

Guided E Learning Application for Autism Spectrum Disorder

¹Dhrumil Kapadia, ²Harsh Rathod, ³Shantanu Shah, ⁴Shubhada Labde

^{1,2,3,4} K.J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai

Abstract:- Autism spectrum disorder (ASD) is a neurological and developmental disorder that start early in childhood and go on throughout a person's life. We need to provide education to young children those who have developed ASD in early childhood stages. These children do not respond naturally, they are always isolated so we need to make them utilize the E- Learning application and make them inclusive in the classroom, help them to develop interest and to interact with everyone in social. So, we are building an educational application incorporating intra and interpersonal development skills. Through this we can keep track on their ability and address their uneven progress in specific areas. The proposal of E- Learning application will be beneficial for the parents and teachers to understand the changes in the behaviour of an ASD child. Along with this we will be implementing Machine Learning algorithms(Classification) such as Random Forest-CART3 to make the E Learning application more simple and then we will be visualizing the data together on tableau and make analysis whether which child suffering from ASD has better grasping power and sustainability to think. It is also evolving such that the complexity will increase as the ASD learners understanding thought process progresses. This E- Learning application will play a drastic role in changing daily habitual life of an ASD child.

Keywords:- E- Learning Application, Random Forest-CART3, ASD, Machine Learning Algorithms.

I. INTRODUCTION

This is some kind of a condition that people with all age groups face like repetitive behaviors, social skills, nonverbal communication and speech or it can be defined as the developmental disorder characterized by certain problems in social interaction, along with restricted and repetitive patterns of behaviors, interests or activities. ASD people are to be taken special care. According to the survey by the disease control center, Autism is affected to 1 in 59 children in the United States. These children having Autism have attachment to environment and experience body movements such as hand flapping, pacing and rocking. At times, they may be aggressive or self-injurious. Sometimes they even feel pained by sounds, touches, smell or sight that may seem normal to other humans who are not suffering ASD.

The main symptoms of Autism are social communication challenges and that affects their life adversely are as follows:

- Gestures
- Lack of Eye Contact
- Facial expressions
- Tone of Voice
- Not looking at or listening to other people
- Talking in a sing-song, flat, or robotic voice
- A narrow range of interests or intense interest in certain topics

The children suffering from Autism Spectrum Disorder (ASD) do not respond and make eye contact while asking for something. They are self-involved and prefer to have solitary play time rather than interacting with other children who are not suffering ASD.

- Autism syndrome. These children don't have a problem with language; in fact, they tend to score in the average or above-average range on intelligence tests. But they have social problems and a narrow scope of interests.
- Autistic disorder. This is what most people think of when they hear the word "autism." It refers to problems with social interactions, communication, and play in children younger than 3 years.
- Childhood disorder. These children have typical development for at least 2 years and then lose some or most of their communication and social skills.
- Your doctor might use this term if your child has some autistic behaviors, like delays in social and communications skills, but doesn't fit into another category.

A. CAUSE AND DIAGNOSIS OF AUTISM:

Researchers indicate that in majority of the cases, genetics could be a basic factor for the ASD. Children born to parents who are older have a higher risk of suffering from Autism. Parents who have a child with ASD have a 2 to 18 percent chance of a second child who is also affected If a pregnant woman is exposed to certain drugs or chemicals, like alcohol or anti-seizure medications, her child is more likely to be autistic. Other risk factors include maternal metabolic conditions such as diabetes and obesity. Research has also linked autism to untreated phenylketonuria (also called PKU, a metabolic disorder caused by the absence of an enzyme) and rubella (German measles). There is no evidence that vaccinations cause autism. Diagnosing ASD can be difficult since there is no medical test to diagnose the doctors. So here comes an important role of machine learning,

artificial intelligence and different algorithms to predict and detect the Autistic behaviors.

B. Prevalence and Incidence Statistics about Autism:

Prevalence of Autism: Between 1 in 500 (2/1,000) to 1 in 166 children (6/1,000) have an Autism Spectrum Disorder (Centre for Disease Control). Prevalence Rate: Approx. 1 in 500 or 0.20% or more than 2,160,000 people in India.

- In 2018, the disease control and prevention centre determined that approximately 1 in 37 boys and 1 in 151 girls were diagnosed with an Autism spectrum disorder. This fact denotes that boys are four times more likely to be diagnosed with autism than girls.
- Most children are still being diagnosed after 4 years of age, though autism can be reliably diagnosed by as early as age 2.

II. RESEARCH METHODOLOGY

A. Collection of data:

To develop the model or application for the students suffering from Autism we visited and contacted various NGOs and many more organizations and we collected the data of students to store their data in the database and help the students in their daily routine.

