

Artificial Intelligence In Special Education, Id& Cp

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Abstract

The present article, 'Artificial Intelligence – an introduction in view of Disability. is a description of Artificial Intelligence, especially in the disability field. It deals with the emergence of Artificial Intelligence, its types, methods used, importance of Assistive devices with Artificial Intelligence with persons with disability, benefits of AI, Examples of AI tools in the field of disability, its drawbacks and future in the field of disability. AI has developed intelligent computer tools for problem solving by humans. It enhances the way children with special needs interact with their environment and learn, as they have implicit educational needs.

Keywords: Artificial Intelligence, Assistive Technology, Special Education, Cerebral Palsy, Intellectual Disability.

Introduction to Artificial Intelligence

In Greek mythology, the concept of machine and mechanical man was mentioned. Though we don't have much available literatures regarding that. One of the stories is about Talos, a giant bronze warrior, who was programmed to guard the island of Crete was mentioned. So, machine learning and Artificial intelligence is a thought of long ago.

In 1950, Turing has published a paper on whether or not a computer can think intelligently like human beings. Though the results were not having much application, but Turing Test became very famous and it was a serious proposal in the field of Artificial Intelligence.

In the year 1951, by using Ferranti Mark1 machine University of Manchester, computer scientist Christopher Strachey, a program was developed for chess. Though it was improved many times. In the year 1956, first time the term Artificial Intelligence was coined. In the year 1959, first time, AI Laboratory was setup for the research purposes. In 1960, first Robot was introduced in General Motors assembly line. In 1961, first chat bot known as Eliza was introduced. In 1997, IBM Deep Blue-Beat the World champion Garry Kas Parvo, in the game of chess. In 2005, In Dap Grand Challenge, the robotic car Stanley' by Stanford Racing team, has won the title. In 2011, IBM's question answering system, Watson defeated the two greatest jeopardy champions Brad Rutter and Ken Jennings. In this way, Artificial Intelligence has

covered the way from hypothetical situation to an Important technology. J.P Morgan has described also the Contract Intelligence platform using AI, Machine learning and image recognition software to analyses legal documents. Programming languages for AI are Python, java, lingo etc.

The need for machine learning, which is also a part of AI has aroused due to cloud data, internet, social media and a lot of data gathered and need to be analyzed. AI has more computerized power, more data and better algorithm. Moreover, more investments in this field is also coming. So we have opportunity to explore in this area, especially for the benefit of the Individuals with special needs.

AI has developed computer tools for carrying out a number of tasks., an intelligent way of problem solving. AI is one of the most valuable applications in the field of Special Educational needs from diagnosing to planning intervention strategies. The main goal of AI is to enhance the way children interact with their environment, to promote learning and enrich their daily life. AI for Accessibility is a Microsoft program committed to empowering people living with disabilities.

AI covers knowledge base, computer vision, expert systems, machine learning, deep learning and natural language. Google's AI eye help Doctors can examine retina scan and intensity for diabetic retinopathy. OK Google, on the basis of data, location, Google search engines work on the basis of AI. Now a days Robot teachers with AI has been introduced in schools. Here skills like humans in

computers, like visual recognition, speech perception, decision making and translational skills are developed which are very beneficial to students. But they cannot replace teachers, and facilitate teaching and learning situation with teacher and AI collaboration i.e. Hybrid model only. So, more differentiated and individualized learning process can be established. In the new curriculum of CBSE, subjects related to AI has been introduced. Learning, Practicing. Testing and Assessment has gain a pace speed with the help of AI. Now the role of teachers has become more exciting, especially for the individuals with special needs. This can be understood by following case studies:

Case 1

A child Rohan (name changed) with cerebral palsy, motor problems and speech problems, was able to communicate with the help of AI, that he is willing to go out for refreshment. Actually he cheers his nonverbal communication. He understands most of the things in his environment, but parents have to take the help of AI to identify his needs. His speaking device is Dynavox. His hands do not work more for sign language or hit the buttons. Now with the help of AI, his speaking device is programmed to give commands to an echo. He can call to his grandpa with the device. Now he is more independent, so, more satisfied, motivated with high morale. He has less family members and friends. But AI is a boon for him in training and monitoring. to interact with the world.

Case 2

A 22year young man Frank (name changed) can type words with joystick. He has been working with a marketing team in a reputed company independently with AI assistive devices. Now he is much confident by joining the workforce and becoming independent productive member of the society.

