

Artificial Intelligence – Impact on Public Governance

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Abstract— Adoption of AI will empower the government to take accurate and flexible decisions, deliver personalized citizen services. Though feared to reduce employment as it replaces redundant work, AI can significantly help in improving its employees' productivity and efficiency. However, turning its vision into a reality is not easy and there are certain challenges which plagues the Indian public sector. In this academic / scholarly article, it has been explored how Artificial Intelligence will form the foundation of new Public Governance and highlight the advanced cases across the value chain.

Index Terms— Artificial Intelligence, Public Governance, Agriculture, Health, Infrastructure, Use Cases.

1 INTRODUCTION

Artificial intelligence (AI) is redefining and revolutionizing the way of life. Things which we earlier thought only humans can do, is now carried out by machines. It enables machines to learn and solve problems on their own with the advanced capabilities [1].

From driving cars to taking care of the elderly, or performing dangerous jobs such as mine detection, AI is able to perform all. It helps make informed decisions based on the rational management of large amounts of data. It can enable us to communicate in unknown languages, thereby breaking the communication barrier, improve the education system and as well as increase the cultural or entertainment experiences at our disposal.

Using AI, new way governments are run and Citizen Centric Services are provided. Governments [2] can use AI and ML in various sectors:

- 1) Intelligent Infrastructure
- 2) Intelligent security - Secure every endpoint
- 3) Enrich citizen service delivery mechanism making it more personalized and interactive
- 4) Transform processes and delivery models to drive efficiency and transparency

In the Public Sector, it can be used in healthcare, education, judicial systems, public employment, security and, more broadly, in the management of relations with citizens, which can be simplified and at the same time be more effective, quick, and efficient.

2 OVERVIEW OF ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) refers to the ability of a computer or a computer-enabled robotic system to process information and produce outcomes in a manner similar to the thought process of humans in learning, decision making and solving problems. By extension, the goal of AI systems is to tackle complex problems in ways similar to human logic and reasoning [3].

Machine learning (ML) is a subset of AI and a central enabler of its capabilities.

With AI and ML we can build systems capable of improving their own performance by learning from data.

Financial institutions and hospitals are already utilizing AI systems to harness the potential of the massive data available

with them. They are using systems to tackle complex problems such as fraud detection and diagnosis of diseases.

AI and ML augments human capabilities. It enables us to learn from data, identify patterns, and make smarter decisions. This capability empowers organizations with new streams of revenue growth, better customer experience, & improved operational efficiency.

It can enable in acquiring insights of unexplored areas at an accelerated speed. AI is driving powerful transformations across a variety of industries and Government sector.

3 AI IN INDIAN GOVERNANCE

Governance, broadly understood as the "action or manner of governing a state" thrives on the ability of the government to ensure efficient, effective, transparent and responsive administration.

India is a large and diverse country making the task of governance that much more challenging. Slow and outdated processes and bureaucratic hurdles have traditionally fettered governance in India, but the recent pivot towards the adoption of emerging technologies is re-invigorating the system [4].

Towards this, there has been sustained discourse in the recent past to optimize the use of AI in fostering efficient governance. India, being the fastest growing economy with the second largest population in the world, has a significant stake in the AI revolution.

Recognizing AI's potential to transform economies and the need for India to strategize its approach, Hon'ble Finance Minister, in his budget speech for 2018 - 2019, mandated NITI Aayog to establish the National Program on AI, with a view to guiding the research and development in new and emerging technologies.

In pursuance of the above, NITI Aayog has adopted a three-pronged approach - undertaking exploratory proof-of-concept AI projects in various areas, crafting a national strategy for building a vibrant AI ecosystem in India and collaborating with various experts and stakeholders. Since the start of this year, NITI Aayog has partnered with several leading AI technology players to implement AI projects in critical areas such as agriculture and health [5].

