

AGING WITH AI

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ABSTRACT

The recent figures globally show that aging population is on the raise. The improvement in the healthcare, decrease in mortality rate resulted in longer life span. This is a blessing for individuals. From the global perspective, national perspective and social and economic perspective it carries challenges.

From Social aspect, due to nucleus families concept of joint family is vanishing rapidly. the many elderly who are financially well but lack in manpower facing age related issues. The buying power has not able to resolve the issues faced by the individual. Technology which exists in every domain on can think of is looked upon as a solution for these aging group. AI which has developed vary rapidly in last decade has contributing and helping various manner. The aim is to see what AI tools can help this "Aging" population and likelihood of adoption in the Indian society.

Keywords: AI, India, AI Tools, Aging

WHAT IS AI

IBM Defines AI as following Artificial intelligence, or AI, is technology that enables computers and machines to simulate human intelligence and problem-solving capabilities.

In simple term we can say Artificial intelligence is a machine's capacity to perform the cognitive functions associate with human minds. Cognitive means relating to the mental process involved in knowing, learning, and understanding things. The aim of AI is to create intelligent machines that take data, learn from it and then act accordingly to achieve specific task. AI can perform tasks that usually require human intervention. Digital assistants, GPS, autonomous vehicles and tools like Open AI's Chat GPT) are few examples of AI used by many on daily basis.

DOMAINS WHERE AI IS USED

The term "Domains" refers to the various specialized areas. Domains deal with specific problems, techniques, and applications. AI is mainly divided in three domains, namely Narrow AI, General AI, and Artificial Superintelligence.

1. Narrow or Weak AI

Narrow AI, also known as Weak AI. This artificial intelligence domain is specializes in performing specific tasks or solving particular problems. In this domain AI systems are designed and trained to do well-defined, limited range of activities. For example, virtual personal assistants like Siri or Alexa. These AI system understand and respond to voice commands.

2. General AI

General AI, also referred to as Strong AI or Artificial General Intelligence (AGI), represents This domain aims to replicate human-level intelligence and cognitive skills in machines. It has a competency to process, understand, learn, and adapt to a wide range of tasks and situations just like a human being. There is a significant challenge in Achieving General AI due to the complexity of human cognition.

3. Artificial Superintelligence

The concept of Artificial Superintelligence (ASI) is to that surpass human intelligence in every aspect. It is an advanced theoretical domain that visualizes AI entities with the potential to outperform humans in virtually every task that requires brain intellectual task. Making it superhuman with cognitive abilities as well as problem-solving skills. ASI is largely a futuristic domain. It is essential to think in depth before we take step towards it by asking a simple question "What would be impact on humans and society?"

OTHER DOMAINS:

Currently AI is been in various domains but we will consider the one which will useful for aging population

1. Machine Learning

This involves designing algorithms that can analyze data, identify patterns and learn from that data over time – without being explicitly programmed to do so. Overall, machine learning enables systems to improve at tasks without continuous human input.

2. Deep Learning

This encompasses artificial neural networks modeled after the human brain, with interconnected nodes. It is been achieved by processing large datasets, neural nets can detect features and patterns on their own and continue refining. For example Speech recognition relies heavily on deep learning.

3. Natural Language Processing

It deals with interactions between computers and human languages. Aim is to develop computer program to process, analyze, understand and generate human language including speech and text. Some important NLP techniques are Text Processing, Part of Speech Tagging, Language Generation, Object Detection, Facial Recognition

4. Robotics and Autonomous Systems

It focuses on developing physical and virtual robots and autonomous systems capable of performing complex tasks Some Examples are Human-Robot Interaction, Drone Technology Powering unmanned aerial vehicles (UAVs) or drones using computer vision for navigation

5. Healthcare

AI is now widely been used in following areas of Healthcare.

Medical Imaging Diagnosis

It uses image analysis and pattern recognition to detect various endogenous diseases like tumors, abnormalities precisely. AI can help to find growths.

Patient Monitoring

In some medical cases continuously monitoring patient vitals. AI can be used in Real-time data mining detects vital sign changes to provide early warning of heart attacks or infections.

Surgery

In Surgery Doctors used medical knowledge and skills to successfully cure a patient. AI can assist surgeons by providing precision navigation, movement tracking and most importantly hazard detection. AI will provide surgical accuracy and safety with the help of scans, robotics and augmented visualization.

