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Artificial Intelligence as the Reason and the Solution of Digital Divide

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Abstract

The potential of Artifical Inteligence (AI) to decrease the digital divide is significant. AI has the ability to improve access to information, enable personalized learning, promote digital inclusion, create job opportunities, address social equity issues, and optimize digital infrastructure. However, it is crucial to ensure that AI is developed and deployed responsibly, ethically, and inclusively, with a focus on promoting equitable access to AI technologies and their benefits for all communities, including those that are currently underserved. The topic of the paper is the digital divide (DD) and the role of artificial intelligence (AI) in reducing the digital gap. The introduction discusses what the DD is and the role of AI in it. After that, the role of AI in reducing the DD is discussed and the prerequisites for the successful use of AI in reducing the DD. The problem of the elderly population is particularly emphasized in the context of digital literacy and the DD. It talks about ways to motivate the older population to use digital devices. Furthermore, it talks about applying theoretical concepts in practice as well as motivating people to apply AI in everyday life. Studies that have been carried out related to the application of AI in reducing the DD are cited, as well as examples of good practice. Finally, examples of applications for reducing the DD are given as well as future steps for reducing the DD with the help of AI.

Keywords: Artifical Intelligence, Digital Divide, Motivation, Responsibility

Introduction

The digital divide refers to the gap between those who have access to and can effectively use digital technologies, such as the internet, computers, and mobile devices, and those who do not. AI (artificial intelligence) is a subset of digital technologies, and it can both contribute to and exacerbate the digital divide (Luttrell et al., 2020; Carter et al., 2020, Cohron, 2015).

AI as the reason for the digital divide

- Access to AI: One aspect of the digital divide is access to AI technologies. AI systems require computing power, infrastructure, and resources to function effectively. However, not all communities, especially those in developing regions or low-income areas, have access to these resources. This lack of access to AI technologies can widen the digital divide as it limits the opportunities for these communities to benefit from AI-driven applications, such as healthcare, education, and economic opportunities.

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- Skills and Education: Another aspect of the digital divide related to AI is the level of skills and education required to effectively use and interact with AI technologies. AI technologies are complex and require specialized skills, such as programming, data analysis, and machine learning. Not all individuals or communities have access to quality education and training in these areas, which can create a skills gap and further widen the digital divide. Those who lack the necessary skills and education may be left behind in the AI-driven economy, facing limited job opportunities and reduced access to AI-enabled services.
- Bias and Ethics: AI systems are trained on data, and if the data used to train AI models is biased, it can perpetuate existing social, cultural, and economic biases. This can lead to discriminatory outcomes, such as biased decision-making in hiring, lending, and other areas. Communities that are already marginalized or underrepresented may be disproportionately impacted by biased AI systems, further exacerbating existing inequalities and widening the digital divide.
- Trust and Privacy: Trust and privacy are critical factors in the adoption and use of AI technologies. Concerns about data privacy, surveillance, and misuse of AI can create distrust, especially among marginalized communities that have historically been subject to surveillance and discrimination. This can lead to reluctance in adopting and using AI technologies, further widening the gap between those who trust and utilize AI and those who do not.
- Economic Disparity: AI technologies have the potential to drive economic growth and create new opportunities. However, the cost of developing, implementing, and maintaining AI systems can be prohibitive for certain communities or individuals with limited financial resources. This economic disparity can further exacerbate the digital divide, as those who cannot afford to invest in AI technologies may miss out on the benefits and opportunities they offer.

AI as the solution for the digital divide

- Accessibility and Inclusivity: AI-powered technologies have the potential to improve accessibility and inclusivity for individuals with disabilities or limited physical mobility. For example, AI can enable voice commands, gesture recognition, or other interfaces that make digital technologies more accessible to a wider range of people.
- Education and Training: AI can be used to develop personalized learning programs and provide remote education and training opportunities to individuals in underserved communities. AI-powered platforms can adapt to the learning needs and preferences of individuals, making education more accessible and engaging.
- Bridging Information Gap: AI can help bridge the information gap by providing access to relevant and localized information to underserved communities. For example, AI-powered chatbots or virtual assistants can provide information on healthcare, education, employment, and other essential services to individuals who may not have easy access to such information.
- Addressing Bias and Fairness: AI can be used to identify and mitigate biases in data and algorithms, promoting fairness and equity in AI-powered applications. By using AI for bias detection and mitigation, we can reduce discriminatory outcomes and ensure that AI technologies are more inclusive and beneficial for all individuals and communities.
- Enhancing Economic Opportunities: AI can create new economic opportunities by enabling automation, innovation, and digital entrepreneurship. By providing access to AI-powered tools and technologies, underserved communities and individuals can potentially participate in the digital economy and close the economic gap.