NITI Aayog has decided to focus on five sectors that are en-

visioned to benefit the most from Artificial Intelligence in solving societal needs [6]:

- 1) Healthcare: Increased access and affordability of quality healthcare
- 2) Agriculture: Enhanced farmers' income, increased farm productivity and reduction of wastage
- 3) Education: Improved access and quality of education
- 4) Smart Cities and Infrastructure: Efficient and connectivity for the burgeoning urban population
- 5) Smart Mobility and Transportation: Smarter and safer modes of transportation and better traffic and congestion problems

4 FOCUS AREAS OF STATE GOVERNMENTS

State governments have envisaged empowering the citizens through welfare programs, setting up an ecosystem to promote MSMEs and processes to smoothen monetary support for weaker section of the society.

The new age technologies can support governments in realizing the mandate set up for the citizens of the state. Technologies like AI can scan through massive data at a much faster pace than human and can quickly provide outputs which are useful for policymakers. It can dissect and identify gaps in processes and provide suggestions to improve efficiency of the initiatives [7].

Some of the top Government Sectors for AI adoption are Agriculture, Healthcare, Education, Energy, Security and Crime Prevention, Social Welfare and Transportation.

5 AGRICULTURE

Global concerns such as climate change, population growth and food security concerns have resulted in countries and industrialists exploring innovative solutions to help and protect the agriculture industry. Digital technologies are leveraged to tackle various issues across the agriculture value chain. AI is emerging as part of the industry's technological evolution for Precision Agriculture [8].

5.1 Weather Monitoring

AI based real-time advisory system based on satellite imagery, weather data etc. to increase farm yields where the farm production levels are low. AI Models to track & predict various environmental impacts on crop yield such as weather changes.

5.2 Crop and Soil Health Monitoring

AI based application can identify potential defects and nutrient deficiencies in soil. Algorithms analyze and correlate foliage patterns with soil defects, plant pests and diseases. It provides advisory notifications to help them plan crop rotation.

5.3 Increasing efficiency of farm mechanization

AI tools provide round the clock monitoring of high value products of horticulture. Image classification tools combined with remote and local sensed data can bring a revolutionary change in utilization and efficiency of farm machinery, in areas

of weed removal, early disease identification, produce harvesting and grading.

5.4 Optimization of supply chain

Predictive analytics using AI tools can bring more accurate supply and demand information to farmers, thus reducing information asymmetry between farmers and intermediaries. Farmers are provided with soil restoration techniques, tips etc. using Chat Bots enabling precision farming.

5.5 Price Discovery

With better insight of the supply demand chain, and also information regarding the global market, AI can regulate pricing strategy for maximizing the returns.

5.6 Autonomous Tractor

GPS controlled autonomous tractor charts its route automatically, ploughs the land saving fuel, and reduces soil erosion maintaining soil quality¹.

5.7 Connected Live-Stock

Sensors are used to monitor the health and food intake of the animals. It sends notifications and provides advice in case of anomalies.

6 EDUCATION

Education plays [9] an extremely crucial role in economic development. New age technologies like Artificial Intelligence and Big data can benefit all - administrators, educators and students. AI can expedite administrative tasks such as enrolment and budgeting. It can also support teachers and institutes improve grading systems and assessment mechanisms.

6.1 Behaviour Management

AI can boost streamlining of education system by helping institutes make better decisions. Analysis of student behaviour based on various parameters such as performance, attendance, gender, socio-economic demographics etc. can help in predicting the probability of certain category of students dropping out.

6.2 Personalized Development Plan

With the help of AI, student and educators can charter curriculum based on student's learning and grasping power. It provides real time feedback to teachers on student's performance to tailor their guidance.

AI can be used for education based Chatbots for providing counselling to the students and other interactive activities

6.3 Improving Teaching Quality

With AI taking up the mundane and repetitive administrative works such as assessment creation, evaluation and manually tracking performance, the teachers will be able to provide more time & attention to students, work on course development, and self-learning [10].

