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Empowering Individuals with Special Needs: Harnessing AI in the Legal Representation of Clients with Special Needs

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EMPOWERING INDIVIDUALS WITH SPECIAL NEEDS: HARNESSING AI IN THE LEGAL REPRESENTATION OF CLIENTS WITH SPECIAL NEEDS

I. THE HISTORY OF ARTIFICIAL INTELLIGENCE.

In the early part of the 20th Century, science fiction began to contemplate the idea of artificial intelligence. The silent 1920 film, *Metropolis,* depicted a bleak future in which the villain builds an android, HEL, to mislead oppressed workers and seize power. Stanley Kubrick's 1968 movie, *2001:A Space Odyssey,* features the HAL-9000 supercomputer which values the mission over human life and can be seen as a prototypical representation of AI harming humans due to inaccurately formulated goals and program specifications. In the 1970 film, *Colossus: The Forbin Project*, the supercomputer Colossus is created to control the United States' nuclear weapons arsenal, but then joins with its Soviet counterpart, Guardian, to take control of the world. *Colossus* was one of the first films to explore an existential threat posed by AI, and what could happen if it takes on an uncontrollable life of its own. Other popular examples from the movie industry include *Blade Runner* (1982), *the Terminator* (1984), *the Matrix* (1999), *I, Robot* (2004), and *Wall-E* (2008).

In the real world, the first digital computers were only invented about eight decades ago as shown on the below chart (see fig. 1). Since that time, technology has grown rapidly.

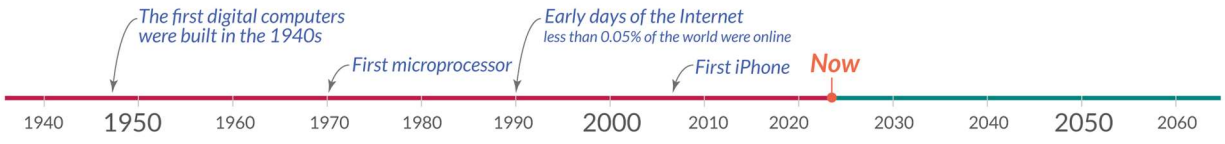

Fig. 1: From *The brief history of artificial intelligence: The world has changed fast – what might be next?* By Max Roser, OurWorldInData.org. https://ourworldindata.org/brief-history-of-ai.

The earliest substantial work in the field of artificial intelligence was done in the mid-20th century by the British logician and computer pioneer, Alan Turing (Copeland, 2023). In 1935, Turing described an abstract computing machine consisting of a limitless memory and a scanner that moves back and forth through the memory, reading what it finds and writing further symbols. The actions of the scanner are dictated by a program of instructions that are also stored in the memory in the form of symbols. This is Turing's stored-program concept, now known simply as the universal Turing machine (Copeland, 2023). Turing gave quite possibly the earliest public lecture (London, 1947) to mention computer intelligence, saying, "What we want is a machine that can learn from experience," and that the "possibility of letting the machine alter its own instructions provides the mechanism for this" (Copeland, 2023). In 1948, Turing introduced many of the central concepts of AI in a report entitled "Intelligent Machinery."

In 1950, Turing introduced a practical test for computer intelligence that is now known simply as the Turing Test. The basic idea of the Turing Test is simple: a human judge engages in a text-based conversation with both a human and a machine, and then decides which of the two they believe to be a human. If the judge is unable to distinguish between the human and the machine based on the conversation, then the machine is said to have passed the Turing Test.

The first working AI programs were written in 1951 to run on the Ferranti Mark 1 machine of the University of Manchester: a checkers-playing program written by Christopher Strachey and a chess-playing program written by Dietrich Prinz (Russell and Norvig, 2021). In 1956, Allen Newell, Cliff Shaw, and Herbert Simon developed the *Logic Theorist*, an artificial intelligence program designed to mimic the problem-solving skills of a human being. The *Logic Theorist* is considered by many to be the first artificial intelligence program, and it was presented at the

Dartmouth Summer Research Project on Artificial Intelligence, where the term "artificial intelligence" was coined (Anyoha, 2017).

From 1957 to 1974, AI flourished (Anyoha, 2017). Computers could store more information and became faster, cheaper, and more accessible. The details of two of the best-known early AI programs, *Eliza* and *Parry*, were published in 1966 and gave an eerie semblance of intelligent conversation (Copeland, 2023). *Eliza*, written by Joseph Weizenbaum of MIT's AI Laboratory, simulated a human therapist. *Parry*, written by Stanford University psychiatrist, Kenneth Colby, simulated a human paranoiac (Copeland, 2023). Psychiatrists who were asked to decide whether they were communicating with *Parry* or a human paranoiac were often unable to tell. Nevertheless, neither *Parry* nor *Eliza* could reasonably be described as intelligent, as their responses were canned—constructed in advance by the programmer and stored away in the computer's memory (Copeland, 2023).

