ARTIFICIAL INTELLIGENCE AND SERVICE PROVISION FOR PEOPLE WITH DISABILITIES

AN ANALYTICAL PAPER

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Learning & Innovating Together

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About the study

Each year the European Platform for Rehabilitation (EPR) develops a study on a topic related to the support of people with disabilities. Through the collection of good practices and their analysis, the study aims to provide EPR members and other stakeholders with interesting projects, methodologies and services from which to learn.

This analytical paper focuses on the impact of AI on the provision of social services to people with disabilities. The aim of the study is to provide social service providers with useful information and analysis on challenges and opportunities brought by the diffusion of AI tools, as well as on project opportunities, support needed and good practices in using AI in an inclusive way. By doing so, the paper aims to help service providers across Europe to engage with AI and integrate it sustainably.

The paper draws from the gathering of expertise from EPR members and events such as the EPR 2020 Annual Conference "Embracing Digital Transformation: Inspiration and Innovation for Quality Services". The main aspects taken into consideration are: 1) challenges and opportunities brought by AI to the overall society; 2) the impact of AI on service providers specifically for people with disabilities; 3) good practices of using AI in social services, with a focus on training and education.

Introduction

Technology is developing nowadays at a fast pace. Artificial intelligence (AI) is a branch of computer science that aims to create intelligent machines that can have certain characteristics and perform specific functions, such as speech recognition, knowledge learning, perception and reasoning, thus being able to solve problems or manipulate and move objects. AI is a key part of the digital transition and it can be a useful tool to tackle today's most pressing challenges, among which an ageing world population, climate change and socioeconomic inequality. AI is set to radically transform our lives as it can be applied to virtually any sector of the economy and society, from healthcare to judiciary to candidate's recruitment process. It is namely for this reason that the consequences of AI on our society have to be carefully analysed, especially when it comes to education, labour market, ethics and the need for regulatory frameworks. Furthermore, there is the need to ensure that the diffusion of AI tools is inclusive and takes into consideration vulnerable groups, including people with a disability.

AI in the EU: project opportunities and funding

AI is becoming a relevant topic in the agenda of governments and EU institutions. Most EU Member States have launched their AI national strategies, while the European Commission launched a Coordinated Plan on AI in April 2021, aimed at increasing investment in AI and aligning European policies, as well as a Proposal for a Regulation on AI. Furthermore, the Commission also introduced the AI Watch, a platform that monitors progress in AI-related scientific research and policies across Member States, while making available publications and reports on the impact of AI on our economy and society.

The EU made available funding and grants to foster research on AI and increase public and private investment and partnerships. Horizon Europe, for instance, offers funds to support research on technological and societal aspects of AI development and deployment. The programme has also launched the AI, Data and Robotics Partnership to boost technological innovation and the uptake of AI.

The European Research Council (ERC) offers grants to promote AI research in European institutes and contributes to creating research centres focused on AI in some EU countries. Finally, the European Innovation Council offers funding to SMEs with innovative and ambitious projects focused on AI deployment.

Opportunities and Challenges

Opportunities

AI offers many opportunities for our economy and society. In the economy and the world of work, AI can enrich many professions and redefine workers' tasks in an easier way, improving efficiency in terms of speed and quality. When it comes to production or manufacturing processes, for instance, AI is increasingly applied to robots in order to improve their flexibility and learning capabilities, especially in assembly and packaging applications. Outside of manufacturing, AI can be deployed in robots used in customer service activities, which are able to interact with customers thanks to AI processing of natural language, allowing employees to focus on tasks which require human creativity. This kind of AI application, including AI processing of natural language, can be particularly useful for people with disabilities, as it will be further explained.

AI doesn't only contribute to efficient task management, but also to the promotion of healthy habits in the workplace. AI-powered sensors, wristbands and digital questionnaires can be used to collect large quantities of data about workers' stress, physical and psychological strain and to suggest employees actions to improve their well-being at work. Such tools can help prevent health issues or disabilities and manage existing ones, therefore assisting people with disabilities in their professional activities.

AI is playing an increasingly important role in the recruitment and hiring process as well, thanks to its ability to analyse huge data sets about different profiles and identify the candidates with the right characteristics and skills. For example, AI-based recruitment tools help companies to advertise their job offers among targeted profiles that match specific requirements set by the employers, therefore increasing the number of qualified applications. Furthermore, AI can help hirers to save time in the screening of CVs by quickly processing them, always while looking for specific requirements.
AI is also improving the experience of jobseekers and candidates during the selection process, for instance by offering them ads on jobs that best suit their skills, interests and career goals, or by providing them with assistance through AI chatbots or feedback after applying for a job.