New technologies powered by AI like AR/VR can help in improving the overall quality of proving practice knowledge.

6.4 Education for All

Online education portals and skill learning applications powered with AI will be reachable to many. These intelligent and interactive tutoring systems will [11] cut across the social barriers and make education inclusive as well exposing both teachers & students to global trends comfortably.

The easy reach of learning materials will act as a catalyst in reskilling and upskilling of citizens, making them future ready for jobs.

6.5 Improving Administration of Institutes

Automation of enrollment processes, maintenance of records – students, facilitators, educators, employees, assets, logistics management, budgeting etc. will support the institute in optimizing the jobs [12].

AI can also help in reducing frauds in the grading system and hence ensuring fool-proof education system. AI, IoT and block-chain were used in collecting school feedback, tracking food delivery, measuring the quantity of food, supplies to be purchased and monitoring meal production.

The initiative not only enhanced efficiency of our operations, but also ensured that quality standards are met while increasing the number of meals served.

7 HEALTH

Healthcare is one of the largest revenue and employment generating industry. Governments are investing in modern technologies to improve the health care system for its citizens. Using technology, it is able to close the gap on last mile and penetrating the remote areas. [13] AI in healthcare has the potential to improve patient care and staff efficiency by assisting with medical image analysis and diagnosis.

7.1 Medical Bots

Chatbots are able to do administrative work such as appointment scheduling based on severity of symptoms. It can monitor patient health and report on its status and notify the staff in a timely manner. It can improve the quality of patient doctor time, provide notification on timely discharge of patients and plan on optimum usage of bed real estate.

7.2 Treatment Design

AI systems have been created to analyze data – notes and reports from a patient's file, external research, and clinical expertise to help select the correct, individually customized treatment path.

7.3 Virtual Nurses

Digital nurse to help monitor patient's condition and follow up with treatments, between doctor visits.

7.4 Health Monitoring

Wearable health trackers monitor heart rate and activity levels. They can send alerts to users and can share this information to doctors and AI systems [14] for additional data points on the needs and habits of patients. These AI applications can be very helpful for remote access of health data points.

7.5 Precision Medicine

Genetics and genomics look for mutations & links to disease from the information in DNA. With the help of AI, body scans can spot cancer & vascular diseases early and predict the health issues people might face based on their genetics.

7.6 Doing Repetitive Jobs

Non diagnostic repetitive jobs such as analyzing tests, X-Rays, CT scans, data entry etc. are done faster and more accurately using medical robots.

7.7 Healthcare System Analysis

With the help of AI algorithms, systems can highlight mistakes in treatments, [15] workflow inefficiencies, and helps area healthcare systems avoid unnecessary patient hospitalizations. This can also be helpful in Fraud Detection in Health domain. Robot-Assisted Surgery is another field where AI is assisting the Health Sector.

8 SUSTAINABILITY

AI is used widely for energy forecasting. The unpredictable nature makes energy from wind, sun, tides etc. slightly unreliable. With insights into the possible changes, AI systems help in regulate production, and optimize supply.

Inputs from AI systems can help organizations understand the consumption pattern and improve energy efficiency. The dynamic nature of the sector has high risk associated with it.

AI solutions can interpret meteorological data to empower planning and production of energy. Adequate information on supply and demand can help in regulating cost and formulating best pricing strategy.

By tracking usage of [16] natural resources such as water and monitoring the condition of the source using AI applications, Government can plan better to tackle water scarcity problem and providing clean drinking water for everyone, efficient irrigation system etc.

9 SOCIAL WELFARE

There has been rise in fake portals, identity theft and fake businesses for getting monetary benefits for the Government.

AI algorithms can scan through bulk data to detect claim patterns, hand writings, repetition of data to identify probable frauds. It can help the benefits of schemes reach out to the appropriate beneficiaries and prevent monetary loss to the Government [17].