Health Chatbots

AI can be used as a medical advisor. By using natural language interfaces patient can communicate and ask queries to Chatbots. This service will provide 24/7 automated access to health advice and hospital administrative support.

6. Transportation

With increased population, the transportation system is already under pressure. With Aging it becomes tiresome for senior citizen to drive and maintain patience. AI can be used to determining fastest routes, delays and road conditions.

ADVANTAGES OF AI :

- Efficiency and Speed:** It can process and analyze huge data in short time enhancing productivity and enabling faster decision-making.
- Error Reduction:** Two Characteristics of AI's namely precision and ability to learn from data assist minimize errors, making it particularly valuable in many applications in medical diagnostics.

- 24/7 Availability: It can provide around the clock, which is especially beneficial in customer service and monitoring applications.
- Handling Repetitive Tasks: AI can easily handle monotonous tasks. This helps humans to increase efficiency and focus on more complex and creative tasks.
- Improved Decision Making: AI can provide insights by analyzing data and identifying patterns, and thus helping in decision-making. As a result it reduces the risk of human error.
- Innovations in Healthcare: AI is changing healthcare through diagnostics, personalized medicine, and patient care.

DISADVANTAGES OF AI :

- High Costs: For any technology to become successful, it has to go through the development, implementation, and maintenance. Complexity in the system is making AI technologies systems expensive.
- Job Shift: Automation jobs that involve repetitive tasks can be easily handled by AI. As a result there will be job loss. That is a matter of concern, as it can reduce employment and will be responsible for economic inequality.
- Lack of Creativity: Major drawback of AI is humans will start losing creativity, ideas, intuition. AI can optimize in the mentioned things.
- Ethical and Privacy Concerns: The deployment of AI raises significant ethical questions, regarding privacy, surveillance.
- Improved Decision-Making: By analyzing data and identifying patterns, AI can provide insights that support more informed decision-making, reducing the risk of human error.
- AI Bias: AI systems can spread and even amplify biases present in their training data, leading to unfair outcomes in the field's like hiring, law enforcement.

DEFINITION OF AGING :

Ageing can't be defined exactly, but the most widely accepted idea is that it is just a part of the life cycle, and, at a certain point in time, begins to age. It's difficult to define ageing; it involves a loss of abilities. It is a physical, psychological, social process. With age, we acquire knowledge and experience. But from a biological point of view, our organs start to lose their ability to function. It is hard to tell who will age quickly or slowly. There are two types of ages: chronological and biological age. Chronological age is the age that appears in our government documents like license, passports that is the number of years we have lived. It is mainly used to measure. On the other hand biological age is the age we appear to have. In any case, it's very difficult to assign a biological age.

GENERAL VIEW OF LOOKING TOWARDS AGEING:

For centuries, ageing was viewed as an adverse process, which comprises of loss of many things like social, physical and cognitive things. In the 1980's the views on ageing changed, now it focuses on successful ageing. In reality ageing means illness, disability, loneliness, and cognitive impairment for many people. At this stage Resilience plays a critical role. This trait allows older persons to deal and do well in adversities.

GLOBAL LEVEL FACTS OF AGING :

- All countries face major challenges to ensure that their health and social systems are ready to make the most of this demographic shift.
- In 2050, 80% of older people will be living in low- and middle-income countries.
- The pace of population ageing is much faster than in the past.
- In 2020, the number of people aged 60 years and older outnumbered children younger than 5 years.

- Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%.

Table 1. Countries with Large Number of Older People

Rank	Country	# 65+ (in millions)	% 65+ (of total population)	# total population (in millions)
1	China	166.37	11.9	1398.03
2	India	84.9	6.1	1391.89
3	United States	52.76	16	329.15
4	Japan	35.58	28.2	126.18
5	Russian Federation	21.42	14.6	146.73

Table 2. Countries Have the Largest Share of People Ages 75+? Ages 85+?

Rank	Country	# 65+ (in millions)	% 65+ (of total population)	# total population (in millions)
1	Japan	28.2	3,558.0	12,618.0
2	Italy	22.8	1,376.0	6,034.0
3	Finland	21.9	121.0	552.0
4	Portugal	21.8	224.0	1,027.0
5	Greece	21.8	233.0	1,070.0

Table1. India is listed in first 5 nations with an aging population but don't have longevity when see the data in Table2.