B. Synthesis of data:

We synthesized the data given by the NGOs and the organizations on the basis of the children knowledge, how the student is performing and then we tested the data using the machine learning algorithms and done the entire synthesis very smoothly.

C. Developing the prediction model:

To develop the model we created a database using firebase and then we have the login up and sign up page where the details given by the NGOs are stored and accessed. On logging in you have activities lined up with a scheduler where you can set a time and will be connected to the phone and will ring an alarm.

D. Application on android:

Then we developed a mobile application which is connected to the database with an interface of login and signup and then we have the activities of the ASD students and we have also a scheduler where we can schedule the activities and this is how it would be helpful to the ASD students for a longer run.

III. METHODOLOGY

A. Fundamental Requirements:

Data mining is a technique that uses data analysis methods and algorithms for extracting information from data. Classification is a data mining technique wherein the data is grouped/classified by different criteria and are used to build models which are used for prediction. The model is first trained using training data and then it is tested using unseen testing data [1].

Data collection is the elementary part of developing this application. Data was collected from parents, institutes and various other sources. The datasets contain data of children to adults.

The data collected is then studied and cleaned so the application can be developed looking forward to the needs of autistic children.

This is an android application. The application aims at providing better understanding, learning and skills for autism spectrum disorder. This application will also include daily facts, knowledge and general FAQs.

In this application the autistic child or his caretaker will login/register on the portal and register themselves in the system's local database. The database used is Google Firebase.

Naive machine learning algorithms will be used to study the changes in the child's behavior before and after using the application.

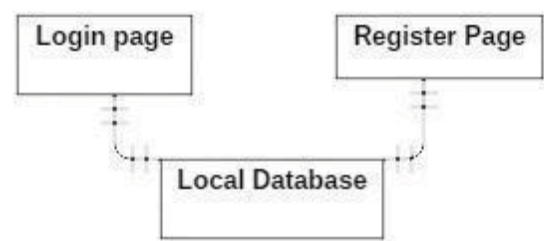


Fig1. Database

The key features provided by this application are:

1. Daily Schedule: The child will be able to customize/schedule his daily activities as per his/her convenience using cartoonist figures. Here the child will create his daily schedule, and at the scheduled time the application will be used to ensure that the user completes the task using Facial recognition and button click count feature.
2. Games: Play is the absence of stress. This app will act as a mode of gaming.
3. Good habits; This feature will display all the good habits that one has to follow using visual representations.
4. Recipes: This feature will allow users to view various recipes.

B. Technical Requirements:

AustismCare app is based on Android Platform. Android software development is the procedure of creating new applications for devices functioning on the Android operating System.

We have created our App on Android Studio using Java Language.