As many of the development programs have been established to reduce inequalities and discrimination based on factors such as gender, economic capacity, region etc., AI solutions can help to identify and prioritize those who face social challenges. It can work towards annihilation of socio-economic disparities.

AI leverages data for service delivery could see applications as predictive delivery on the basis of citizen data, rationalization of administrative personnel on the basis of predicted service demand and AI based grievance redressal through chatbots.

10 SECURITY AND CRIME PREVENTION

AI has found its use in fields of intelligence collection and analysis, logistics, cyber operations, information operations, command and control, and in a variety of semi-autonomous and autonomous vehicles.

The incorporation of Artificial Intelligence into security systems can be used to reduce the ever increasing threats of Cyber Security. [18] AI technologies possess the capability to detect vulnerabilities and take remedial measures to minimize exposure of secure online platforms containing highly sensitive data from being targeted by unscrupulous social elements.

CCC can use artificial intelligence to separate critical risks from routine network activity, identifying chains of activities that result in attacks and helping security teams to get ahead of those attacks.

Predictive analytics and other AI-powered crime analysis tools have made significant strides to predict when terrorists or other threats will strike a target. It works on drawing on data sources that includes passenger load numbers to traffic changes, and creating a schedule that makes it difficult for a terrorist to predict when there will be increased police presence [19].

Using AI data collected ranging from traditional security cameras to smart lamps can be used to detect gunfire and pinpoint where gunshots came from. AI can detect if there are any suspicious changes in the behavior of individuals or unusual movements and hence can help in predicting "who will commit a crime". It will also track individual over time.

AI Security Cameras can better scan for license plates on cars, run facial recognition to search for potential criminals or missing people, and automatically detect suspicious anomalies like unattended bags in crowded venues.

Social media intelligence platforms can provide aid to public safety by gathering information from social media and predicting potential activities that could disrupt public peace.

11 INFRASTRUCTURE

Use of AI in providing effective solutions in crowd management such as managing sports events, emergency and disasters, predicting crowd behavior and potential responses to incidents. Similar Big Data and AI solutions could help with advance prediction and response management [20].

State Command Control Centre can utilize artificial intelligence (AI) for the management of accidents and crises. AI technology enables the instant entry of voice commands from emergency teams into the system. Embedded machine learning helps the system in tackling emergencies, by simulating various scenarios & reducing response time & human error.

AI can be used to monitor patronage and accordingly control associated systems such as pavement lighting, park maintenance and other operational conditions which could lead to cost savings while also improve safety and accessibility.

With the help of AI we can design sophisticated urban traffic control systems that can optimize signal timings at the intersection, zonal and network level, while also facilitating services such as automatic vehicle detection for extension of

red/green phase or providing intermittent priority.

AI can be used in making real time dynamic decisions on traffic flows such as lane monitoring, access to exits, toll pricing, allocating right of way to public transport vehicles, enforcing traffic regulations through smart ticketing.

12 KEY USE CASES

12.1 Agriculture

Crop Insurance, Precision Farming, Soil Health monitoring, Connected Live-Stock, Price Discovery, Sensor Data Fusion in Machinery

12.2 Education

Career counselling Chatbots, Reduce Drop Out Rate, Personalized Language skills, Interactive tutoring systems, Optimize Mid-day meal operations

12.3 Health

Avoiding spread of diseases, Medical Bots, Treatment Design, Virtual Nurses, Precision Medicine and Drug Creation, Healthcare System Analysis, Doing Repetitive Jobs

12.4 Social Welfare

Dialect Classification, Sentiment Analysis, Identifying fraudulent benefits claims, AI driven Citizen Service Delivery, Dynamic Dashboards to answer Citizen questions, AI enabled CM Dashboard

12.5 Security

Reviewing Social media for quick notifications on Emergency situations, Vehicle Network and Data Security, Preventing Cyber-Attacks by IDing suspicious Behavior, Predicting Social Unrest & Geopolitical Events, Behavioral & Crowd Analytics and Facial Recognition, Object Detection for Surveillance, AI enabled Surveillance in Command Control Centre