CHALLENGES FACED BY AGING POPULATION :

It includes physical health, mental health, ageism, and financial insecurity.

1. Physical Health Problems

It can be said as the biggest challenge. In many countries aging people ignore their physical health problems for various reasons. Some of these health concerns include: Some Common health issues are Heart disease, Diabetes, Hearing loss, pulmonary disease, heart attack or stroke, loss of balance

2. Mental Health Problems

World Health Organization (WHO) estimated that approximately 15% of adults aged 60 and over suffer from a mental disorder. Life changing events like retirement or loss of loved one also impact an elderly individual's mental health. Speaking to a mental health professional for diagnosis and treatment can help alleviate some of these symptoms, as well as calling 988 for support. Some common mental health issues are Alzheimer's and dementia, Depression

Anxiety, Sleep disorders, Personality disorders

3. Ageism Problems

One major issue faced in Ageism is feelings of loneliness and isolation, both of which can manifest as physical health symptoms. Family loss, negligence by family member due to some reason like illness, mental health, financial status etc. results in loneliness.

4. Financial Problems

□ Medicine and Hospitalization

Prices of medicine and hospitalization are soaring up. Some countries provide minimal facilities to aging people but many countries lack in basic infrastructure. It becomes a challenge for people to avail medical related facilities and either they have to land up at a place which is substandard or low standard. Or in worst come scenario simply accept the reality and take a stand do nothing.

□ **Debt**

Many countries have a very high standard of living. Globally many people lack in financial management in early stage of career. Habit of over spending results in accumulating debt—credit cards, housing loan, personal loan and other expenses are carried in their senior years. At old age reduced incomes, limited financial assistance from family and friends, can built stress.

□ **Financial Scams**

It's common for aging adults to be targeted by scammers. Fraud could take place via telephone, by mail, in person, or over the internet. Seniors can face a variety of challenges as they age and it becomes a challenge to trust on any one and find the way to do activities online or offline without being getting cheated.

□ **Reduced Income**

Globally cost of living has seen a increasing graph. Not all have a financial stability at at old age. With time individual requirements decline, unseen expenses are unpredictable. With low, moderate or no income many people can't afford to maintain their living standards.

AGING IN INDIA

According to United Nations Population Fund (UNFPA) Report India is ageing, elderly to make up 20% of population by 2050. Data show that on average women between the age of 60 and 80 have higher life expectancy at the when compared with men. Report projected that the population of people aged 80+ years will grow at a rate of around 279% between 2022 and 2050 with a “prevalence of widowed and highly reliant very old women”. In India the growth rate of the elderly population is currently estimated to be at 41%, and it will be 20% of total population by 2050. It is probable that elderly population will have surpassed the population of children (aged 0 to 15 years) in the country. States such as Rajasthan, Haryana, Gujarat, Uttarakhand, Kerala, Himachal Pradesh, and the Union Territory of Jammu & Kashmir woman have higher Life Further, the sex ratio (females per 1,000 males) among the elderly has been climbing steadily since 1991, with the ratio in the general population stagnating. Between 2011 and 2021, the ratio increased in India as a whole and across all regions. Report also states that more than 40% of the elderly in India are in the poorest state, and round 18.7% of them living without an income. According to report due to Poverty older women likely to be widowed, living alone, no income, and owing fewer assets, is fully dependent on family for support.

*According to Statistica February 2023 Report financial status of Indian elderly people is as following Poor (20%), Very poor (19%), Average (22%), Good (26%) and Better (13%) In this scenario only 60 % India's old people who are not in poor state can afford to use AI Tools made for aging population.

** Old age dependency ratio in India from which was 2021 Male (14.8%) Female (16.7%) Average (15.7%). By 2031 it is estimated to be Male (18.8%) Female (20.1%) Average (21.5%) . In this scenario India's Aging Male and Female dependency will increased by 2031 and they will be force to adapt AI technology as old age assistance.

TOOL USED BY AGING POPULATION:

1. Homes solutions for Aging Elderly

Many aging people stay alone in western countries. The scenario is rapidly changing in India. The family structure has shifted from joint to nucleus due to various reasons. Now many orders live alone and they need technology to help them. Aging people who are living with there family needs devices as there is alimitation from family perspective to monitor them 24/7. So IoT Based devices like actuators, and biomedical monitors will be an asset . These devices uses internet and connected to a remote facility for data collection and processing. The data gather will be help for analysis and decisionmaking. Things like Activity recognition can play a major role.

