

Emotion Detection of Autistic Children Using Deep Learning Techniques

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Abstract

Children with Autism Spectrum Disorders (ASD) have a deficiency in figuring out conceptual comparable traits which can be tougher to understand, along with emotions and additionally spotting the similarities, which can be tough for getting to know new situations. People with this syndrome have issues with emotion recognition. Our proposed method works on detecting the feelings of autistic kids from the expression on their faces. Facial Emotion Detection is a technique closer to detecting human feelings via facial expressions. The technique additionally contributes to the getting to know feature of emotion recognition for autistic kids. Autistic humans have repetitive behaviour. They are not prepared to do social communication. The proposed method will discover the expression of autistic humans and apprehend the emotion, and offers the description as Text. The challenge consists of the feelings along with happiness, angry, fear, unhappy and neutrality. In our technique, we can additionally upload a function as Audio with voice for his or her smooth understanding. The set of rules used is Convolution Neural Network (CNN). Our proposed device is a software primarily based totally, and it is able to be easily accessed with the Web camera. Our challenge will even offer as a getting-to-know platform online. The software will assist autistic kids in enhancing their communication skills and adjustments in their behaviour and is beneficial in expressing their feelings.

Keywords: - *Autism, Emotion Recognition, Facial Expression Recognition, Image processing, Convolution Neural Network. Training.*

INTRODUCTION

Human beings can express their feelings in various ways, such as facial expression, bodily expressions, or language. Autism Spectrum Disorder (ASD) is a developmental sickness; this is characterized through and tested on the grounds of social, verbal exchange deficits and repetitive, stereotyped conduct. ASD starts earlier than the age of three and closing at some point in people's life, even though signs can also additionally enhance over time.

Some youngsters with ASD display recommendations of destiny issues in the first few months of life. In others, signs can also additionally not display up till 24 months or later. Research shows that autism develops from an aggregate of genetic and nongenetic, or environmental, impacts. These impacts seem to boom the threat that a child will broaden autism.

Emotion recognition (ER) complexities are taken into consideration to be not unusual place in lots of human beings with ASD, and this will be a challenge, as knowledge feelings improve human beings to behave in a socially salient manner. Emotions may be diagnosed from a number of references of descriptor, consisting of facial expressions, tone of voice and frame

posture. ASD is recognized primarily based totally on a fixed behavioral standard. These standards encompass repetitive behaviors in addition to missing in social conduct and delays in verbal and non-verbal verbal exchange.

Furthermore, youngsters with Autistic Spectrum Disorders monitor deficiency of their expressive language and impairments in verbal exchange. This may want to cause an entire loss of language improvement and results in postponement in spoken language.

Autistic Spectrum Disorders youngsters disrupted in the understanding of others language and social interactions. These traits encompass missing of eye-contact, facial expression, non-verbal factors of verbal exchange and frame gesture. This additionally results in failure of sharing of interests with others.

Social impairments can also additionally reflect as a loss of social reciprocity and perception into their very own and others feelings. The restricted, repetitive and stereotyped behaviors are 1/3 kind of traits to diagnose Autistic Spectrum Disorders. The performance degree may be calculated through the usage of quantitative analysis. Our finding signalizes autistic children

who have gradual ease in spotting the following feelings, including anger, fear, happiness, unhappiness, and neutrality. This utility will make a big distinction in the lives of Autistic children. This will assist them in enhancing their behaviours and competencies and additionally to speak nicely with the human beings around them.

LITERATURE SURVEY

[1] K.Prem Kumar et al. (2020) primary focus is that a survey is taken for the implementation method that undergoes face detection, developmental-age and gender prediction, and feeling recognition using python models and libraries is being employed for the implementation section. It detects face exploitation haar cascade classifiers that will haar feature selection for feature extraction.

[2] Christina Tsangour et al. (2016) suggests a study to assist them to boost their facial features recognition and response skills. Emotrain was developed as an associate degree interactive platform that utilizes deep learning. The EmoTrain platform accesses the front-facing camera on the user's device and sends the camera frames to the server running the CNN model – that analyzes every image and

generates a likelihood vector for the seven emotions and sends this back to the app.

