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SURVEY ON CHILD ACTIVITY RECOGNITION USING MACHINE LEARNING

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Abstract - *The child monitoring system is a kind of alert system which can detect child's movements and activities and can convey the message about the condition of child to the concerned authority via an email or mobile or even a display. The proposed system can detect the child's motion especially handling unsafe objects and video of the child's present position can be displayed on a display monitor so that the mother or another responsible person can watch the child while away from him or her. This child monitoring system is capable of detecting motion and any harmful condition of the child automatically. The OpenCV Python module is used to make the total control system which is used to detect a child's action and reaction and send a message to ensure the safety of the child. A display is used to have a video output of a sleeping child.*

Key Words: **Child, alert system, safety, OpenCV Python.**

1. INTRODUCTION

Machine learning is an important branch in the field of Artificial Intelligence (AI). Machine learning aims at understanding the structure of the given data and tries to fit that data into appropriate models which can be utilized by the users at ease. Machine learning deals with the development of software which responds to varying situations or mere data. Machine learning consists of a system that is trained by the programmer with given data sets and makes use of this trained data set to identify various problems and provide a direct solution or a path towards decision making.

This work presents a child monitoring system for busy parents so that they can ensure the proper care and safety of their babies. Parents usually have instincts to secure their child from unfortunate danger or risks that might probably occur in their absence. However, technology has overcome the protection measure for the child on an everyday basis. This has made the parents regardless of their instincts to safeguard the child as well as raise the family. Parents have now taken a step forward to use these mechanisms to benefit in terms of safety issues of their child. This project involves a system that is capable of identifying the child's motion and determining whether it is in a safe environment or not.In addition to this, the system also invokes an alert voice message to the child and sends an email attached with a snapshot along with an SMS to the concerned guardian in order to convey the current activity of the child.

2. SCOPE OF THE WORK

A modern baby monitoring system can be a solution for handling children properly instead of keeping them in child's day care centres or appointing a nanny for them. The main objective of the project is as follows:

- It monitors the child in the absence of a parent.
- It ensures the safety of the child by monitoring them constantly.
- If the child is detected using a harmful object, an alert message is used to wide awake the child.

3. APPLICATIONS

The applications of the child activity recognition system are as follows:

- Parents could be able to track the child using their separate GSM application provided for the parent.
- Parents could get a clear perspective of what the child is doing currently.
- Parents can locate and retrieve details anywhere and anytime.

4. REVIEW OF PREVIEW WORKS

This section reviews the different models, guidelines and algorithms used to identify the physical movements of children and recognize the child's activity. These works have focussed on knowing the emotional and physical condition of the child under surveillance. The challenges that are caused due to accuracy in similar pattern recognition and estimation of correct joint positions are discussed in this section.

4.1. Facial Emotion Recognition in Child Psychiatry:

This work focuses on facial affect (emotion) recognition in children and adolescents with identifies psychiatric disorders other than autism in them. A systematic search, using **PRISMA** guidelines is been used. This has disadvantage with the Emotional Recognition Errors.

4.2. Child Activity Recognition Based on Co-operation Fusion Model:

This paper uses the single 3-axis accelerometer and barometer to recognize the child's activity. Its uses **Multilayer Perceptron [MLP], Bayes Net [BN].** This also calculates the mean and standard deviation over the sliding windows.

4.3. Emotion Recognition Pattern in Adolescent Boys with Attention Deficit / Hyperactivity disorder:

This paper focuses on the emotional recognition in the facial expression of adolescent boys which detects the ADHD disorder. The algorithm used is **Facial Expression of Emotion Stimuli and Test [FEEST] and Raven's Progressive matrices**, but due to the confusion in two similar expressions it gives less accuracy in the result.

4.4 Human Activity Recognition process using 3-D posture Data:

This paper focuses on the human activity recognition sensed by an RGB-Camera. It uses three methods namely **K-means clustering, support vector machines, and hidden Markov models.** This model shows the real time.

4.5. Activity Recognition for ASD Children based On Joint Estimation:

This method is for estimating the upper joints and special motions since the motion estimation is challenging in ASD of children. The algorithms applied are **Gaussian process, feature model, dense sampling, Feature mapping.** This shows an effective result on dataset.

The comparison table of these works based on the algorithm used, accuracy and confusion matrices obtained is given below:

Table -1: Comparison Table

S.no	Title	Algorithm	Accuracy	Confusion matrices
1.	Facial Emotion Recognition in Child Psychiatry	PRISMA [Preferred reporting items for Systematic Reviews and Meta-Analysis Guidelines]	Accuracy is less	Emotional Recognition errors.
2.	Child Activity Recognition Based on Co-operation Fusion Model	Multilayer Perceptron [MLP], Bayes Net [BN].	Accuracy is up to 86.2%	Confusion matrices stipulate that many of the prophecy errors are due to confusion between activities.
3.	Emotion Recognition Pattern	Facial Expression of Emotion Stimuli and Test [FEEST] and	Less accuracy	Prediction between two

	in Adolescent Boys with Attention Deficit/ Hyperactivity disorder	Raven's Progressive matrices		similar emotions is difficult.
4.	Human Activity Recognition process using 3-D posture Data	K-Means Clustering, support vector machine and Hidden Markov model	Accuracy is up to 84.7%	Intrinsic limitations of tracking algorithms.
5.	Activity Recognition for ASD Children based On Joint Estimation	Gaussian process, feature model, dense sampling, Feature mapping	Accuracy is up to 85.9%	Estimation of joints from less body annotation is difficult.

5. CONCLUSION

Monitoring a child continuously is really a tough job as well as it is not possible for the parents to carry their babies all the time with them especially while working. Hiring a caregiver or sending the child to a day care center might help in monitoring the child at all times when the parents are unavailable to look after the child. But these two methodologies may not be capacious for parents according to their demands. Most importantly parents do not get surety about their child's safety in both of the cases. In this perspective, a child monitoring device can be the best solution to remove anxiety and stress of the parents. By devising this monitoring system with increased accuracy and responsive measures a safer environment for the children can be built.

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