2. Health monitoring using AI technologies

Today's world is data drive. Data plays important role in medical field as well. It can help medical professionals to enhance healthcare quality. Predictive analytics which will play a major role in health monitoring technologies for elderly. Places where AI will important Supervised and unsupervised monitoring & learning, Telecare systems
Explainable AI and X-ray film classification and recognition

3. Wearable Devices

These wearable devices assist in remote monitoring of elderly persons, and provide real-time data for effective decision-making. Some examples of wearable devices are smart watch, ECG, Cardiovascular measurement devices, Blood oxygen saturation monitoring devices.

4. Robotic Systems

With change in technology, robotics has developed in drastically. from robots to smart robots are playing leading role in various domains. Healthcare domain is it can be used for aging people as assistance. Robot can be used for giving companion, give medicine on time, to pick up things, and give reminders and alerts to concern healthcare establishments. Some examples of Robotic systems are Medication management Robotic systems, Interactive and communicative robots.

CONTRIBUTION OF COMPANIES IN DEVELOPING AI BASED TOOLS :

Industries are established to provide products to fulfill the demands of individuals or a society. Today's agotech industry grants diverse, innovative solutions that allow seniors to confidently age in place and enjoy the comfort and individuality. The role of this industry to transforming senior care and improving their quality of life. Following companies are providing solutions to aging population. They are using AI and machine learning to improve the elderly's well-being and quality of life.

1. Fujitsu

Among the businesses creating waves with AI-powered "aging in place" solutions is Fujitsu. Using the combined power of AI, 5G, and IoT for health care monitoring and remote consulting, the company's better-living platform is a comprehensive gerontechnology solution.

The AI-powered technology offers the ability to analyze audio to determine a patient's state of health. Additionally, the technology eliminates the need for in-person clinical visits by enabling medical professionals to remotely monitor the health of their senior patients.

2. Amazon Alexa

The well-known virtual assistant Alexa has undergone a makeover to become a senior care option. With the recent release of Care Hub, an Alexa add-on from Amazon, family members and home care professionals can use the mobile app to monitor the elderly.

3. Apple Watch Fall Detection

The Apple Watch's accelerometer and gyroscope sensors are what enable the Fall Detection feature. In order to identify a hard fall, it analyzes wrist trajectory and impact acceleration using data from the sensors in conjunction with a unique algorithm. The watch's hand vibrations and emergency alert are automatically activated in the event of a hard fall.

4. Vayyar

The Israeli semiconductor manufacturer Vayyar Imaging Ltd. makes radar sensors for 4D imaging. These sensors have many uses, including senior care, even though their original purpose was to screen for early-stage breast cancer.

Vayyar Care: This innovative senior security solution from Vayyar uses a camera-free system to give seniors 24/7 home security. When a senior falls and is unable to press a button or pull a cable to call for assistance, the contactless, wall-mounted sensors notify first responders.

5. Sensi.AI

Sensi.ai is the world's first virtual home care provider. The platform offers voice-based trend analysis that provides insights and treatment recommendations that help reduce risk, prevent the bad and

promote the good. A virtual caregiver is not intended to replace physical caregivers, but rather to expand the reach of this workforce.

CONCLUSION :

In Indian context, AI technology will gradually make the entry in life of aging population and society. The reason lies in financial constraint, awareness in its need and finally lack independent decision making as they are either financially dependent or financially independent but not willing to adapt the technology. When AI technology became part of Health care domain in India that time it will gain acceptance at individual household. Industries are investing a lot on AI Based technology and tools using research, real time data and innovation. They are trying their best make life easy for aging population by identifying their needs and providing exact solution on the same. Change is inevitable. Let it Age let it be technology. In near future globally importance of AI will be growing. It will be contributing towards betterment of aging population. With time cost of will go down and will be affordable to all walk of life. The resistance and affordability factor will be faded and need will be a key factor. The gap between Young and Aging will force aging population to have more dependency on AI technology for major health related and psychological related issue than humans. Aging population will be dependently independent population enjoying life with the help of AI.

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