[3] Zihan Tan et al. (2020) suggests the study of the syndrome treatment in China remains, for the most part, supported coaching courses and lacking professional academics could be a severe downside for the individuals in China. In this paper, they aim to conduct an emotional recognition study for them. This experiment is predicated on the accessible datasets, which show the behavior recognition accuracy reaches on the far side 90% and also the heart recognition achieves 99%. Hence the result explains that the planned system analyzes the link among valence arousal and expression class for the syndrome coaching class.

[4] Pooja aristocrat (2019) this paper works on police work the emotions of unfit children from the expression of their faces. This paper works on four emotions. The emotions that are enforced during this study are sad, happy, neutral, and angry. They include Machine learning algorithms that are used for the classification of emotions. Here during this study, the Machine learning classifiers employed in the classification method are support vector machine and neural network.

[5] Joaquin Rapela et al. (2012) suggests a proposal for a completely unique intervention to coach the speed and accuracy of attention orienting and eye movements in syndrome Spectrum Disorder (ASD). It helps kids to boost their fixation skills whereas enjoying a computer game controlled by a watch tracker. Here associate degree implementation supported wireless and dry electrooculography (EOG) technology is being used. If it's successful, this method will develop an associate degree approach to medical aid that would improve clinical and behavioural performance in kids and adults with ASD.

[6] Bob R. Schadenberg (2019) argues exploitation of robots in interventions for unfit kids is that automatons are terribly predictable. Even supposing robot behaviour can be designed to be perceived as predictable, a degree of perceived unpredictability is unavoidable. In their work, they give the impression of being at a selected sort of sure thing and outline it as "the ability to quickly and accurately predict the robots future actions". Initial results show that seeing the cause of a robots responsive actions influences to what extent it's perceived as being unpredictable and its competence.

[7] Yang Liu et al. (2020) suggests a form of psychological feature, Training Device for unfit Children. They designed a coaching device to help autistic children's color cognition. The device combines the acousto-optic control technology, LED to show color, graphics and psychological feature coaching information, acknowledges the children's utterances through automatic speech recognition technology, and so controls the semiconductor diode and speaker to show interrelated light-weight and music through the system so as to stimulate the sensory system of the unfit children.

[8] Wu Horng et al. (201) uses a face recognition algorithmic rule to model variations in perception between unfit and non-unfit children. With this model, it's attainable to breed many phenomena of syndrome by presumptuous that unfit kids lack the flexibility to abstract from horizontal invariants. In particular, it explains why unfit children are ready to higher acknowledge faces from elements of the face, whereas the overall recognition of faces is worse than in non-unfit children.

[9] Saahithyaa Vijayaraghavan et al. (2020) explained concerning the FSR device primarily based Embedded system

to detect an imbalance in unfit children. The main aim of the study is to style and develop a conveyable and easy-to-use pressure mat to notice an imbalance in unfit kids and to live the pressure applied by totally different points underneath the foot, and to research the improvement of posture equalisation skills of unfit children.

[10] Amina SaniAdamu et al. (2019) explains a Survey on software system Applications use in Therapy for unfit Children. This analysis aims to survey mobile and computer applications that are developed to supply higher learning surroundings and communication platform for unfit children. Here many techniques have been enforced and tested on kids living with the syndrome, and that they serve the purpose that the applying was engineered for the unfit children.

[11] R. Subalakshmi (2020) This paper examines the behavior of Autistic kids activities exploitation Applied Behavior Analysis (ABA) therapy, PECS (Picture Exchange Communication System) and Social Stories, these are the training techniques. data is collected by behavioural intrusion whereas training kids diagnosed with a syndrome spectrum disorder. Data Mining Techniques

analyzes the development of the kids, and it helps them in humanizing their behavior.