12.6 Energy

Waste sorting, Recycling and Disposal, Energy Forecasting, Improve Energy Efficiency

12.7 Infrastructure

Disaster and Emergency Management, Predicting Traffic Density, Agent-Based Simulations for Decision Making, Predicting Social Unrest & Geopolitical Events, Intelligent Transport System, Smart Cities

13 CONCLUSION

Adoption of AI will empower the government to take accurate and flexible decisions and deliver personalized citizen services. AI can significantly help in improving its employees' productivity and efficiency. However, turning vision into a reality is faced with challenges which impacts the state Government.

13.1 Data Infrastructure (Data availability, Quality, Sanctity and Consolidation)

Data is what powers AI and makes it intelligent. Various Government Departments have started the drive to digitize their

department data. Department of Registration & Stamps, Education, Finance, Health and Tribal Welfare have attained significant level of Data Digitization in various states.

However, there are multiple other departments like Revenue, Agriculture, Horticulture, Industries, Social Welfare, Employment, Police etc. which have yet to get to the higher levels of data digitization. Also, the centralized and consolidated view of the state data departments is yet to be achieved.

13.2 Data Privacy & Security

Even with all the potential benefits of AI, which are envisaged to aid humans, people still have concerns regarding data privacy and are apprehensive to share data for a better experience. Data privacy issues are looming large in view of the adoption of new technologies including AI in public governance.

13.3 Ethical Framework

The use of new technologies should be governed by a framework to ensure that the technologies are used in ethical and legal manner. There is no such frameworks existing in public governance.

13.4 Encouraging Collaboration

There is significant level of collaboration required among the Industries (private or public), Government bodies and the Academia for research, adoption and application of AI. There is momentum for such collaboration for new technologies through various organizations in the field of public governance.

13.5 Talent Gap

Governments are seeking transformation using AI to have a comprehensive approach to build talent and invest in innovation. Public Governance bodies have established huge infrastructure for capacity building & skill development. However, courses and skills based on AI and related fields are not yet made part of skill development initiatives.

REFERENCES

- [1] <https://niti.gov.in>
- [2] <https://www.mpcongress.org>
- [3] <https://www.ibef.org>
- [4] <http://udise.in>
- [5] <https://www.hindustantimes.com/education/percent-age-of-out-of-school-girls-in-mp-jumps-to-8-5-aser-2016/story-a6cWOn7mRXdEIVH6SfNzH.html>
- [6] www.mospi.gov.in
- [7] <https://indianexpress.com/article/explained/cost-of-climate-change-in-india-heatwave-monsoon-temperature-weather-5237814/>
- [8] <https://timesofindia.indiatimes.com/city/bhopal/madhya-pradesh-is-4th-poorest-state-in-country-global-study/articleshow/66014164.cms>
- [9] <http://planningcommission.nic.in>
- [10] https://en.wikipedia.org/wiki/List_of_states_and_uni_on_territories_of_India_by_crime_rate
- [11] <https://www.analyticsindiamag.com>

- [12] Worldwide Semi-annual Cognitive Artificial Intelligence Systems Spending Guide from International Data Corp. (IDC), 2017
- [13] Data Age 2025: "The Evolution of Data to Life-Critical whitepaper by International Data Corporation, 2017"
- [14] National Health Policy 2015 Draft
- [15] Frost & Sullivan, "From \$600 M to \$6 Billion, Artificial Intelligence Systems Poised for Dramatic Market Expansion in Healthcare"
- [16] Chand, R., R. Saxena and S. Rana; Estimates and analysis of farm income in India (2015)
- [17] www.Smartcities.gov.in
- [18] NTDP, India Transport Report: Moving India to 2032
- [19] <https://searchhealthit.techtarget.com>
- [20] <https://novatiosolutions.com>

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