monitoring system based on the Internet of Things is proposed.

DISADVANTAGES OF EXISTING SYSTEM

The sensor, equipment unit the majority of it is made up of the parent's application, cloud server, etc. The Raspberry Web-enabled single-board computer Pi 3 B+, serves as the foundation for the framework. The RPi module communicates with all peripherals via wired or wireless connections.

ADVANTAGES OF PROPOSED SYSTEM

A newborn child observing frame is a component of the proposed baby care framework: work, the module for moving information, the module for investigating information, and the UI. The Baby Observing Frame-work controls the support and various components and collects data from various sensors. Information is transferred between the client, the Newborn child checking framework, and the Information Examination Module via the Information Move module. The information analysis module analyzes the data gathered and makes a different decision for a later time.

LITERATURE SURVEY

[1]The Performance Of The Haar Cascade Classifiers Applied To The Face And Eyes

Detection:

The main purpose of creating such an image base was to provide an extensive and credible data for the systematic performance evaluation of the face detection, facial features extraction and face recognition algorithms. The eyes' detection ratios, while restricted only to the face ROIs, were comparable despite various face detectors involved. It's worth noting, that the best results were achieved with no restrictions on the minimum neighbors number of the face detector.

[2]Face Feature Extraction Techniques:

Face recognition is very important in computer vision. For human being it is easy to identify human face in any posture but it is not an easy task for systems. Feature extraction is useful technique for recognizing faces through systems. It is used for security, criminal records or identification, verification of person, etc. In face images there are variety of face posture.

[3]Using Real Time Computer Algorithms In Automatic Position Monitoring Management Systems:

We propose using real time face detection algorithms integrated on an existing Learning Management System (LMS), which automatically detects and registers students attending on a lecture. The system represents a supplemental tool for instructors, combining algorithms used in machine learning with adaptive methods used to track facial changes during a longer period of time. This new system aims to be less time consuming than traditional methods, at the same time being nonintrusive and not interfere with the regular teaching process.

[4]Human Face Detection In Complex Background:

It is the first important step in a fully automatic human face recognition system. In this paper a new method to locate human faces in a complex background is proposed. This system utilizes a hierarchical knowledge-based method and consists of three levels. The higher two levels are based on mosaic images at different resolutions. In the lower level, an improved edge detection method is proposed.

[5]Baby Face Detection Based Recognition System:

In the Baby Face Detection based existing position monitoring system, a portable Baby Face Detection device need to be configured with the students Baby Face Detection earlier. Later either during the lecture hours or before, the student needs to record the Baby Face Detection on the configured device to ensure their position monitoring for the day. The problem with this approach is that during the lecture time it may distract the attention of the students.

[6]Rfid(Radio Frequency Identification) Based Recognition System:

In the RFID based existing system, the student needs to carry a Radio Frequency Identity Card with them and place the ID on the card reader to record their presence for the day. The system is capable of to connect to RS232 and record the position monitoring to the saved database. There are possibilities for the fraudulent access may occur. Some are students may make use of other students ID to ensure their presence when the particular student is absent or they even try to misuse it sometimes.

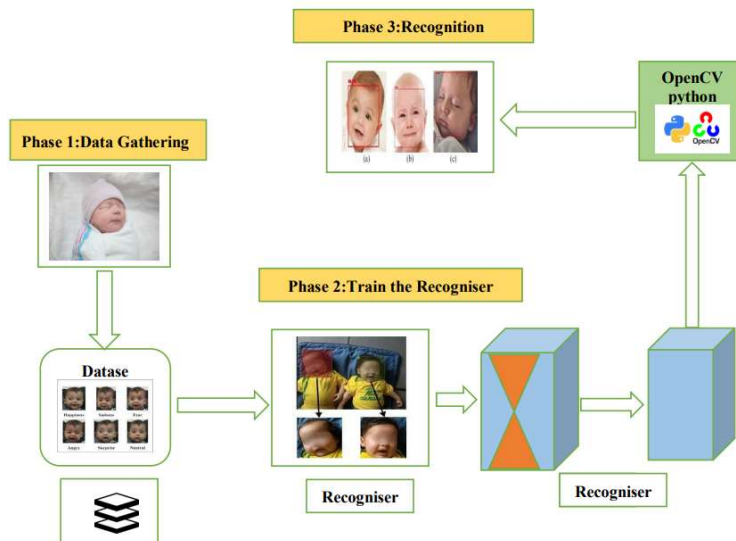
[7]Iris Based Recognition System:

In the Iris based student position monitoring system, the student needs to stand in front of a camera, so that the camera will scan the Iris of the student. The scanned iris is matched with data of student stored in the database and the position monitoring on their presence needs be updated. This reduces the paper and pen workload of the faculty member of the institute. This also reduces the chances of proxies in the class, and helps in maintaining the student records safe. It is a wireless biometric technique that solves the problem of spurious position monitoring and the trouble of laying the corresponding network.