[12] Karanya Sitdhisanguan et al. (2007) suggests a comparative study of WIMP and tangible user interfaces in coaching form matching talent for autistic children. In this paper, 2 versions of computer-based training application for unfit kids were compared in terms of learning ability. One in each of them is predicated on a customary WIMP interface, whereas the opposite adopts a tangible user interface.

[13] Lentin Joseph et al. (2017) This paper discusses the feeling recognition technique to be used in social automaton exploitation deep learning techniques. This feeling recognition technique will add real-time to predict the behavior of ASD children. The robot-assisted medical aid is a rising field during which a special sort of automaton known as the social robot is employed to act with ASD individual. These robots have social and communicative skills, which will influence the ASD individual.

[14] MdInzamam Ul Haque et al. (2018) explained a quest that's discussed that is to show young unfit kids recognizing human facial expression with the assistance of pc vision and image processing. This paper mostly discusses the work of facial

features recognition employing a deep convolutional neural network. The Kaggle FER2013 dataset has been accustomed to train and experiment with a deep convolutional neural network model.

[15] Tamara Z. Fadhil et al. (2018), during this paper, a system was enforced for Live Monitoring System for Recognizing Varied Emotions of unfit Children. The system consists of NodeMCU ESP8266, galvanic skin response (GSR) sensor, broker (server) and a smartphone or personal computer. This method observes the subject's reactions to totally different emotions like sadness, happiness, nervousness, hunger, relaxation and trepidation, and so records the data. Message Queuing Telemetry Transport (MQTT) protocol had been accustomed publish the info online.

[16] Jun Deng et al. (2016) explains concerning the Exploitation of Phase-Based options for unvoiced Speech feeling Recognition. They proposed a brand new speech feeling recognition framework, using the outer product in combination with power and L2 normalization. The ensuing illustration is fed to train a classification model with a linear kernel classifier.

[17] Rodolfo Pavez et al. (2019) This paper explains the study concerning the feeling Recognition in kids with ASD exploitation Technologies: a scientific Mapping Study. They suggest the techniques employed and program recommendations that can be terribly useful for ASD Children and conjointly acknowledge the emotions.

[18] A. Sarrafzadeh et al. (2009) presents the thought of a wearable tool that uses automatic facial features recognition developed by the authors to help the unfit modify social situations. during this paper, they describe a way we have developed for facial features recognition that operates in real-time. Experimental results show that this new technique is superior to the analysis of solely either static pictures or dynamic videos that are the 2 strategies used commonly.

[19] S Vidhusha et al. (2019), during this work, a computer game (VR) platform has been developed that acts as a simulative learning tool to show and train children affected with syndrome spectral disorder. Encephalogram signals of participants throughout card teaching and VR teaching sessions were non-heritable, and practical property parameters were calculable from the non-heritable signals. This VR

experiment with unfit kids indicates that their psychological feature ability is increased through constructive teaching by exploiting appropriate VR environments.

[20] Jonathan C. Kim et al. (2017) the target of this analysis is to make an associate degree automatic emotion classifier integrated with an automation, such the robot will perceive the spirit of somebody's user by analyzing the speech signals from the user. Improving audio-based feeling prediction for kids with ASD can permit for the robotic system to properly assess the engagement level of the kid and modify its responses to maximise the standard of interaction between the automaton and the kid associate degreed sustain an interactive learning environment.

EXISTING SYSTEM

Emotion recognition troubles are regularly stated in people with an autism spectrum disorder (ASD). The Autistic human beings normally understand the emotions via the charts and become aware of the emotions. There are some applications this is used to understand the emotion with AI interplay video platform which identifies the facial features with differing types of emotions as text. We have used Convolution Neural Network (CNN) set of

rules for computing the capabilities wanted for the category of facial expressions. We put in force real-time facial features reputation on a computer, which incorporates our strategies for growing an emotion reputation model, and our framework for attaining real-time overall performance from the built-in digital camera of well known era with the assist of computer.

PROPOSED SYSTEM

The proposed system will identify the expression of the autistic people and recognize the emotion and gives the description as Text.