Decreasing digital divide by AI

AI has the potential to decrease the digital divide by addressing various challenges that contribute to the divide and promoting equitable access to technology and its benefits. Here are some ways how AI can contribute to decreasing the digital divide (Tkachenko et al., 2021):

- Access to Information and Services: AI-powered technologies can help bridge the gap in access to information and services by providing automated translation services, voice-based interfaces, and natural language processing capabilities that enable people with limited literacy or language skills to access and interact with digital content. This can be particularly helpful for marginalized communities and individuals with disabilities who may face barriers in accessing information and services due to language or literacy limitations.
- Customized Learning: AI can enable personalized and adaptive learning experiences that cater to the unique needs and learning styles of individuals. This can help address educational disparities by providing tailored learning opportunities that are accessible and relevant to diverse learners, including those in underserved communities. AI-powered educational platforms can provide personalized recommendations, adaptive assessments, and targeted interventions that can improve learning outcomes and narrow the gap in educational attainment.
- Healthcare and Remote Services: AI can enable remote healthcare services, telemedicine, and remote diagnostics, which can help overcome geographical barriers and provide healthcare access to underserved or remote areas. AI-powered diagnostic tools, predictive analytics, and remote monitoring systems can enable early detection and management of health conditions, reducing healthcare disparities and improving health outcomes for underserved communities.
- Job Market and Economic Opportunities: AI can create new job opportunities and empower underserved communities by providing access to remote work, online marketplaces, and e-commerce platforms. AI- powered job matching platforms, gig economy platforms, and online marketplaces can provide opportunities for individuals in remote or underserved areas to access work and economic opportunities, reducing the gap in employment and economic participation.
- Social and Environmental Impact: AI can be leveraged to address social and environmental challenges that disproportionately impact underserved communities. For example, AI can be used for disaster prediction, early warning systems, and disaster response planning, which can help vulnerable communities mitigate the impact of natural disasters. AI can also be used for social good initiatives, such as identifying patterns of inequality, discrimination, or bias in societal systems, and driving policy changes to address these disparities.
- Bias Mitigation: AI can help mitigate bias in decision-making processes, such as hiring, lending, and criminal justice, which can contribute to disparities and inequalities. AI algorithms can be designed and trained to be fair, transparent, and accountable, and can be used to identify and mitigate bias in decision-making, ensuring that the benefits of AI technologies are distributed more equitably.

It is important to note that the successful use of AI to decrease the digital divide requires careful consideration of ethical and social implications, and robust efforts to ensure that AI technologies are developed and deployed in an inclusive, transparent, and accountable manner. Policies, regulations, and responsible AI practices should be in place to ensure that AI is used in a manner that promotes equity, inclusivity, and fairness, and does not exacerbate existing disparities. Collaboration among governments, private sector organizations, non-profit organizations, and communities is crucial in harnessing the potential of AI to decrease the digital divide and promote equitable access to technology and its benefits.

The way of ensuring the benefits of AI and decreasing of digitaldivide

Achieving collaboration among governments, private sector organizations, non-profit organizations, and communities to ensure equitable distribution of benefits from AI and to address the digital divide

requires coordinated efforts and strategies. Here are some potential steps that can be taken (Yeasmin, 2019; Rao, 2019; Calderon, 2019):