When it comes to the impact of AI on our society, this technology has a great potential to fill the gap of social inequality, especially between the mainstream population and vulnerable groups like people with disabilities, by offering them more opportunities in their daily life and promoting their independence. For example, the ability to process human language and use computer vision makes AI a useful tool for people with speech impairments, hearing disabilities or limited vision, who can benefit from AI-based applications (some examples are mentioned later in the paper) that help them to interact with others and the surrounding environment. Similarly, AI can empower people with reduced mobility through AI-powered driverless vehicles, letting them go out more often, be socially active and improve their well-being and quality of life. In this context, AI can offer a great support to social services providers by facilitating the communication with users, helping them to better understand their needs and offer care solutions that truly promote their social inclusion and autonomy.

AI can help significantly in the education and training of people with disabilities, especially by offering personalised learning content according to data on people's learning style and past behaviours. AI-powered training programs can adapt more flexibly to suit the needs of learners, to identify their weaknesses and recommend them further training. Social services providers that work on training opportunities for people with disabilities can benefit a lot from these programmes, because their level of adaptation can increase accessibility of education and training for people with disabilities. According to the learner's disability, for instance, these programmes can offer lessons in the form of video tutorials with or without automatic transcriptions, or in the form of texts automatically read. An example of AI-powered learning application for people with disabilities is *I-Stem*, which analyses and converts into formats accessible to persons with vision impairments or learning disabilities documents or images with maths, tables or columns, promoting their education in STEM subjects.

AI can be applied in a wide range of Assistive Technology (AT) to support people with disabilities in their daily lives. Some examples include:

- **Human-Machine Interaction**: Brain-machine interfaces (BCI) encode signals emitted by the brain and help people with disabilities to interact with an environment, control objects and interact with intelligent machines like tablets, robots, but also smart vehicles;
- **Robots**: robots that use AI technology to manipulate objects and increase perception can provide guidance for blind people, people with intellectual disabilities and those who need help for orientation in spaces unknown to them (e.g. in hospitals or airports). Technological innovation is also leading to the diffusion of the so-called "Care Robots", social robots which thanks to AI can reproduce human actions safely and efficiently and assist persons with cognitive deficits or reduced mobility in multiple daily actions, keeping them company by becoming telephones or TVs, and facilitating the work of social services workers;
- **Robotic technologies**: prostheses, wearables, exoskeletons enhance self-control in rehabilitation processes, supported by the monitoring of medical professionals;
- AI technologies such as **natural language processing, speech-to-text and voice recognition applications**: these technologies can assist people with speech impairments to be understood by normalising impaired speech (an example is Google's *Parrotron*). Similarly, people with hearing disabilities can benefit from AI-based applications that through computer vision translate sign language into speech or perform lip-reading thanks to specific algorithms (like Google's *DeepMind*). People with limited vision can be supported by AI-based computer vision apps which are able to describe the environment, objects and people, as well as to read texts from newspapers, smartphones and so on (like Microsoft's *Seeing AI*).

Challenges

The radical changes brought about by rapid technological progress and the diffusion of AI in many sectors offer opportunities, but also pose some major challenges, outlined below.

Education. The overall digital transition is increasing the demand for digital skills in the labour market, which will soon become indispensable to access to future jobs. Considering the complexity of AI technology and the importance to harness it responsibly, there is an urgent need to educate all levels of society on AI uses and applications, starting from young students in compulsory education with

programs on computational thinking, algorithm solving etc., and moving on to VET and professional training for adults. Education on AI is fundamental to fully harness AI's potential, since only by understanding its functioning and the challenges it poses can we use it responsibly and adequately. For education systems to adapt to this demand, heavy investment from governments is needed. Furthermore, it is important to ensure that such programmes are accessible also from people with disabilities. To do so, it can be useful to use some of the inclusive learning tools that AI already offers and that were mentioned above.

Professional training and skills. The need to train people on AI applies also to professionals and employees, since the gradual integration of AI technology into the organisation of work and the management of tasks will require them to reskill and upskill in order to fully harness it. This is a big challenge especially in the social service sector, where the lack of specific ICT training of staff is often bigger compared to other sectors and requires significant investment. Adequate professional training must include people with disabilities, who are often excluded from the labour market and have less training opportunities. Given the rapid transformations in the labour market, keeping these groups updated with technological developments is crucial to improve their chance to access employment opportunities. In this regard, the sharing of information and best practices among service providers and networks such as EPR is extremely useful.