Moreover, we provide evidence for the existence of emotions in children for correct identification of expressions mainly depends on Five static expressions were used one neutral expression and four emotional expressions, namely, anger, fear, happiness, and sadness. Our method we will also add a feature as Audio with voice for their easy understanding. Our project is an application based and it can be easily accessed with the web camera. This will also provide as a learning platform via online.

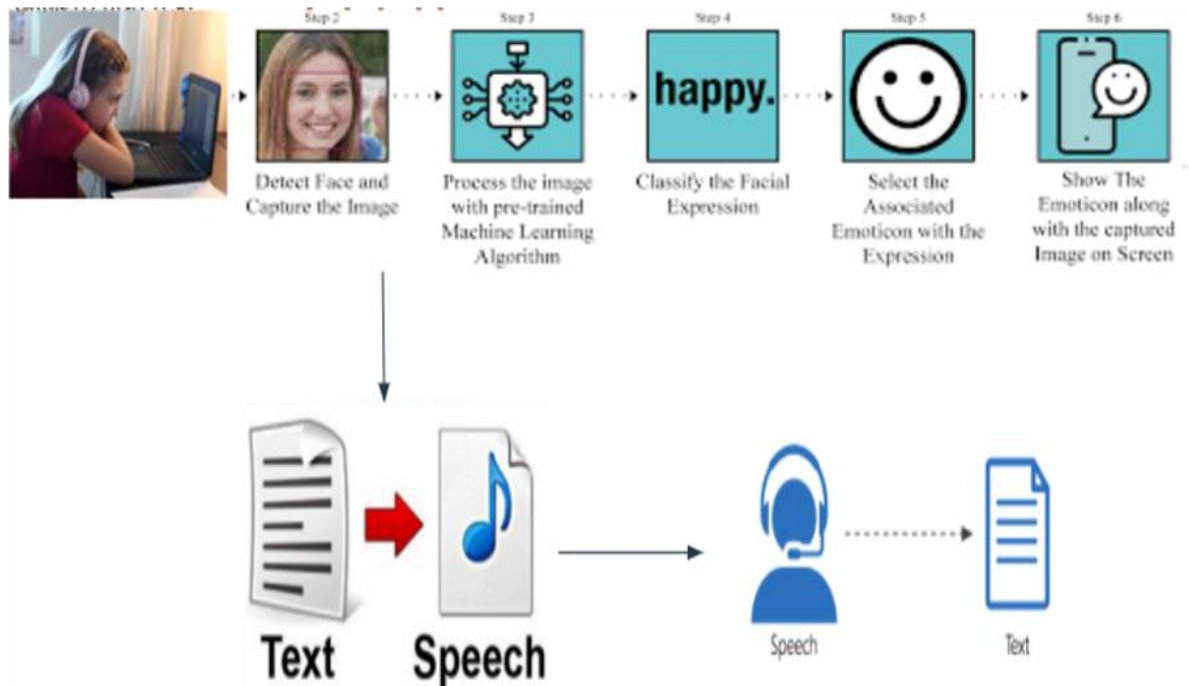


Figure 1: Flow Chart of Emotion Recognition

MODEL CONSTRUCTION

In a face recognition technique primarily based totally on ConvNet is proposed, consisting of 9 layers, 3 of which can be convolution layers, pooling layers, completely linked layers and a SoftMax regression layer. The network became examined on Caffe, a deep learning framework able to process over 60 million images in line with day. Caffe framework educated and examined extraordinary face databases. ORL face database consisted of a complete of four hundred photos for forty people. AR face records base contained a complete of 2600 photos for one hundred people. After about 200 iterations, the community reached an accuracy charge of 90%. After 2000 iterations, it reached 97%. Finally, after

10,000 iterations, the popularity charge for all face records units of AR and ORL reached an accuracy of 99.82% and 99.78%, respectively. When in comparison with different techniques used for the AR database and ORL database, the ConvNet used crowned the evaluation because of exceptional convergence and sturdy robustness.