- Policy and Regulation: Governments can play a crucial role in developing policies and regulations that promote equitable access to AI technologies and address concerns such as bias, ethics, privacy, and economic disparities. This can include creating incentives for private sector organizations to invest in AI solutions that benefit underserved communities, establishing guidelines for ethical AI development and deployment, and implementing regulations that ensure data privacy and security. Governments can also facilitate partnerships between private sector organizations, non-profit organizations, and communities to promote collaborative efforts.
- Public-Private Partnerships: Collaboration between governments, private sector organizations, non-profit organizations, and communities through public-private partnerships can drive initiatives that bridge the digital divide related to AI. This can involve joint projects that focus on providing access to AI technologies in underserved areas, offering training and education programs to build AI skills, and developing AI applications that address social and economic challenges faced by marginalized communities. Public-private partnerships can leverage the expertise, resources, and networks of each stakeholder to collectively work towards equitable distribution of AI benefits.
- Community Engagement: Engaging communities, especially those that are underserved or marginalized, in the decision-making process related to AI can ensure that their perspectives, needs, and concerns are taken into account. This can involve community outreach programs, participatory workshops, and forums for gathering community input on AI initiatives. Engaging communities can help in building trust, understanding local context and requirements, and tailoring AI solutions to the specific needs of the communities, thereby ensuring more equitable outcomes.
- Education and Training: Promoting education and training programs related to AI can help bridge the skills gap and empower individuals and communities to effectively use AI technologies. This can involve collaborations between private sector organizations, non-profit organizations, and educational institutions to offer accessible and affordable AI education and training programs. It can also include efforts to promote diversity and inclusion in AI education and training to ensure that underrepresented groups have equal opportunities to acquire AI skills.
- Awareness and Advocacy: Raising awareness about the digital divide, biases in AI, and the need for equitable distribution of AI benefits through advocacy campaigns can create a broader societal understanding and support for addressing these issues. Non-profit organizations, advocacy groups, and community organizations can play a vital role in advocating for policies and practices that promote fairness and inclusivity in AI technologies. This can include efforts to highlight the impact of the digital divide on marginalized communities, advocate for responsible AI development and deployment, and promote transparency and accountability in AI systems.
- Resource Allocation: Ensuring that resources are allocated in an equitable manner to support AI initiatives aimed at bridging the digital divide is crucial. Private sector organizations can allocate funding and resources towards projects that promote access to AI technologies in underserved areas, governments can allocate budgets and grants for AI initiatives that benefit marginalized communities, and non-profit organizations can seek funding and donations to support their efforts in addressing the digital divide related to AI.
- Collaboration Platforms: Establishing collaborative platforms, such as forums, networks, and consortia, that bring together governments, private sector organizations, non-profit organizations, and communities can facilitate ongoing dialogue, knowledge sharing, and joint initiatives. These platforms can serve as a space for stakeholders to come together, share best practices, collaborate on projects, and collectively work towards achieving equitable distribution of AI benefits.

By fostering collaboration among governments, private sector organizations, non-profit organizations, and communities, and by implementing policies, partnerships, and initiatives that address the digital divide related to AI, we can work towards a more inclusive and equitable adoption and use of AI technologies that benefit all members of society.

Influencing AI on digital literacy of elderly and decreasing of digital divide

AI can influence digital literacy among elderly individuals and contribute to decreasing the digital divide. Here are some ways how AI can impact digital literacy among elderly individuals (He et al., 2022):

- Personalized Digital Learning: AI-powered platforms can provide personalized and adaptive digital learning experiences that cater to the unique needs and learning styles of elderly individuals. These platforms can offer tailored tutorials, interactive guides, and user-friendly interfaces that can help elderly individuals acquire digital literacy skills at their own pace and level of comfort.
- Virtual Assistants: AI-powered virtual assistants, such as Amazon's Alexa, Google Assistant, or Apple's Siri, can provide voice-based interfaces and assistance that can be particularly helpful for elderly individuals with limited mobility or visual impairments. These virtual assistants can help elderly individuals perform tasks such as setting reminders, making phone calls, or searching the internet, which can enhance their digital literacy skills and enable them to interact with technology more easily.
- Natural Language Processing: AI-powered natural language processing capabilities can enable elderly individuals to interact with digital devices using voice commands or speech-to-text features. This can make it easier for elderly individuals who may have challenges with typing or using traditional interfaces to engage with digital technologies and develop digital literacy skills.
- Digital Health and Wellness: AI-powered digital health and wellness applications, such as remote monitoring systems or health tracking apps, can help elderly individuals manage their health and wellness using digital technologies. These applications can promote digital literacy by requiring users to navigate and interact with digital interfaces, thereby improving their comfort and familiarity with technology.
- Social Connection: AI-powered social media platforms, messaging apps, and video conferencing tools can help elderly individuals stay connected with their families, friends, and communities, promoting social interaction and reducing social isolation. These platforms can also provide opportunities for elderly individuals to engage with digital technologies, learn new digital skills, and improve their digital literacy.

It's important to note that the design and development of AI-powered technologies should take into consideration the unique needs, abilities, and challenges faced by elderly individuals, and should be accessible, user-friendly, and inclusive. Proper training, education, and support should also be provided to help elderly individuals build their digital literacy skills and overcome any barriers they may face. Additionally, addressing issues of affordability, availability, and accessibility of technology and internet access for elderly individuals can also contribute to reducing the digital divide and promoting digital literacy among this population.