Lack of regulations on accountability. AI also poses key questions concerning ethics and accountability, as it is still difficult to determine whether possible mistakes are the fault of the machine or the humans who designed it. This lack of clear accountability is one of the reasons why citizens might distrust the use of AI and find it opaque. This calls for the development of standards and regulations that ensure that AI products and services are used responsibly and with a transparent decision-making process. At the EU level, the Commission's Proposal for a Regulation on AI addresses namely this current lack of regulations.

Bias in recruitment. The need for regulations and minimum professional standards on ethics and accountability also relates to one of the major challenges posed by AI, that is the risk of bias in recruitment. AI tools are based on human programmers, their ideas and assumptions, and might therefore pick up human errors and bias. Such bias create an issue of accountability and can reinforce discrimination due to age, ethnicity, disability etc. Homogeneous systems might in fact favour people with similar characteristics to those already employed and exclude groups that are not equally represented in data sets. People with disabilities might therefore be excluded from the labour market and be left behind by these systems, which would turn into another barrier rather than an advantage. Social services providers must therefore work to raise awareness among employers using AI in recruitment about the need of people with disabilities to have a more personalised approach.

Accessibility and inclusive design. The challenge of inclusion requires the promotion of standards of accessibility of AI tools and a human-centred approach to their development. If AI is not transparent enough and users cannot understand why the tool came up with some answers instead of others, it might become a new barrier for many, including people with disabilities. Furthermore, efforts must be made to ensure that people with disabilities can make informed decisions when it comes to using AI and AT products and services. For this reason, awareness about the topic of accessibility must be raised among IT professionals and engineers who should adopt an inclusive design for AI tools and services, so that these solutions truly consider the needs of everyone and improve the experience of all users. Challenges are an additional opportunity for development that can highlight the elements of provision, legislation, communication, cooperation and so forth that should or could be improved.

Examples of use of AI in support of people with disabilities in and outside EPR

Fundación ONCE: ONCE is working on AI and people with disabilities in various ways. Together with Inserta Empleo it has launched the program "For Digital Talent", which offers scholarships to 117 people with disabilities to train them in digital skills and prepare them for employment opportunities in technological sectors, including AI. The program promotes the inclusion and professional development of people with disabilities in specialised and highly qualified technical jobs, giving them the skills required.

In 2018, ONCE had a robot that welcomed visitors at the VII Fundación ONCE Biennial of Contemporary Art. The robot used AI technology as a Personal Accessible Cognitive Assistant and provided support to visitors.

The foundation also has contributed to the creation of ACCESSJOBS, a video conferencing platform that enables users to have inclusive and accessible meetings thanks to AI-powered easy-to-read automated subtitles, image recognition and transcription to text.

ILUNION and Fundación ONCE in collaboration with Microsoft: the three have been cooperating within the framework of a strategic collaboration started twenty years ago between ONCE and Microsoft to expand SoundScape, Microsoft Research's solution for guiding blind people. The collaboration aimed to integrate it with BeepCon, the intelligent beacon system developed by ILUNION that facilitates the identification and location of nearby objects for people with visual disabilities.

ILUNION and Fundación ONCE have also been working since 2018 on the development of a chatbot based on Microsoft Artificial Intelligence technology, to improve the interaction and accessibility of users of its website.

Fundación Intras: Intras is part of the project CAPTAIN - Coach Assistant via Projected and Tangible Interface, which proposes the development of a virtual assistant to support elderly and people with disabilities at home with their physical and cognitive difficulties, as well as to foster social participation. It uses cutting-edge technologies such as Augmented Reality and AI to analyse physiological and emotional data gathered from facial and body microexpressions.

Microsoft France: the French branch developed JobNow, a platform that helps persons with autistic spectrum disorder to train themselves for career recruitment interviews. A virtual recruiter asks users questions and the AI-based system analyses the answers provided as well as the eye movement of the candidates to check if they are looking at the virtual recruiter or not. The system then provides recommendations that could help candidates to progress in future interviews.

Microsoft France, together with Simplon.con, also launched a programme at their Artificial Intelligence school for 12 autistic students, which includes 7 months of learning and a one year internship to get a job.

European Union of the Deaf: EUD participates in the Artificial intelligence for the Deaf (aiD), a project that aims to address the challenge of deaf people communication and social integration. It leverages the latest advances in AI and develops speech-to-text and text-to-speech modules tailored to real time interaction between deaf and hearing people. The core innovation lies in the development of new algorithms and techniques that enable the real-time translation of video to text or speech and vice-versa with satisfactory accuracy. Such tools can ease communication, promote accessible educational solutions for deaf children, and provide intelligent relay services for deaf people, including emergency services.