FRAMEWORK

In order to prevail real-time emotion computing performance, we mapped and applied a framework. Face expressions they are provided with at the screen. By incorporating our work in real-time emotion reputation from a web camera, the platform is capable of tracking the person's expressions in real-time and

choosing if the person appears the expressions of the one accurately. It is established that training in facial features mirroring is essential to enhance the popularity abilities. This type of training permits us to enhance the abilities of people with ASD in facial expression recognition. See below **figure 2**.

CONCLUSION

In this paper, we constitute an interactive platform that is primarily based totally on deep learning strategies. This is designed to assist enhance emotion recognition in people with Autism Spectrum Disorder. The training platform allows the person to

examine the face expression photographs that is captured and is proven with their very own faces in real-time. By making use of our work in real-time emotion recognition from a web camera. The utility interface tracks the person's face from the device's front-facing camera and may decide if the person makes the perfect facial expression. Using this approach of training, the goal is to assist humans with ASD overcome their problems in face processing capabilities which include know-how emotional states. This kind of getting to know platform can be very beneficial for autistic kids and it will increase the learnability of emotions.

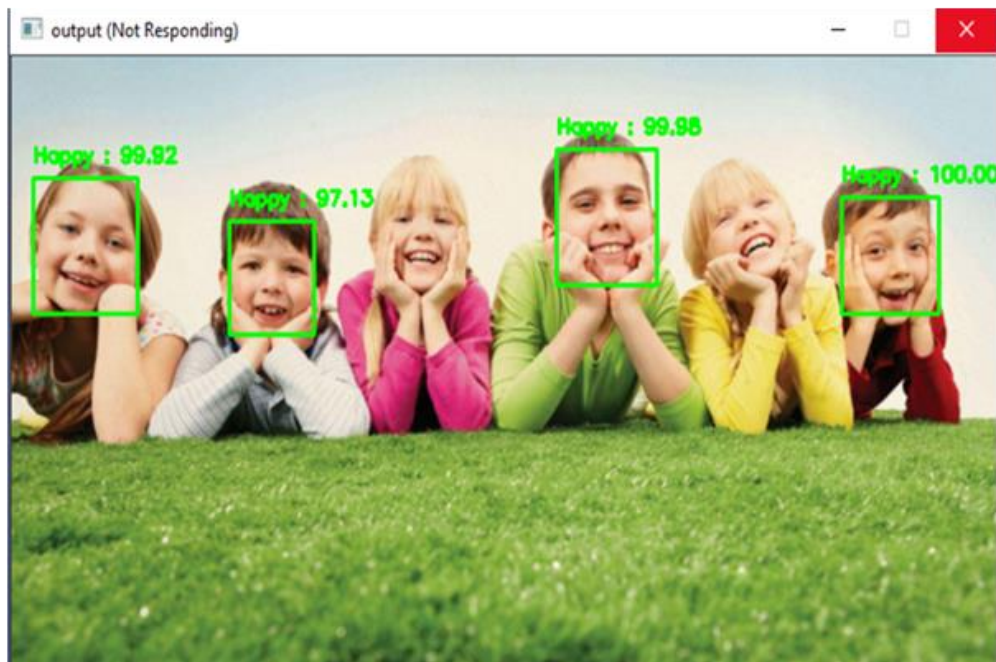


Figure 2. Output of the Framework

FUTURE WORK

In the future, we generally tend to assist the autistic kids with the want of actual records as a lecture room surroundings to check the real scenario. After we acquire the autistic kids's actual data, future work may be carried out. The Current studies especially identify the feelings of the character; however, the coaching process is a one-to-one interaction process. If teachers' behaviours are covered in the scope of recognition, it'll be greater realistic. Then After spotting the overall emotional performance of autistic kids, we will consider comparing the rating for the emotions expressed, and the end result may be displayed. If the rating is less, it'll encourage the character to practice extra. In addition, we will consist of anxiety, surprise, and lots greater feelings.

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