During the 1970s and 1980s, there was an evolution of AI techniques. The first one was the "expert system," which imitated human's aptitude to make decisions (Abonamah et al., 2021). For such AI systems, every effort is made to incorporate all of the information about some narrow field that an expert (or group of experts) would know, so that a good expert system can often outperform any single human expert. Computers started to utilize reasoning depending on "rules" - an "if-then/else" procedure used to respond to queries. There are many commercial expert systems, including programs for medical diagnosis, chemical analysis, credit authorization, financial management, corporate planning, financial document routing, oil and mineral prospecting, genetic engineering, automobile design and manufacture, camera lens design, computer installation design, airline scheduling, cargo placement, and automatic help services for home computer owners (Leppert and Schaeffer, 2023).

Another approach which was dominant in the 1970s and 1980s was Symbolic AI. Symbolic AI algorithms work by processing symbols, which represent objects or concepts in the world, and their relationships. The main approach in Symbolic AI is to use logic-based programming, where rules and axioms are used to make inferences and deductions (DataCamp, 2023). Symbolic AI has been applied in various fields, including natural language processing, expert systems, and robotics. Some specific examples include:

- *Siri* and other digital assistants use Symbolic AI to understand natural language and provide responses.
- Medical diagnosis systems use Symbolic AI to provide recommendations to doctors based on patient symptoms.
- Autonomous cars use Symbolic AI to make decisions based on the environment, such as recognizing stop signs and traffic lights.
- Computer vision systems use Symbolic AI to recognize objects and patterns in images.

Connectionism, or neuronlike computing, developed out of attempts to understand how the human brain works at the neural level and, in particular, how people learn and remember (DataCamp, 2023). Connectionism has been used to create artificial neural networks, which are computer systems that are designed to mimic the way the brain works by learning from example. Applications of neural networks include the following:

- Visual perception. Networks can recognize faces and other objects from visual data. For example, neural networks can distinguish whether an animal in a picture is a cat or a dog. Such networks can also distinguish a group of people as separate individuals.

- Language processing. Neural networks are able to convert handwritten and typewritten material to electronic text. Neural networks also convert speech to printed text and printed text to speech.
- Financial analysis. Neural networks are being used increasingly for loan risk assessment, real estate valuation, bankruptcy prediction, share price prediction, and other business applications.
- Medicine. Medical applications include detecting lung nodules and heart arrhythmias and predicting adverse drug reactions.
- Telecommunications. Telecommunications applications of neural networks include control of telephone switching networks and echo cancellation on satellite links (DataCamp, 2023).

During the 1990s and 2000s, many of the landmark goals of artificial intelligence had been achieved (Anyoha, 2017). In 1997, reigning world chess champion and grand master, Gary Kasparov, was defeated by IBM's *Deep Blue*, a chess playing computer program. This highly publicized match was the first time a reigning world chess champion lost to a computer and served as a huge step towards an artificially intelligent decision-making program (Anyoha, 2017). In the same year, speech recognition software, developed by Dragon Systems, was implemented on Windows (Anyoha, 2017). This was another great step forward but in the direction of the spoken language interpretation endeavor. It seemed that there wasn't a problem machines couldn't handle. Even human emotion was fair game as evidenced by *Kismet*, a robot developed by Cynthia Breazeal that could recognize and display emotions (Anyoha, 2017). A timeline of some of the more significant systems is set forth below (see fig. 2).

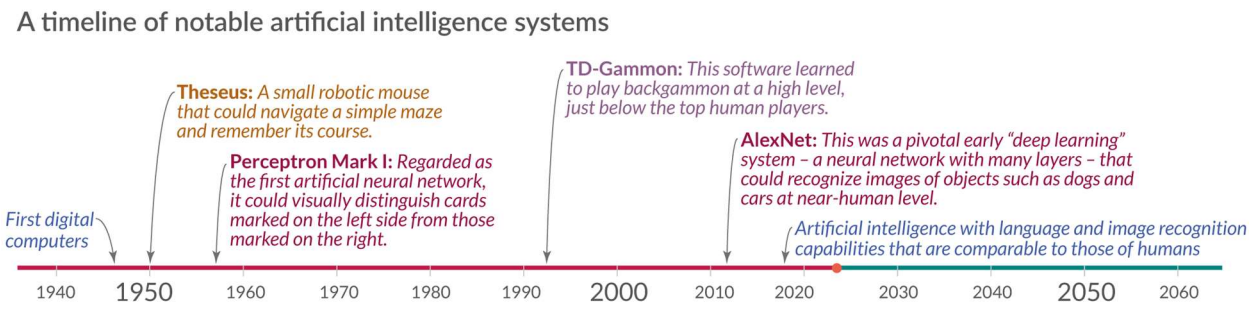

Fig. 2: A timeline of notable artificial intelligence systems from *The brief history of artificial intelligence: The world has changed fast – what might be next?* By Max Roser, OurWorldInData.org. https://ourworldindata.org/brief-history-of-ai.