AI equipment have reduced stress of the parents to some extent about what will happen to their children with special needs.

Assistive device is any item or product that is used to increase, maintain or improve functional capabilities of individuals with disabilities. For example: wheelchairs, hearing -visual aids, software & hardware etc.

Our expectations of AI more in the future is that, it will be helpful in providing:

- Differentiated and individualized learning- Adjusting learning based on an individual student's particular needs and knowledge.

- Universal access for all students: Equal education to all including those who speak different languages or who might have visual or hearing impairments.

- Automate admin tasks and assessment- It is believed that in future, routine and bureaucratic tasks and tasks performed by teaching assistants can be performed by machines leaving teachers more time to teach.

Fears related to AI:

- Ai can kill creativity- AI may not judge the student's creativity and analytical thinking, limiting education to a set of rules learnt by heart.

- Deepening inequality: We might end up in having classrooms with lots of young people interacting with AI systems, while only the privileged will keep the human interaction.

Ai gives potential access to learning. It is the time that Institutions take advantage of AI in advanced technology and modify their updating environment. AI shapes the future and classes beyond the classrooms. With AI, Learning will be more interactive anywhere and anytime in a technology learned environment, hybrid online, face to face lessons, personalized learning and guidance. Thus, each and every student can bring out their attributes, as no two persons have same skills of learning.

AI in Special Education

AI is an active area of research for 50 years. Basically, it is the study and development of 'intelligence agents' that can perceive their environment and take actions that increase their possibilities of success. Intelligence agents are the physical form of device(eg. Humanoid robots) or in software form with intellectual capacity (eg. A virtual avatar).

AI techniques have been gradually used to improve the life of individuals with special needs, covering a large number of difficulties, causing problems in learning, cognition, communication, behaviour, emotion, sensory & physical development. (2001 SEN Code of Practice)

The code of practice highlights the fact that not all children will progress at the same rate and each child has different strengths & need. So, it is very important for understanding of settings in which AI is going to be used, like availability, training to use, need etc. It may be different in different social conditions. But, definitely AI is enabling development of collaborative interactive environment. AI powered innovations are creating new possibilities regardless of how a person listens, speaks or writes. AI powered text messaging platform for mental health interventions are providing support to young people too.

AI tools in teaching and learning can enable inclusion of students with learning impairments or disabilities. AI offers effective support for online

learning and teaching including personalized learning for students, automated instructions, routine tasks, and powering adaptive assessments. Robotics with AI can be used to support, assist, and augment the teaching professionals. Appropriate assistive technology enables students with disabilities to compensate for certain impairments. This specialized technology promotes independence and decrease the need for other support. AI can dramatically improve the efficiencies of our workplaces and can augment the work humans can do. AI help teachers to detect students with learning difficulties and address them at an early age. AI tools and inventories are important part of education, especially for children with special needs, since AI are able to integrate the freedom of action of the student with more explicit control and guidance. Teachers and parents mostly use AI in training students rather than diagnosing their needs.

Some examples of AI tools for individuals with special needs in various categories are as follows:

- (a) **Dyslexia-** it is the most common developmental delay causing problems in reading, writing and spelling, which is neurologically based & lifelong condition. Its diagnosis is complex but AI makes it simple.

Palacios et al. have presented a rule based classification for the diagnosis of dyslexia with genetic fuzzy systems in early childhood. It can be used by parents, teachers for detecting those symptoms to therapists. Kohli et al.-2010 has introduced a systematic approach for identification of dyslexia at an early stage by using artificial neural networks, ANN. Melis et al.2001 has introduced ActiveMath, a web based intelligent tutoring system for maths, which allows the students to learn in their own environment. It uses a number of AI techniques to realize adaptive course generation, student modeling, feedback, interactive exercises etc. Anthony et al 2008 has designed an intelligent tutoring system- ITS for students learning algebra equation solving. The type of ITS used in this method is known as ‘cognitive tutors’ who pose authentic problems to students and give emphasis to learn by doing. Gonzalez et.al 2010 has designed an automated platform for the detection and analysis of errors in mathematical problems to support the personalized feedback of pupils. This method was found particularly useful for Down Syndrome cases, who exhibit difficulties in the arithmetic operations of addition and subtraction. Srihari et.al2008 has presented two computerized method of automatic scoring of

short hand written essays in reading comprehension tests. The aim of this system is to assign to each handwritten response a score which is comparable to that of human score. Jain et.al 2009 has proposed a model called Perception based learning Disability Detector- PLEDDOR. It is an artificial neural network model for identifying difficulties in reading- dyslexia, writing- dysgraphia, & in Math- dyscalculia, using curriculum-based test conducted by special educators. Hernandez et.al 2009 has introduced SEDA- Expert system for learning difficulties in children’s basic education. It consists of psych psychopedagogy evaluation ie to identify relationship between input variables eg. Age, sex, educational level, & output system eg. Psychomotor aspect, intellectual aspect, personal aspect.