C. System Design:

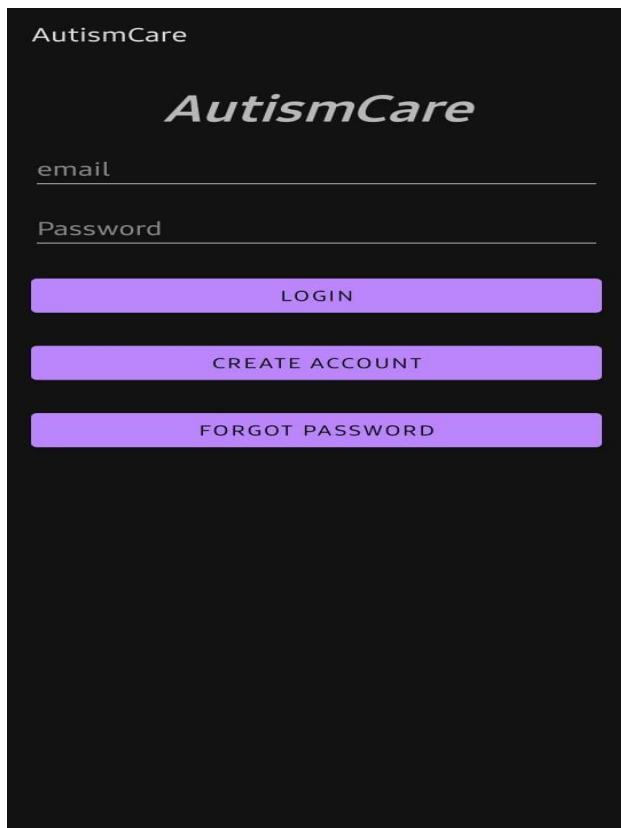


Fig.A : Login Page

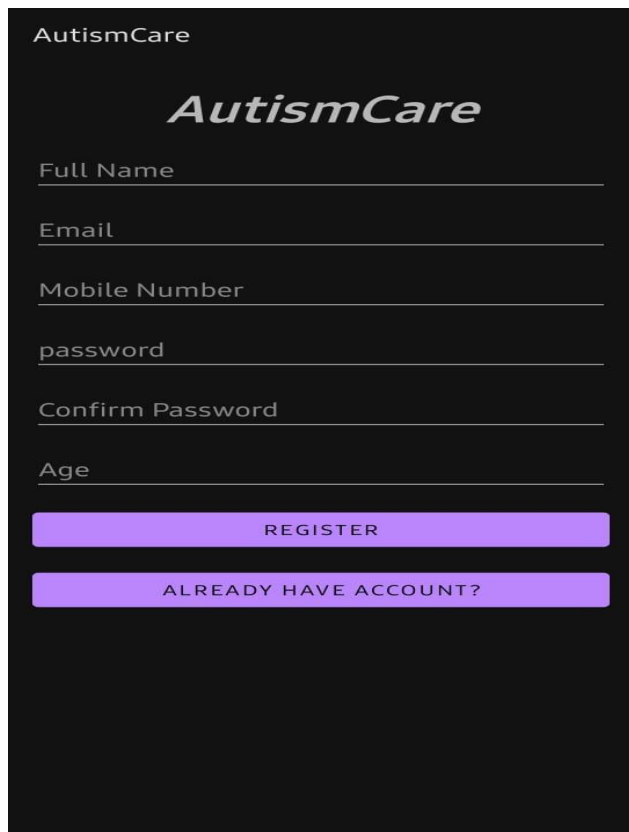


Fig.B: Register Page

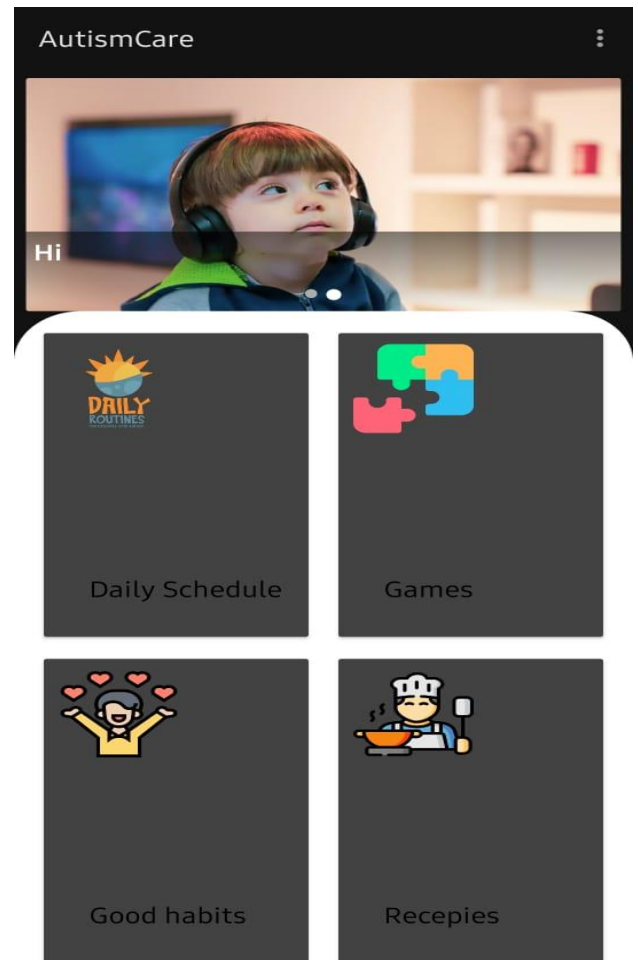


Fig.C: Menu Dashboard



FigD. Memory matching game

IV. LIMITATIONS AND FUTURE WORK

Limitations are this application works only on android devices and we are working for IOS devices as well and planning to host it on the play store .Our future work for this application is we will be using reinforcement learning and making the app more convenient for ASD students to use.

V. CONCLUSION

Till today, we have not yet met the proper requirements for inclusive classrooms and still lack behind in technology so by using this Intelligent guided E learning system we can specifically address the needs of learner students with Autism Spectrum disorder (ASD) suffering at early stages. The system can be utilized by teachers, SEAs, interventionists, and parents as a guide for one-on-one activities or as a self-directed individual learning tool for the students. It will also provide reports on daily basis and day to day analysis of a particular student. The guide will be more useful in education exploration and will be a great invention to technology and will be meaningful to the E learning and life of the students. This will prove the model to become more robust and life-giving ways.

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