The 2010s saw a rise of deep learning and the development of AI applications in image recognition, nature language processing, and autonomous vehicles. Deep learning is a method in artificial intelligence that teaches computers to process data in a way that is inspired by the human brain. Deep learning models can recognize complex patterns in pictures, text, sounds, and other data to produce accurate insights and predictions.

Language and image recognition capabilities of AI systems have developed very rapidly in the 21st Century. The below chart (see fig. 3) stems from a number of tests in which human and AI performance were evaluated in five different domains, from handwriting recognition to language understanding (Roser, 2022). Within each of the five domains, the initial performance of the AI system is set to -100, and human performance in these tests is used as a baseline set to zero (Roser, 2022). This means that when the model's performance crossed the zero line, the AI system scored more points in the relevant test than the humans who did the same test (Roser, 2022). Just 10 years ago, no machine could reliably provide language or image recognition at a human level. But, as the chart shows, AI systems have become steadily more capable and are now beating humans in tests in all of these domains (Roser, 2022).

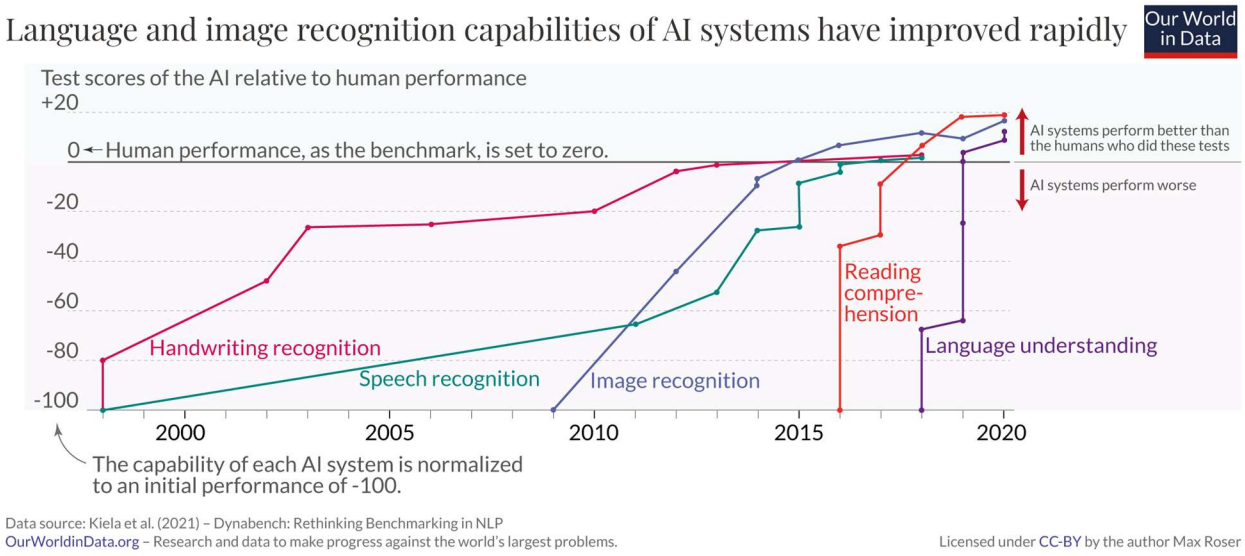

Fig. 3: Test scores of the AI relative to human performance from *The brief history of artificial intelligence: The world has changed fast – what might be next?* By Max Roser, OurWorldInData.org. https://ourworldindata.org/brief-history-of-ai.

Today, AI is integrated into a wide range of new domains. Smart assistants, such as Amazon *Alexa*, *Google Assistant*, and Apple's *Siri*, utilize natural language processing and machine learning to understand and respond to user queries, manage appointments, control smart home devices, and provide personalized recommendations (Roser, 2022). Self-driving cars and autonomous vehicle systems leverage AI technologies such as computer vision, sensor fusion, and reinforcement learning (Roser, 2022). AI is used in financial systems for fraud detection, credit scoring and risk management. It is integrated into healthcare systems for medical imaging analysis, diagnostic support, drug delivery and personalized medicine (Roser, 2022). Large AIs called recommender systems determine what you see on social media, which products are shown to you in online shops, and what gets recommended to you on YouTube (Roser, 2022). Increasingly, they are not just recommending the media we consume, but based on their capacity to generate images and texts, they are also creating the media we consume (Roser, 2022).

II. USING AI TO EMPOWER PERSONS WITH SPECIAL NEEDS

Technology has been opening doors for individuals with special needs, from motorized scooters to hearing aids, for a long time and in the coming years, AI will begin to supercharge these efforts with new abilities and expanded access (Snow, 2019). AI is already easing communication, creating learning opportunities, promoting a more independent lifestyle, and providing a connection to the outside world for people with disabilities, and it has the exciting potential to lead us to a more inclusive future regardless of ability.