Motivate elderly for using digital solutions

In the process of decreasing digital divide by AI very important is motivation. Motivating elderly individuals to use digital solutions can be key to decreasing the digital divide and improving their digital literacy. Here are some ways to motivate elderly individuals to embrace and use digital technologies (Xie et al., 2021):

- Demonstrate Relevance: Highlight the practical benefits and relevance of digital solutions for the daily lives of elderly individuals. Show how using digital technologies can help them stay connected with family and friends, access information, manage health and wellness, or engage in hobbies and interests. Emphasize the positive impact that using digital technologies can have on their quality of life.
- Provide Training and Support: Offer tailored training and support programs that cater to the unique needs and abilities of elderly individuals. Provide patient and patient-paced instruction, with step-by-step guidance, hands-on practice, and ongoing support. Make sure that the training is accessible, inclusive, and adapted to their learning style and pace.
- Foster Social Connection: Highlight the social aspect of using digital technologies, such as video calls, messaging apps, or social media platforms, as a way to connect with family, friends, and communities. Encourage and facilitate social interaction through digital technologies, as it can be a strong motivator for elderly individuals to learn and use digital solutions.
- Address Privacy and Security Concerns: Address concerns around privacy and security that elderly individuals may have when using digital technologies. Provide information and education on best practices for online safety, data protection, and privacy settings. Assure them that their personal information will be kept secure and build trust in the use of digital technologies.
- Customize User Interfaces: Use AI-powered technologies to customize user interfaces based on the needs and preferences of elderly individuals. For example, larger text, simpler layouts, or voice-based interfaces can make digital technologies more accessible and user-friendly for elderly individuals with visual impairments, cognitive limitations, or physical disabilities.
- Demonstrate Success Stories: Share success stories of other elderly individuals who have embraced digital technologies and benefited from them. Highlight real-life examples of how using digital solutions has improved their lives, increased their independence, or enhanced their well-being. This can serve as inspiration and motivation for other elderly individuals to follow suit.
- Provide Ongoing Support: Offer ongoing support, assistance, and follow-up after the initial training to ensure that elderly individuals are comfortable and confident in using digital technologies. Address any challenges, provide additional resources, and encourage continuous learning and exploration of new digital solutions.

Motivation plays a crucial role in encouraging elderly individuals to adopt and use digital technologies. By addressing their needs, providing relevant training and support, fostering social connection, addressing concerns, customizing user interfaces, sharing success stories, and providing ongoing support, we can help motivate elderly individuals to embrace digital solutions and improve their digital literacy skills.

Motivate elderly to using smartphone

Motivating elderly individuals to use smartphones can be beneficial in improving their digital literacy and reducing the digital divide. Here are some ways to motivate elderly individuals to use smartphones (McGaughey et al., 2013):

- Highlight the Benefits: Demonstrate the practical benefits of using smartphones, such as staying connected with family and friends, accessing information and services online, managing appointments and reminders, and engaging in hobbies and interests. Show how smartphones can enhance their daily lives and improve their overall well-being.
- Simplify User Interfaces: Ensure that the smartphone's user interface is simple, intuitive, and easy to navigate. Customize settings to make it easier for elderly individuals to use, such as larger text, bigger icons, or simplified layouts. Consider installing apps or features specifically designed for seniors that provide larger buttons, easy- to-read text, and simple interfaces.

- Provide Training and Support: Offer patient and patient-paced training programs that cater to the unique needs and abilities of elderly individuals. Provide hands-on guidance, practice sessions, and ongoing support to help them become familiar with using smartphones. Offer resources, tutorials, and user guides in simple language that are easy to understand.
- Address Concerns: Address any concerns that elderly individuals may have about using smartphones, such as privacy, security, or costs. Provide information, education, and reassurance on how to protect their personal information, set up security settings, and manage costs associated with data usage and app purchases. Build trust in using smartphones as a safe and secure tool.
- Foster Social Connection: Highlight the social aspect of using smartphones, such as making video calls, sending messages, or connecting through social media. Emphasize how smartphones can help elderly individuals stay connected with their loved ones, friends, and communities, especially if they are physically isolated or have limited mobility. Show real-life examples of how smartphones can facilitate social connection and reduce social isolation.
- Personalize Apps and Features: Customize apps and features on smartphones to suit the interests and needs of elderly individuals. For example, install apps related to health and wellness, news, or hobbies that align with their interests. Personalize settings, such as font size, display brightness, or volume, to suit their preferences and abilities.
- Demonstrate Success Stories: Share success stories of other elderly individuals who have embraced smartphones and experienced the benefits. Highlight real-life examples of how smartphones have improved their lives and made tasks easier and more convenient. This can serve as motivation and inspiration for other elderly individuals to adopt smartphones.
- Provide Ongoing Support: Offer ongoing support, assistance, and follow-up after the initial training to ensure that elderly individuals are comfortable and confident in using smartphones. Provide a helpline or a support system they can contact if they have questions or need assistance. Regularly check in with them to address any challenges and provide additional resources as needed.