- (b) **ADHD-** It refers to a wide range of difficulties that become apparent during the developmental period, characterized by a set of behavior problems of inattention, hyperactivity & impulsivity or their combinations. AI has offered some improved diagnostic & intervention tools for these behavior difficulties. Rebolledo-Mendez and Freitas presented the neuro-sky mindset which is able to detect attention levels in an assessment exercise. Neurosky consists of a headset with 3 electrodes, which are put beneath the ears & on the forehead. The electrical signals read at the above locations are used as input by Neurosky algorithms to assess the attention levels. An AI driven Avtaar was also designed to pose questions & have limited conversation with the users. It is low cost, non clinical & easy to use tool designed for leisure. Aguillar et.al 2006 has designed a model tutor module in an intelligent tutorial system ITS, which is an interactive instructional method for ADHD assessment.

- (c) **Sensory/ physical impairment-** Georgopoulos et.al 2003 presented a fuzzy cognitive map approach for differential diagnosis of specific language impairment. Fuzzy cognitive maps are a soft computing methodology that uses a symbolic representation for the description & modeling of complex systems for differential diagnosis of SLI from dyslexia and autism. Schipor et.al 2003 attempted to create a computer-based speech therapy CBST system using a fuzzy expert system for helping learners with speech disorder called LOGOMON. Pavlopoulos et.al 2008 implemented a neural network approach for the self-assessment for the learners optimized with the aid of genetic

programming. The purpose was to assess the user's answers from both single & multiple questions in an e-learning environment. Drigas et.al 2008 has presented 'Dedalos' project which deals with teaching of the English language as a second language to hearing impaired children.

(d) **Autism-** Children with ASD exhibit impairments in social skill language & communication skills and a tendency towards repetitive patterns of interest & behavior. AI techniques can facilitate early intervention & provide specialists with robust tools indicating the person's ASD level. Sebe et.al 2006 has implemented an emotion recognition computerized tool based on joint visual and audio cues. This human- computer interaction application besides the 6 universal emotions (happy, surprise, angry, disgust, fear& sad) is able to recognize other affective states like interest, boredom, confusion & frustration, when it is difficult to assess emotion. Riedl et.al 2007 has designed a platform to aid adolescents with high functioning Autistic Spectrum disorder HFASD rehearse & learn social skills with reduced help of parents, teachers and therapists. Arthi & Tamilarasi 2008 has introduced a model which helps in the diagnosis of Autism in children by applying Artificial Neural Networks-ANN technique. AI apps are also helping people with Down Syndrome and Autism performing their tasks/jobs in manufacturing and distributing.

(e) **Cerebral Palsy-** Research has found that AI systems help to refine prognosis, and assist in management selection and support therapy for children with CP. Virtual reality can help to keep children with CP engaged with the rehabilitation program improving motor functions more rapidly. AI application can benefit children with CP through symptom management devices. Eg. Mobility devices adapting navigation, avoiding obstacles and traffic, are ideal for wheelchair users. The combination of AI with imaging technology can make it possible to measure large sets of data from video material. This also makes it easier for medical professionals to share their findings of spontaneous movements associated with CP to others, helping them to diagnose their patients. These processes help to speed up the process of diagnosing CP in children. Early detection of CP is important to allow treatment to begin as soon as possible. Hence developing AI approaches to detect CP could improve

children's life significantly. These systems manage uncertain, incomplete, or inconsistent information and provide some reasoning. They determine a diagnosis based on experience, intuition and picking up patterns with more accuracy.

Automated Grading System

Teacher's answer checking may be defaulted. But it is still best in subjective answers. AI is best in multiple-choice questions and fill in the blank type questions. AI reduces teacher's burden and increase efficiency in teaching.