Overall, there are about 42.5 million Americans with disabilities, making up 13% of the civilian noninstitutionalized population, according to U.S. Census Bureau data from 2021. This group includes people with hearing, vision, cognitive, walking, self-care or independent living difficulties (Leppert and Schaeffer, 2023). According to the Bureau of Labor Statistics, the unemployment rate for persons with disabilities is twice that of persons without disabilities. In 2022, the unemployment rate was 7.6 percent for persons with disabilities, compared with the unemployment rate for persons without disabilities, which was 3.5 percent. AI may help level the playing field.

A. SPEECH AND COMMUNICATION

A key area where AI has been utilized is to assist people who have difficulty with speech and communication. *Voiceitt* is an accessible speech recognition technology company that uses AI and machine learning to assist people with non-standard speech and speech impairments (Jagati, 2023). The technology is designed to recognize and adapt to non-standard speech patterns, thereby enabling clearer communication (Jagati, 2023). This technology actually learns from the individual's unique speech patterns and uses this information to translate it into a form that is easily understood by others. This can be particularly helpful for persons with cerebral palsy, Parkinson's

disease and Down syndrome where producing clear speech can be challenging (Jagati, 2023). *Voiceitt* also has a live captioning capability to allow real-time speech transcription during video calls or live interactions.

In addition, AI can reduce the communication gap for nonverbal individuals with motor disabilities who rely on typing text into computers to communicate. A team from the University of Cambridge and the University of Dundee, developed a new context-aware method that reduces this communication gap by eliminating between 50% and 96% of the keystrokes the person has to type to communicate (Kristensson et al., 2020). The method developed by Per Ola Kristensson and his colleagues uses artificial intelligence to allow a user to quickly retrieve sentences they have typed in the past (Kristensson et al., 2020). Prior research has shown that people who rely on speech synthesis, just like everyone else, tend to reuse many of the same phrases and sentences in everyday conversation (Kristensson et al., 2020). However, retrieving these phrases and sentences is a time-consuming process for users of existing speech synthesis technologies, further slowing down the flow of conversation (Kristensson et al., 2020). In the new AI enhanced system, as the person is typing, the system uses information retrieval algorithms to automatically retrieve the most relevant previous sentences based on the text typed and the context of the conversation that the person is involved in (Kristensson et al., 2020). Context includes information about the conversation such as the location, time of day, and automatic identification of the speaking partner's face. The other speaker is identified using a computer vision algorithm trained to recognize human faces from a front-mounted camera.

Researchers at UC San Francisco have successfully developed a "speech neuroprosthesis" that has enabled a man with severe paralysis to communicate in sentences, translating signals from his brain into words that appear as text on a screen (Marks, 2021). This

study focuses on translating signals intended to control muscles of the vocal system for speaking words, rather than signals to move the arm or hand to enable typing and taps into the natural and fluid aspects of speech, promising a more rapid and organic means of communication (Marks, 2021).

B. VISION

Almost 20 million Americans — 8 percent of the U.S. population — have visual impairments. Visual impairments, including blindness, are one of the leading causes of loss of independence among people age 65 and older (Guralnik et al., 1999). Costs related to visual impairments total about $40 billion a year in the U.S. Medical costs account for almost 60 percent — $22 billion — of the total cost (Georgetown University, 2019). Although many causes of visual impairments are preventable, the number of people with such impairments is expected to double within the next three decades (Georgetown University, 2019). Visual impairments range from poor vision to blindness, and cannot be completely corrected by glasses, contact lenses, medication, or surgery. People with visual impairments have difficulty performing routine tasks, such as reading a newspaper. Compared to those who do not have difficulty seeing, people who have impaired vision are more limited in their activities, including paid work and social engagements. Furthermore, people with visual impairments generally use more health care services and experience higher out-of-pocket health care costs than those who do not have visual impairments (Georgetown University, 2019).

AI-powered imaging tools now have the potential to assist visually impaired individuals by converting visual data into various kinds of interpretable formats. For instance, tools like *OCR.best* and *Image2TxT* are designed to automatically decipher visual cues and convert them into text and audio-based responses (Jagati, 2023). The AI-driven tool *Be My Eyes AI* acts as a tour guide, food

blogger, and personal assistant ushering in a new form of complex, and human-mimicking assistance using OpenAI's hyper-realistic AI language model (DiBenedetto, 2023). AI-based image tools can also be used to increase and decrease contrast and optimize the resolution quality of images in real time. As a result, individuals with conditions like myopia and hyperopia can alter the resolution of images to suit their visual abilities (Jagati, 2023). Smart assistants like Amazon's *Alexa* and Apple's *Siri* have become some of the biggest helpers for blind users, allowing them to get online more easily (Jagati, 2023).

C. HEARING

As of the first quarter of 2023, the WHO estimates that approximately 430 million people currently have "severe disabling hearing loss," which accounts for nearly 5% of the global population (Jagati, 2023). Moreover, the research body has indicated that by 2050, over 700 million people — or one in every 10 people — will have disabling hearing loss (Jagati, 2023).