Motivating elderly individuals to use smartphones requires addressing their needs, simplifying user interfaces, providing training and support, addressing concerns, fostering social connection, personalizing apps and features, demonstrating success stories, and providing ongoing support. By doing so, we can encourage elderly individuals to embrace smartphones and improve their digital literacy skills, thereby reducing the digital divide.

Turning on measures of decreasing digital divide by using of AI form theory in practice

Turning measures from theory into practice requires a coordinated effort among different stakeholders, including governments, private sector organizations, non-profit organizations, communities, and individuals. Here are some steps that can be taken to implement measures for decreasing the digital divide using AI (Fang et al., 2019):

- Develop Collaborative Partnerships: Establish collaborations among governments, private sector organizations, non-profit organizations, and communities to work together towards reducing the digital divide. This can involve creating partnerships, task forces, or working groups to jointly identify priorities, set goals, and implement strategies.
- Conduct Needs Assessment: Conduct a comprehensive needs assessment to understand the specific requirements and challenges faced by underserved communities, including the elderly, in terms of access, education, and usage of AI technologies. This can involve surveys, interviews, and focus groups to gather input from the target communities and identify their unique needs and preferences.

- Plan and Implement Programs: Based on the needs assessment, develop and implement targeted programs and initiatives that address the identified gaps. These programs can include digital literacy training, providing affordable access to internet services and devices, offering localized and relevant content, and engaging communities through workshops, events, and other activities.
- Design Inclusive AI Technologies: Ensure that AI technologies are designed with inclusivity in mind. This can involve conducting thorough audits of AI algorithms and data used for training to identify and mitigate biases, designing user interfaces that are intuitive and accessible, and considering the needs and preferences of diverse users, including the elderly.
- Evaluate and Refine: Continuously monitor and evaluate the effectiveness of the implemented programs and initiatives to determine their impact on reducing the digital divide. This can involve collecting data, measuring outcomes, and seeking feedback from the target communities to refine and improve the strategies and approaches being used.
- Engage Communities: Involve the target communities, including the elderly, in the decision-making process and seek their input on the design, implementation, and evaluation of the programs. This can foster ownership, trust, and engagement, and ensure that the initiatives are tailored to the specific needs and preferences of the communities being served.
- Advocate for Supportive Policies: Advocate for policies and regulations that prioritize digital inclusion and address issues such as internet access, affordability, education, and fairness in AI. This can involve engaging with policymakers, advocating for changes in existing policies or the enactment of new policies, and participating in relevant policy discussions and forums.
- Raise Awareness: Create awareness among the target communities, including the elderly, about the benefits of AI technologies and how they can be used to bridge the digital divide. This can involve public outreach campaigns, community events, and educational materials to inform and educate the communities about the opportunities and resources available.

Implementing measures to decrease the digital divide using AI requires a multi-faceted and collaborative approach, involving multiple stakeholders and addressing various aspects of access, education, inclusivity, and policy. It requires sustained effort, ongoing evaluation, and continuous improvement to ensure that the measures are effectively translated from theory into practice and have a meaningful impact in reducing the digital divide.

Motivating communities for using AI in everyday life

Motivating communities to involve in using AI in everyday life can be achieved through various approaches. Here are some strategies that can be employed (Lao et al., 2021):

- Demonstrate the Benefits: Showcasing the practical benefits of AI in everyday life can be a powerful motivator. This can involve highlighting real-life examples of how AI technologies have improved people's lives, such as in healthcare, transportation, communication, and entertainment. Demonstrating the positive impact of AI on everyday tasks and activities can help communities see the value and relevance of AI in their lives.
- Provide Access to Resources: Ensure that communities have access to the necessary resources, including infrastructure, devices, and affordable internet connectivity, to fully participate in the use of AI. Lack of access to these resources can be a barrier to community involvement in AI technologies. Providing access to resources can empower communities to explore and utilize AI applications in their daily lives.
- Offer Education and Training: Providing education and training programs that focus on digital literacy and AI literacy can help communities build the skills and knowledge needed to effectively use AI technologies. This can involve workshops, training sessions, and educational materials that are tailored to the specific needs and preferences of the communities being

targeted. Offering education and training can empower communities to develop the confidence and competence to use AI in their everyday activities.