Easy to Track Everything

Activities and progress/performance of each student can be traced. Student's attendance can be updated, face recognition can be used. Feedback from students/parents/teachers is easier with AI. AI can help people developing skills in the workplace and evolve the culture around inclusive hiring and economic recovery. The inclusive design research center IDRC at OCAD University is investing disability understanding in hiring algorithms and builds on future of work and disability.

'Everyone wins when we harness AI' says Kiran Kaja, technical programme manager at Google. Voice recognition was developed for disabled people, but it's the hot item at the moment and is useful for everyone. The big opportunity for AI is the advance translation capabilities and free apps, which could help assistive technology and it could go 'Global' and reach part of the world where there are more disabled people and fewer services and support.

Global Importance

AI Technology can educate globally with diversity of language and culture at same platform. Hearing and visual impairment students and intellectually disabled students are benefitted a lot.

In a smart AI guided campus, students and teachers will be connected to all systems. This will guide teachers too about where the students are facing challenges. AI saves time and get the outsource resources and immediate feedback about how students are receiving the information, and if there is any scope for improvement. Virtual assistance and interaction with human mind help in reshaping learning.

Table 1: Opinions by representatives of some of the Indian organizations these are working on 'Use of AI in Education' (Dhar, 2019) [6], (Dialani, 2019) [7]

Name of the Organization Representative	Opinions expressed by the Organization Representative
Sameer Bora, Executive VP, Next Education India Pvt. Ltd.	Adaptive assessments give very accurate results. Based on these the teacher can give individual feedback to each child on what should be the new learning path. Earlier, students would get a general advice – 'Good. Can do better'. But AI allows teachers to be more focused.
Swapnil Dharmadhikari, Founder, Splashgain Technology Solutions Pvt. Ltd.	Remote Proctoring is the future monitoring of exams. The technology captures physical movements of the candidate. If the candidate tries to open a new window or an URL, it immediately sends an alert to the remote invigilator. In the future physical invigilation will be replaced with digital invigilation.
Prashanth B. R., Co-Founder, Krackin and Kiran G. R., Co- Founder, Krackin	Algorithms replace mentors in providing customized learning. AI enables students to discover a unique path of learning, customised to their aspiration and capabilities. At present it's being used in 89 colleges, and by 300+ companies.
Sreedhar Narla, CEO-Founder, ICET Solutions, Bengaluru	Mobile App making attendance register redundant. Traditional attendance takes about 10 minutes, but this app can do the task in one minute. The teacher takes a couple of shots with her phone camera, the images are processed in the cloud and the attendance marked.
Zishaan Hayath, Co-Founder and CEO, Toppr	At Toppr, we use both AI and AI to layout the learner's characteristics and inadequacies. Singular learning rates and records are pondered. These tests are planned to help a child's trust in zones they surpass desires in and challenge them in areas they don't. This comprehensive technique empowers children to remain energized and spurred.

Source: (Dhar, 2019) [6], (Dialani, 2019) [7]

AI tools are being successfully applied to solve problems in the field of disability and special education. But there is a need of proper training for AI guided tools to teachers, parents and therapists for assessment & intervention methods. Saving time, cost and appropriate results are increasing AI tools for diagnosing & intervention purpose and also creating more efficient learning environment. Now AI has been considered as a promising educational aiding tool for all individuals who are in need to embrace their learning with independence. This is also an important concern that these Technologies are still have to be implemented in developing countries, which is a big challenge. Though attempts are going on. Like Hexis-Antara aims to remove the access barrier to books by converting textbook and nonacademic content into braille on demand through Vembi, a device specially designed for VI children. DAISY consortium is developing an easy-to-use conversion solution for developing countries, dramatically expanding the availability of

accessible books for people with disabilities using low-configuration devices such as solar powered audio players, affordable braille displays and basic phones. AI4Bharat aims to improve accessibility for the deaf population in India by creating datasets to advance Indian Sign Language understanding with a focus on workplace communication.

Conclusion

A lot of investments are going on in developing AI tools to ensure the accessibility of learning materials, language development, and assistive technology options. AI powered innovations in Education can build and advance equity for people with disabilities and also at all stages of employment too like job searching, interviewing, and upskilling. AI IN India's education sector has also come to be quite significant. AI has the potential to add USD 1 trillion to the Indian economy by 2035, according to a 2018 discussion paper by NITI Aayog.

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