Over 100,000 deaf and hard of hearing individuals have used *Ava*, an app that allows them to take part in group conversations in either English or French (with more limited use for Spanish, Italian, German, and Russian) (Snow, 2019). Everyone engaged in a conversation opens *Ava* on their phones, then speaks normally as the app listens in. *Ava* converts spoken words into text in nearly real time, rendering each speaker's words into a different color for those needing to read along to follow the chat. Users are discovering new ways to open up voice-based assistants to the deaf, too. One project made Amazon's *Echo* able to understand and respond in sign language using a webcam (Snow, 2019).

Another platform called *Whisper* harnesses sound separation technology to enhance the quality of incoming speech while reducing background noise to deliver sharper audio signals. The

platform also uses algorithms to learn and adapt to a user's listening preferences over time (Jagati, 2023).

A company called *Vuzix* has developed eyeglasses that can display text directly on the lenses (Tugend, 2022). Roshan Mathew, a graduate student in computer-human interaction at the Rochester Institute of Technology, has tried the *Vuzix* glasses and loves them. "When I have to use a smartphone or laptop when talking to someone, I can't maintain face-to-face contact," Mr. Mathew, who is deaf, said. "Communications are not just what we say, but what we see." (Tugend, 2022).

D. MOBILITY

The Center for Disease Control and Prevention notes that a little over 12% of Americans experience mobility issues (Jagati, 2023). AI in this context is being used to assist with navigation and movement capabilities for wheelchairs and in the development of mobility-focused exoskeletons and prosthetic limbs.

HOOBOX Robotics' *Wheelie 7*, allows wheelchair users to initiate moves like going forward, turning, and stopping by making nine distinct facial expressions (Snow, 2019). Firms like UPnRIDE and WHILL have created products that offer autonomous navigation and movement capabilities for wheelchairs (Jagati, 2023).

AI also appears in mobility-focused exoskeletons and prosthetic limbs, improving the autonomy of finer movements in prosthetic arms and boosting the power of electromyography-controlled nerve interfaces for electronic prosthetics (Jagati, 2023). AI-based systems can actuate and read different nerve inputs simultaneously, improving the overall function and dexterity of the devices (Jagati, 2023). The University of Stanford has also developed an exoskeleton prototype that uses AI to improve energy expenditure and provide a more natural gait for users (Jagati, 2023).

In 2011, Gert-Jan Oskam became paralyzed from the hips down due to a spinal cord injury after being involved in a motorcycle accident. The Dutch patient has regained the ability to walk again after getting an implant that acted as a 'digital bridge' between his brain and spinal cord (Yao, 2023). AI was the key. The device is called a brain-spine interface that can pick up Oskam's thoughts about wanting to walk through electrical activity in the cortex (Yao, 2023). This signal travels to an external computer he wears and is then sent to an implant within his spine (Yao, 2023).

E. Autism Spectrum Disorder

About 1 in 36 children have been diagnosed with an autism spectrum disorder in the United States, a statistic that may be higher considering those who remain undiagnosed (Haslan, 2023). While the prevalence of the condition (sometimes characterized by differing use of language and social awareness) has led to strides in early diagnosis and educational support, students who age out of the educational system confront a dearth of opportunities (Haslan, 2023).

Over 60% of all autistic adults (including roughly 2 million with college degrees) struggle to obtain and keep employment due to a myriad of challenges they face in the workplace, from the sensory overload of a noisy office to understanding the social dynamics—such as how you speak differently to a peer than a CEO (Haslan, 2023). Real-time conversations are especially difficult for people with autism as they require individuals to simultaneously analyze and process facial expressions, information, tone, word choice and more, which can impede understanding and hamper work performance (Haslan, 2023). Yet people with autism often have unique skill sets—including attention to detail and faster recognition of patterns. Employment programs, particularly large companies like Microsoft and IBM, have over the past decade capitalized on the skills of autistic individuals in supported environments (Haslan, 2023).

Some of the benefits of AI for individuals with autism spectrum disorder (ASD) include the following:

- Personalized Learning: AI can adapt to the unique learning style of each individual, providing a personalized learning experience. This is particularly beneficial for those with ASD, who often require tailored educational approaches. AI can adjust the pace, content, and method of instruction to optimize learning outcomes.
- Improved Communication: One of the key benefits of AI for individuals on the autism spectrum is that it can help bridge the communication gap that they may experience. Many autistic individuals struggle with verbal communication, whether it's difficulty expressing themselves or trouble understanding others. AI can assist in translating and interpreting nuanced human communication, making it easier for those with ASD to interact with the world around them.
- Social Interaction Training: AI-powered robots and virtual characters can provide a safe and controlled environment for individuals with ASD to practice social interaction. These AI entities can simulate various social scenarios, helping those with ASD to learn and understand social cues and norms.
- Emotional Recognition: AI can be trained to recognize and interpret human emotions. This can be particularly beneficial for individuals with ASD, who often struggle with understanding and expressing emotions. By providing real-time feedback on emotional states, AI can help those with ASD navigate emotional interactions.
- Behavioral Analysis and Intervention: AI can analyze behavioral patterns and predict potential challenges or meltdowns. This allows for timely interventions and the

implementation of coping strategies, reducing stress for both the individual with ASD and their caregivers.