- Foster Local Relevance: Customizing AI technologies to be locally relevant and culturally appropriate can help communities see the direct applicability of AI in their everyday lives. This can involve developing AI applications that are designed to address local challenges, offer solutions that are meaningful and aligned with the community's values, and provide content and services that are locally relevant. Making AI locally relevant can help communities feel a sense of ownership and relevance in adopting and using AI technologies.
- Address Privacy and Security Concerns: Addressing privacy and security concerns related to AI can help communities feel more comfortable and confident in using AI technologies. This can involve implementing robust privacy and security measures in AI applications, providing clear and transparent information about data usage and protection, and addressing any concerns or questions from communities about the potential risks associated with AI technologies.
- Foster Collaboration and Co-creation: Encouraging communities to actively participate in the development and co-creation of AI technologies can foster a sense of ownership and motivation. This can involve involving communities in the design, testing, and feedback stages of AI projects, and encouraging their active involvement in shaping the development and use of AI technologies. Co-creation can empower communities to take an active role in shaping AI technologies to meet their specific needs and requirements.
- Create Local Use Cases: Creating local use cases and success stories that showcase the impact of AI in everyday life within the community can serve as inspiration and motivation for others to get involved. This can involve identifying and highlighting local AI success stories, sharing case studies, testimonials, and testimonials from community members who have benefited from AI technologies. Creating local use cases can help communities see the tangible results and benefits of AI in their everyday lives.

Motivating communities to involve in using AI in everyday life requires a holistic approach that considers access, education, relevance, privacy, security, collaboration, and local context. By addressing these factors, communities can be encouraged and empowered to embrace AI technologies as a valuable tool in their daily activities.

Examples of studies about using AI in the context of decreasing of digital divide

Here are some real-life studies that highlight the use of AI in the context of addressing the digital divide (Kitsara, 2022):

- *AI for Social Good: Unlocking the Potential of Artificial Intelligence to Bridge the Digital Divide*: This study by the World Bank Group examines how AI can be harnessed for social good to bridge the digital divide. It explores various AI use cases, including improving access to education, healthcare, financial services, and agriculture in developing countries. The study highlights how AI technologies can help overcome barriers to digital inclusion and promote equitable access to digital opportunities.
- *AI and Rural Healthcare: Designing Interventions for Low-Resource Settings*: This study from Stanford University focuses on the use of AI in rural healthcare settings to address the digital divide. It explores how AI can be used to improve healthcare delivery, diagnosis, and treatment in low-resource settings where access to quality healthcare is limited. The study highlights the potential of AI to bridge the gap in healthcare access between rural and urban areas, and improve health outcomes for underserved communities.
- *AI for Rural Health: A Case Study on Diabetes Management in Rural Arkansas*: This study from the University of Arkansas examines the use of AI for diabetes management in rural areas to

reduce the digital divide in healthcare. It explores how AI technologies can be used to remotely monitor and manage diabetes patients in rural Arkansas, where access to healthcare facilities is limited. The study highlights the potential of AI in improving healthcare outcomes for rural communities and reducing disparities in healthcare access.

- *AI in Education: Realizing the Potential of Artificial Intelligence for Equitable Education*: This study by UNESCO focuses on the use of AI in education to bridge the digital divide. It explores various AI use cases in education, including personalized learning, adaptive assessments, and remote education, and how these technologies can help overcome barriers to education and promote equitable access to quality education. The study highlights the potential of AI in addressing the digital divide in education and improving learning outcomes for underserved communities.

These studies provide real-life examples of how AI is being used to address the digital divide in various contexts, including healthcare, education, and social services. They highlight the potential of AI to bridge the gap in access to digital opportunities and promote equitable distribution of benefits, showcasing the positive impact of AI in addressing the digital divide and promoting inclusion. The results of the studies mentioned above vary depending on the specific context and use case. However, some common themes and findings from these studies include:

- Improved Access: AI has the potential to improve access to critical services, such as healthcare, education, and financial services, in underserved communities. By leveraging AI technologies, these studies have shown that it is possible to overcome barriers to access, such as geographic remoteness, lack of infrastructure, and limited resources, and provide services to communities that otherwise may have limited access to them.
- Enhanced Efficiency: AI can help improve the efficiency of service delivery by automating repetitive tasks, streamlining processes, and enabling remote access. For example, in rural healthcare settings, AI has been shown to enhance diagnosis and treatment by leveraging machine learning algorithms to analyze medical data and provide timely recommendations. In education, AI can enable personalized learning pathways and adaptive assessments that cater to the individual needs of learners, leading to improved educational outcomes.
- Increased Equity: AI has the potential to promote equity by reducing disparities in access to digital opportunities. These studies highlight how AI can be leveraged to ensure that digital solutions are inclusive and reach all members of a community, including the elderly, low-income individuals, and marginalized populations. This can help bridge the digital divide and ensure that the benefits of AI are distributed more equitably.
- Positive Social Impact: These studies also emphasize the potential of AI to generate positive social impact by addressing societal challenges and promoting social good. For example, AI can be used in agriculture to optimize crop management, improve food security, and enhance livelihoods of rural farmers. In education, AI can enable remote learning opportunities, reaching learners in remote or underserved areas. These social impacts can contribute to bridging the digital divide and promoting overall well-being in communities.

While these studies highlight the potential of AI in addressing the digital divide, there may also be challenges and limitations that need to be considered, such as issues related to privacy, data ethics, and bias. However, the findings from these studies suggest that AI has the potential to contribute positively to reducing the digital divide and promoting more equitable access to digital opportunities for all members of the community.

Experiences of countries which successfully resolved digital divide

There are several countries that have made significant progress in addressing the digital divide and promoting digital inclusion. Here are some examples of countries that have successfully resolved or made significant strides in reducing the digital divide (Akca et al., 2007):

- South Korea: South Korea has been recognized as one of the countries with the highest levels of digital inclusion. The government has implemented various policies and initiatives to promote broadband infrastructure development, digital skills training, and digital content creation. These efforts have resulted in widespread internet access and high levels of digital literacy among the population, including the elderly and underserved communities.
- Estonia: Estonia is known for its advanced digital governance and e-government services, which have resulted in high levels of digital inclusion across the population. The country has implemented a comprehensive digital transformation strategy that includes digital infrastructure development, digital skills training, and online public services. As a result, Estonia has one of the highest rates of internet access and digital literacy in Europe.
- Singapore: Singapore has implemented a national digital inclusion program called "Digital for Life" that aims to ensure that all segments of the population, including the elderly and low-income individuals, have access to digital technologies and skills. The program includes initiatives such as subsidizing digital devices, providing digital skills training, and offering targeted support for vulnerable groups. These efforts have resulted in high levels of digital inclusion and access to digital services in Singapore.
- Finland: Finland has implemented a national digital literacy program called "Everyone Onboard" that aims to promote digital inclusion for all citizens, including those in remote and rural areas. The program includes initiatives such as digital skills training, affordable broadband access, and support for digital service adoption. Finland has achieved high levels of digital inclusion and internet access across the country, including among elderly and marginalized populations.
- Bhutan: Bhutan is a small, landlocked country in South Asia that has made significant progress in bridging the digital divide. The government has implemented various initiatives to promote digital literacy, access to digital technologies, and online public services. These efforts have resulted in improved internet access, digital skills, and online services for the Bhutanese population, including those in rural and remote areas.

It's important to note that these countries' successes in reducing the digital divide are the result of comprehensive strategies that include a combination of infrastructure development, digital skills training, targeted initiatives for vulnerable groups, and supportive policy frameworks. These experiences highlight the importance of multi-stakeholder collaboration, proactive government policies, and community engagement in addressing the digital divide and promoting digital inclusion.

AI applications which decrease digital divide

There are several examples of AI applications that have the potential to decrease the digital divide by improving access, affordability, and usability of digital technologies. Here are some real-world examples (Friemel and Signer, 2010):

- AI-powered language translation: Language barriers can be a significant hurdle to digital inclusion, especially for marginalized communities. AI-powered language translation technologies, such as Google Translate, Microsoft Translator, and other similar solutions, can bridge the language gap and enable users to access information, communicate, and interact

online in their native language. This can be particularly beneficial for elderly individuals who may not be fluent in the dominant language used in digital technologies.