[8]Face Based Recognition System:

The facial recognition technology can be used in recording the position monitoring through a high-resolution digital camera that detects and recognizes the faces of the students and the machine compares the recognized face with students' face images stored in the database. Once the face of the student is matched with the stored image, then the position monitoring is marked in position monitoring database for further calculation. If the captured image doesn't match with the students' face present in the database then this image is stored as a new image onto the database. In this system, there are possibilities for the camera to not to capture the image properly or it may miss some of the students from capturing.

Families in which both guardians work are becoming more common. Then there are unpracticed first-time guardians at that point. The child either receives unwelcome attention or is ignored in both of these scenarios. As a result, the goal of this paper is to provide diverse responses to all of the questions that working or inexperienced parents may have about how to handle their children. The Raspberry Pi 3b+-controlled baby monitor collects sensor data. information and thus screens various boundaries, such as the internal temperature, pulse, bed wetting, and room temperature temperature.

SYSTEM ARCHITECTURE

Face recognition is an easy task for humans. Experiments have shown, that even one to three day old babies are able to distinguish between known faces. Automatic face recognition is all about extracting those meaningful features from an image, putting them into a useful representation and performing some kind of classification on them. Face recognition based on the geometric features of a face is probably the most intuitive approach to face recognition.

First it will locate the "normal face picture" of your pictures by getting the mean estimation of every pixel. At that point the eigenfaces are determined in contrast with this normal face, where the first eigenface is the most prevailing face contrasts, and the second eigenface is the second most predominant face contrasts, etc., until you have around 50 eigenfaces that speak to the greater part of the distinctions in all the preparation set pictures. Firstly, the step of preprocessing is to prepare the dataset into a shape. The new form will run and produce effective results on a generalized algorithm. Secondly, the face is identified from the images collected in real-time in the feature extraction step. Finally, to group the picture into one of seven classes, the emotion classification stage consists of applying the CNN algorithm.

Classification

Here, the device classifies the picture into one of the seven universal expressions as entitled in the dataset—Happy, Sleeping, Crying. The training was carried out using CNN, which is a collection of neural networks. On the training range, the dataset was trained first. Before feeding it into CNN, the process of feature extraction was not performed on the results. The method followed was to experiment on the CNN with various architectures, to obtain better accuracy with the validation set. The step of classification of emotion consists of the following stages:

Data splitting:

The dataset was separated into three categories: training, public testing, and private testing. A training and public test set was used for the generation of a model and a private test set was used for the validation of the model.

Model training and generation:

The design of the neural network was addressed in-depth in the layout of CNN section earlier. Here we can see that the proposed model was set to the network and that after training on datasets, the model updates will be generated and applied to the previous structure with the .json file.

Evaluation of model:

The updates of the model produced during the training process were evaluated on the validation set consisting of 3589 images.

Using the CNN model to classify test dataset as well as real-time images:

The transfer learning theory can be used to recognize the emotion in images here in real-time. The model developed during the training phase consists of the corresponding weights and values that can be used to detect new facial expressions. The design of the neural network was addressed in-depth in the layout of CNN section earlier. Here we can see that the proposed model was set to the network and that after training on datasets, the model updates will be

generated and applied to the previous structure with the file. The updates of the model produced during the training process were evaluated on the validation set consisting of 3589 images. The transfer learning theory can be used to recognize the emotion in images here in real-time. The model developed during the training phase consists of the corresponding weights and values that can be used to detect new facial expressions.

CNN ALGORITHM:

Step 1: Start

Step 2: Run Cry detection script every 5 minutes

Step 3: Recording Audio

Step 4: Crying level > Threshold

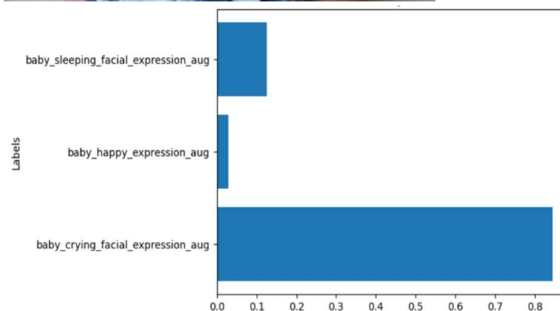
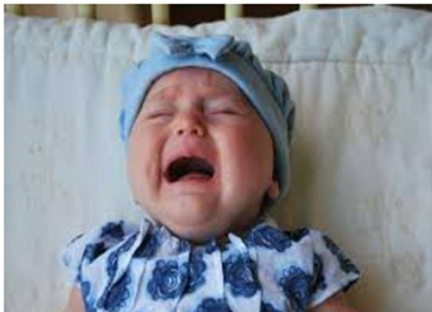
Step 5: Sending Notification to the Firebase

Step 6: The Firebase sends the notification to the Android Application

Step 7: The parents receives the notification

Step 8: End

RESULT AND CONCLUSION





The Data Acquisition Module is able to collect essential information about the baby and its surrounding. The Information Securing Module can gather fundamental data about the child and its encompassing. The Support Control Unit is effective in quieting down the crying newborn child either via consequently shaking the support or by giving mitigating climate to it. Sound and picture handling help in breaking down the reason for cry and different feelings of the child. The Shrewd Child Care Framework can effectively help occupied guardians in dealing with their infants.

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