- Enhanced Independence: AI can assist individuals with ASD in accomplishing daily tasks and routines, promoting independence and self-confidence. This can range from AI-powered reminders for tasks to AI-assisted navigation for those who struggle with spatial orientation.
- Therapeutic Applications: AI can be integrated into therapeutic interventions, such as Cognitive Behavioral Therapy (CBT). By providing personalized and adaptive therapeutic content, AI can enhance the effectiveness of these interventions.
- Early Detection and Diagnosis: AI can analyze subtle patterns and indicators that might be overlooked by humans, potentially enabling earlier detection and diagnosis of ASD. Early diagnosis is crucial as it allows for early intervention, which can significantly improve outcomes for individuals with ASD.
- Accessible Therapy: AI can make therapeutic resources more accessible to those who might not otherwise have access to them. For example, AI-powered apps can provide therapeutic exercises and strategies directly to smartphones, making therapy accessible anywhere, at anytime.
- Data-Driven Insights: AI can analyze large amounts of data to provide insights into ASD. This can lead to a better understanding of the disorder and inform the development of new strategies and interventions (Donnelly, 2023).

A new communications platform in development at the University of Maryland could increase employment opportunities for the autistic community by helping individuals navigate the nuances of communication with their neurotypical colleagues. The platform. called *Fostering Inclusivity*

through Technology (FIT), is supported by a $1.5 million Grand Challenges Grant from UMD (Haslan, 2023). The platform could use artificial intelligence to support real-time interactions in the virtual workspace, with potential features ranging from interpreting nonverbal cues like facial expressions to an indirect language translator for better understanding (Haslan, 2023). The project team is working with the autistic community throughout the design process to ensure the platform works as intended (Haslan, 2023).

Empowered Brain™ is the world's first wearable system that helps students with autism, ADHD, and other social-emotional challenges to learn the life skills crucial for happy self-sufficiency. An individual looks through a wearable computer or "digital coach" that recognizes social situations and guides the user toward appropriate responses (Molko, 2020). The real-time reinforcement builds social-emotional skills and self-confidence, and creates data for progress reports (Molko, 2020). This facilitates increased functional independence, also enabling some to interact more effectively in a standard workplace setting (Molko, 2020).

Social robots, which are made to interact with humans, can help teach social and educational skills to students of all abilities, but have significant potential with children with autism. Children with autism tend to respond to robots "in a way that they don't to puppets or pet therapies, or to many of the other kinds of things that we've tried," said Brian Scassellati, a professor of computer science, cognitive science and mechanical engineering at Yale University (Tugend, 2022). Scassellati suggested that may be because robots seem human-like, but are nonjudgmental (Tugend, 2022).

A humanoid robot, named *Nao*, learns about a child's behavior by using two cameras and four microphones to record the child's facial expression and body language as the child interacts (Sinha, 2018). Once it records the data, it carefully assesses the data to figure out the most effective way

to gain the child's attention. *Milo*, developed by the company Robokind, shows emotions through facial expressions, can communicate with its own voice, and can teach children about social norms (Sinha, 2018).

An app called *Identifor Companion* is helping adults and children find employment (Sinha, 2018). It includes an AI-powered virtual assistant called *Abby* that is capable of having real back-and-forth conversations with the users. It learns the routines of users and keeps their school, work and social life on track (Sinha, 2018).

III. AI IN ELDERLY CARE

A. PROMOTING INDEPENDENCE

AI-powered systems can assist older adults in performing daily activities, such as medication management, fall detection, and navigation, enabling them to live independently for longer (Padhan et al., 2023). Innovative home technologies with AI algorithms can detect deviations from standard behavior patterns and provide timely emergency alerts (Padhan et al., 2023). In the context of aging, AI may also be used to support a more sophisticated level of decision-making in the home by older adults who are living independently or desire to do so. This includes the use of AI to automate home safety risk prevention and the capability to respond to emergencies in real-time (Padhan et al., 2023). The system can send a real-time alarm to the family, care facility, or medical agent without human assistance if it determines that something odd might occur (broadly) or something is wrong with the user's health practices or medical recommendations (Padhan et al., 2023). In addition, AI-driven wearable devices can monitor vital signs and activity levels, promoting a healthier and more independent lifestyle.