- AI-driven content recommendation: AI algorithms can analyze user preferences, behavior, and interests to provide personalized content recommendations, which can help users discover relevant digital content and services. This can be especially useful for elderly individuals who may have limited digital literacy skills or may be less familiar with digital technologies. AI-powered content recommendation can enable personalized learning, entertainment, and access to relevant information, thus promoting digital engagement and inclusion.
- AI-based accessibility tools: AI technologies can be used to develop accessibility tools that make digital technologies more usable for individuals with disabilities, including the elderly. For example, AI-powered voice recognition and voice commands can help individuals with mobility limitations or visual impairments interact with digital devices and services. AI-based image recognition can provide visual descriptions for individuals with visual impairments. These accessibility tools can enhance digital inclusivity and enable elderly individuals with disabilities to use digital technologies more effectively.
- AI-driven telehealthcare: Telehealthcare, which involves the use of digital technologies for remote healthcare services, can be especially beneficial for elderly individuals who may face challenges accessing healthcare due to mobility issues or limited access to healthcare facilities. AI-powered telehealthcare solutions, such as remote monitoring devices, virtual consultations, and AI-assisted diagnostics, can provide remote healthcare services, reduce the need for physical travel, and improve access to healthcare for elderly individuals, thus promoting digital inclusion in healthcare services.
- AI-powered digital skills training: AI can be used in the development of digital skills training programs that are personalized, adaptive, and accessible. AI algorithms can analyze learners' needs, learning styles, and progress to provide tailored digital skills training programs that are suitable for individuals with varying levels of digital literacy, including the elderly. These AI-powered digital skills training programs can help bridge the digital skills gap and empower elderly individuals with the necessary digital literacy to use digital technologies effectively.

Perspective of using AI in decreasing digital divide in future

The digital divide refers to the gap between those who have access to digital technologies and those who do not. With the rapid advancement of artificial intelligence (AI) technology, there is potential for AI to play a significant role in decreasing the digital divide in the future. Here are some perspectives on how AI can contribute to bridging the digital divide (Kitsara, 2022):

- Access to Information: AI can help provide access to information for underserved communities, particularly in remote or low-income areas. AI-powered search engines, language translation tools, and voice assistants can enable people to access information and resources online, even if they do not have advanced digital literacy skills or speak the same language as the content they are seeking. This can empower individuals to gain knowledge, learn new skills, and access educational content, narrowing the information gap.
- Personalized Learning: AI has the potential to revolutionize education by providing personalized learning experiences. Adaptive learning platforms that use AI algorithms can tailor learning materials and assessments to an individual's specific needs and learning pace. This can benefit students with diverse learning abilities and backgrounds, allowing them to learn at their own pace and in their preferred format, regardless of their location or access to traditional educational resources.
- Digital Inclusion: AI can enable digital inclusion by making technology more accessible and user-friendly. For example, AI-powered voice interfaces can make digital devices and services more

accessible for people with visual or motor impairments. Natural language processing and machine learning algorithms can also help bridge language barriers by providing real-time translations, enabling people who speak different languages to communicate and collaborate more effectively online.

- Job Opportunities: AI can create job opportunities in underserved communities. As AI technologies continue to advance, there will be a growing demand for skilled workers who can develop, implement, and manage AI solutions. Providing access to AI education and training programs can empower individuals in underserved communities to acquire the skills needed to participate in the AI-driven job market, reducing the digital divide in terms of employment opportunities.
- Social Equity: AI can contribute to addressing social equity issues by reducing bias and discrimination. Bias in AI algorithms has been a concern, as it can perpetuate existing inequalities. However, by ensuring ethical and responsible development and deployment of AI systems, it is possible to mitigate bias and discrimination. For example, AI can be used to identify and address biased practices in hiring, lending, and other areas, promoting fairness and equality in access to opportunities and resources.
- Infrastructure Optimization: AI can help optimize the deployment of digital infrastructure in underserved areas. AI algorithms can analyze data on population density, connectivity, and other factors to optimize the placement of internet access points, reduce the cost of infrastructure development, and improve the efficiency of resource allocation. This can help expand internet access to underserved areas and bridge the digital dividein terms of physical connectivity.

Conclusion

The potential of AI to decrease the digital divide is significant. AI has the ability to improve access to information, enable personalized learning, promote digital inclusion, create job opportunities, address social equity issues, and optimize digital infrastructure. However, it is crucial to ensure that AI is developed and deployed responsibly, ethically, and inclusively, with a focus on promoting equitable access to AI technologies and their benefits for all communities, including those that are currently underserved. Careful consideration of ethical implications, bias mitigation, privacy protection, and community engagement is essential to ensure that AI is leveraged in a way that truly bridges the digital divide and creates a more inclusive digital future for everyone. Collaboration among policymakers, technologists, communities, and stakeholders is vital to harness the potential of AI for decreasing the digital divide and ensuring that its benefits are accessible to all.

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