B. Monitoring of Chronic Diseases

AI algorithms also have the potential to revolutionize health monitoring for older adults (Padhan et al., 2023). By analyzing data from wearable devices, electronic health records, and other sources, AI can provide real-time data analysis, detect early warning signs of diseases, and provide personalized treatment plans and recommendations (Padhan et al., 2023). AI-enabled telemedicine platforms also enable remote monitoring and virtual consultations, improving access to healthcare for older adults in remote or underserved areas (DeAngelis, 2023). In addition to a diagnostic and management algorithm, humankind has created iPad software with Reshma Merchant in Singapore for geriatric syndromes (RGA). It has been demonstrated that AI can read retinal scans like doctors (Vigario, 2019). AI will also be crucial in the deprescription process, and possible applications include the ongoing development of virtual medicine and improved assessment of osteoporosis and fracture risk concerning age, frailty, and life expectancy (Mohapatra et al., 2023).

C. Assistive Robots

Robotic systems equipped with sensors and actuators can provide physical assistance to older adults with mobility support, personal hygiene, and household chores (Mohapatra et al., 2023). These robots can be programmed to adapt to individual needs, providing personalized and responsive care. Robotic exoskeletons and mobility aids enable older adults with mobility impairments to regain independence and perform activities they would otherwise struggle with (Mohapatra et al., 2023). Robots with a mind are being created to help elderly patients in hospitals with their therapy (Mohapatra et al., 2023). By physically touching humans, these robots can affect their emotional, physical, and social well-being. With this addition, older adults' spirits were seen to improve (Mohapatra et al., 2023).

Social robots offer companionship and engagement, providing emotional support and cognitive stimulation (Mohapatra et al., 2023). These robots can engage in conversations, play games, and even assist in reminiscence therapy, improving older adults' overall quality of life (Mohapatra et al., 2023). The robot's acceptance among older people is greatly influenced by its physical appearance. When dementia-stricken seniors were given companion animal robots, positive outcomes were discovered (Mohapatra et al., 2023). Studies reveal that companion animal robots of the right size, weight, and shape can stimulate the brains of older people with dementia.

IV. LEGAL AND ETHICAL CONSIDERATIONS

In the United States, AI regulation is decentralized which can cause uncertainty surrounding what legal implications can result from the use of artificial intelligence (Watters, 2023). While we do have some rules that regulate the outcomes, there is often confusion around the actual operational usage of AI tools. These include:

- Violations to intellectual property rights;
- Data privacy issues that violate General Data Protection Regulation (GDPR);
- Violations of employment regulations;
- Inappropriate usage of copyright data;
- Disputes concerning contract law when generative AI is used;
- Consumer confidentiality and issues with personally identifiable information (PII); and
- Inaccurate usage of generative AI output.

In addition to the legal concerns raised by AI, there are many ethical concerns which must be addressed. Numerous conversations are being had all over the world about the ethical use of

technology. Without clear and concise guidelines for how AI tools can and should be used, there is potential for misuse and legal consequences (Watters, 2023).

A. PRIVACY

The training of AI models requires massive amounts of data, some of which includes personally identifiable information (Watters, 2023). There is currently little insight into how the data is being collected, processed and stored which raises concerns about who can access the data and how they can use it (Watters, 2023). There are other privacy concerns surrounding the use of AI in surveillance. Law enforcement agencies use AI to monitor and track the movements of suspects (Watters, 2023). While highly valuable, many are worried about the misuse of those capabilities in public spaces, infringing upon individual rights to privacy (Watters, 2023). This is particularly true in the context of AI developed to assist those with disabilities, as data profiles of people with disabilities are sometimes easy to spot, which makes privacy a particular concern—especially for conditions that have a high chance for stigmatization, like mental health issues (Snow, 2019).

B. BIAS

Another ethical concern surrounding AI is bias. Human biases are well-documented, from implicit association tests that demonstrate biases we may not even be aware of, to field experiments that demonstrate how much these biases can affect outcomes (Manyika et al., 2022). Over the past few years, society has started to wrestle with just how much these human biases can make their way into artificial intelligence systems — with harmful results. All types of AI need diverse data sets to prevent algorithms from learning bias or coming up with results that discriminate against certain groups (Snow, 2019). Bias can creep into algorithms in several ways. AI systems learn to make decisions based on training data, which can include biased human decisions or reflect

historical or social inequities, even if sensitive variables such as gender, race, or sexual orientation are removed (Manyika et al., 2022). AI can help identify and reduce the impact of human biases, but it can also make the problem worse by baking in and deploying biases at scale in sensitive application areas (Snow, 2019).

For example, as the investigative news site ProPublica has found, a criminal justice algorithm used in Broward County, Florida, mislabeled African-American defendants as "high risk" at nearly twice the rate as it mislabeled white defendants (Manyika et al., 2022). Other research has found that training natural language processing models on news articles can lead them to exhibit gender stereotypes.

While this problem is usually invoked in the context of racial and gender discrimination, people with disabilities are also at risk (Snow, 2019). If individuals with special needs are not being reflected in the data from the start, it will jeopardize their access to ubiquitous technologies that are becoming an essential part of the fabric of the modern world (Snow, 2019).

C. SECURITY

Security remains a top priority when it comes to AI (and really any branch of computer science) (Watters, 2023). Lax security can have a wide-ranging impact. For example, AI is susceptible to malicious attacks, which can compromise outcomes (Watters, 2023). The Cybersecurity Infrastructure and Security Agency (CISA) references documented instances of attacks leadings to misbehaviors in autonomous vehicles and the hiding of objects in security camera footage (Watters, 2023).

D. JOB DISPLACEMENT

Job displacement is a concern that is frequently cited in discussions surrounding AI. There is fear that automation will replace certain aspects or entire job roles, causing unemployment rates

to spike industries (Watters, 2023). According to CompTIA's Business Technology Adoption and Skills Trends report, 81% of U.S. workers have recently seen articles which focus on the replacement of workers with AI (Watters, 2023). The same report found that 3 out of 4 workers are very or somewhat concerned about how automated technologies will impact the workforce (Watters, 2023).

E. DEEPFAKES

The rise of deepfake is concerning. Generative AI's capacity to produce content that blurs the lines between reality and fabrication is alarming (Dey, 2023). From synthetic news reports to manipulated videos, these creations can distort public perception, fuel propaganda and detrimentally impact both individuals and organizations (Dey, 2023).

Deepfakes are now able to circumvent voice and facial recognition which can be used to override security measures (Watters, 2023). One study even showed that a Microsoft API was tricked more than 75% of the time using easily generated deepfakes (Watters, 2023). There is also concern over whether deepfakes could be used to influence the stock market if a CEO was believed to be making decisions or taking actions that were considered questionable (Watters, 2023). With no oversight and easy access to the software, the abuse of deepfakes presents a significant security gap.

F. MISINFORMATION

Misinformation has a way of creating social divides and perpetuating untrue opinions to the detriment of organizations and others (Watters, 2023). As a topic that has gained scrutiny in the context of the political upheaval seen in recent years, misinformation can affect public opinion and cause severe reputational damage (Watters, 2023). Once misinformation becomes widely shared on social media, it can be difficult to determine where it originated and challenging to combat. AI

tools have been used to spread misinformation, making it appear as though the information is legitimate, when it is in fact not (Watters, 2023).

G. Exploitation of Intellectual Property

A recent lawsuit against *ChatGPT* involving several popular writers who claim the platform made illegal use of their copyrighted work has brought attention to the issue of AI exploitation of intellectual property (Watters, 2023). Several authors, including Jodi Picoult and John Grisham, recently sued *OpenAI* for infringing on copyright by using their content to train their algorithms, claiming that this type of exploitation will endanger the ability of authors to make a living from writing (Watters, 2023). This kind of exploitation has owners of intellectual property concerned about how AI will continue to impact their livelihoods.

H. Explainability and Accountability

It's not enough to simply put AI tools out into the world and watch them work. It can be particularly important to understand the decision-making process with certain AI applications (Watters, 2023). In some cases, it can be difficult to understand why certain AI tools came to conclusions which can have sizeable implications, especially in industries such as healthcare or law enforcement, where influencing factors must be considered, and real human lives are at stake (Watters, 2023).

Furthermore, the increasing prevalence of AI in all industries means that we use AI tools to make decisions daily. In cases where those decisions lead to negative outcomes, it can be difficult to identify who is responsible for the results (Roser, 2022). Are companies on the hook for validating the algorithms of a tool they buy, or do you look to the creator of an AI tool? The quest for accountability can be a deep rabbit hole which can make it difficult to keep individuals and companies accountable (Watters, 2023).

V. CONCLUSION

Today, we stand on the brink of the Fourth Industrial Revolution, which has been defined by the World Economic Forum as follows:

> "The Fourth Industrial Revolution represents a fundamental change in the way we live, work and relate to one another. It is a new chapter in human development, enabled by extraordinary technology advances commensurate with those of the first, second and third industrial revolutions. These advances are merging the physical, digital and biological worlds in ways that create both huge promise and potential peril. The speed, breadth and depth of this revolution is forcing us to rethink how countries develop, how organizations create value and even what it means to be human. The Fourth Industrial Revolution is about more than just technology-driven change; it is an opportunity to help everyone, including leaders, policy-makers and people from all income groups and nations, to harness converging technologies in order to create an inclusive, human-centered future. The real opportunity is to look beyond technology, and find ways to give the greatest number of people the ability to positively impact their families, organizations and communities" (Schwab, 2016).

The potential of AI to benefit people with special needs is exciting and far-reaching. Through the application of advanced technologies, AI has the capacity to enhance accessibility, foster independence, and improve the overall quality of life for individuals with disabilities. By leveraging AI driven solutions in areas such as assistive devices, communication tools, healthcare, education, and employment, people with disabilities can gain greater empowerment and inclusion in society. However, it is crucial to address ethical considerations, data privacy, and the need for inclusive design practices to ensure that AI solutions truly serve the diverse needs of individuals with disabilities. As AI continues to advance, it holds the promise of creating a more inclusive and equitable world for people of all abilities.

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