**Big Data and AI driven government**

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Welcome to the introduction lecture on Big Data and AI-driven government. In this lecture, we will introduce two new topics, Big Data and AI-driven government. First it will cover some background information on AI (Artificial Intelligence), introduce Big Data, and then investigate AI development in government. AI technologies are reshaping our society in a variety of ways. Artificial intelligence is a transformative technology that has rapidly emerged as one of the most influential and fascinating fields in computer science and beyond. It encompasses many capabilities, from machine learning and natural language processing to robotics and computer vision, making it an integral part of our daily lives.

So what is artificial intelligence?Artificial intelligence refers to the ability of computer systems to perform tasks that typically require human intelligence, such as understanding natural language, recognizing objects, and making decisions. It involves the simulation of human intelligence processes using machines.

If we look at applications of AI, they are diverse, it significantly impacts various sectors, including healthcare, finance, education, transportation, entertainment, and government. The study of AI encompasses a wide range of topics, with machine learning techniques currently shaping the field.

The question that comes up is, how does machine learning actually work? Machine learning works by processing large amounts of data to find patterns and correlations that are not clearly visible, allowing it to make predictions, automate tasks, and continuously improve performance. It learns to build generic models to make predictions, so it is a data-driven task. Sometimes, it is necessary for the data used for training to be large enough to achieve expected outcomes.

Behind the scenes, machine learning uses labeled data to learn data patterns to build generalized models. ML algorithms are grouped into supervised, unsupervised, and semi-supervised sections. Supervised machine learning uses labeled data to train, validate, and test ML models. While unsupervised machine learning processes unlabeled data to uncover generic structures, such as grouping similar items into clusters. The success of machine learning heavily relies on the quality and quantity of data used for training.

The question is how big should the data set be to gain benefits from machine learning? The data has a critical role in the AI age, the amount of data generated on a daily basis is overwhelming, and traditional methods of data processing are insufficient to handle it. This has given rise to the concept of Big Data, a transformative field that is reshaping industries, driving innovations, and impacting our daily lives.

We will make a concise introduction to understand what Big Data is, its key characteristics, and its profound impact on business, technology, and society. Briefly, Big Data refers to the vast and complex data sets that outstrip classical data management techniques. Which means that Big Data is not simply a large data set; it has five defining characteristics.

The first characteristic is volume. In Big Data the volume means the data that involves immense quantities of information, far more extensive than what can be managed by traditional databases. Daily, we generate data from social networks, machines, and business processes.

The second attribute is velocity, which defines the data generation speed. That is data generated rapidly from different sources such as internet media, the Internet of Things, as well as sensors that require real-time processing and analysis.

Another property is variety. Generated data encompasses diverse data types. Data types can be structured, unstructured, and semi-structured. Structured data means it is data that usually resides in relational databases with well-defined attributes. However, in unstructured data it refers to images, videos, PDF files, and log files. In the semi-structured version of the data it is the schema that is not well defined, such as JSON or XML files.

Veracity ensures the accuracy and reliability of data. However, data quality management can be a significant challenge due to inconsistencies, errors, and duplications commonly found in Big Data. Due to these 5 critical elements, Big Data applications require unique AI methods to process data to build applications.

AI is driving in our society and also in applications in our government. If we look at how AI is shaping our governments, as we said AI has applications in a variety of fields, including government. With the rapid advancement of technology, governments worldwide are using Artificial Intelligence to improve efficiency, transparency, and responsiveness of public services. AI-driven government initiatives have brought about a revolution in the way governments interact with citizens, manage resources, and make data-driven decisions. In this context we will explore the concept of AI-driven government, its various applications, and its potential benefits.

AI-driven government is also known as smart government or Government 4.0. It is a concept that aims to integrate advanced technologies such as AI and data analytics into governance. The objective is to create a more citizen-centric, efficient, and sustainable government that makes informed decisions and delivers better services to its constituents using data-driven insights. The use of Big Data helps governments with public safety, decision making, and allocating resources while enhancing transparency and efficiency in the public sector.

Let’s look at the primary use cases of AI in government and government-led domains. In citizen services AI-powered chatbots and virtual assistants are being utilized to provide instant, round-the-clock responses to citizens' queries, simplifying access to government services and information.

In predictive policing law enforcement agencies utilize AI to analyze crime data, predict potential crime hotspots, and enable proactive and efficient resource allocation. Also, AI is used in healthcare in which AI assists in optimizing hospital operations, predicting and preventing disease outbreaks, and aiding in diagnosis and treatment planning for better healthcare delivery. Also Big Data and AI can be used to enable personalized treatment, patient care, and drug development for public care.

One of the other fields where governments benefit from AI is traffic management. AI-powered systems allow for real-time analysis of traffic data to manage traffic flow, reduce congestion, and enhance road safety through intelligent traffic controls. Self-driving cars powered by AI are on the horizon, promising safer and more efficient roads.

Also in public financial management AI detects fraud and enhances tax collection, ensuring public funds are managed efficiently and transparently. One of the other fields AI can be used in is education, which means that AI-powered tools have the potential to personalize education by identifying students' needs and offering customized learning materials and assessments. It helps students to become life-long learners, self-learners. Students and educators benefit from AI tools to prepare materials, course content, and advanced analytics. It is also used in administrative tasks such as managing enrollment and grading.

Also AI is used for technology and innovation, which relies on Big Data and Big Data is the driving force behind technological innovation, supporting developments in Artificial Intelligence, machine learning, and data analytics. Through research and science data is utilized by researchers to gain insights across diverse fields, from climate science to genetics it helps to identify patterns, trends, and solutions to complex problems.

AI has to overcome some challenging tasks, such as extracting valuable insights from vast data sets in real time. Data analytics, machine learning, and Artificial Intelligence are at the forefront of making sense of Big Data, offering potential for unprecedented innovation and discovery. As we said, AI and Big Data are the potential tools in today’s digital age. They have the potential to uncover hidden potential, opportunities, solve complex problems, and shape the future of business, science, and society. By analyzing vast amounts of information we can make better decisions and create a more informed future. It is a journey into the world of data driven decisions and endless possibilities.

If we look at the benefits of AI-driven government, the integration of AI in the government can result in various advantages, such as providing efficiency, allocating processes, and using data to make informed decisions. This means government operations can be more streamlined, reduce administrative costs, and improve the efficient allocation of resources.

Also, another concept and another topic is transparency. AI can help to ensure transparency in government operations, making it easier for citizens to access information, more inter-government activities, and more participatory decision making. Also, AI can optimize resources by allocating, improving the accuracy of the predictions, and helping governments to achieve significant cost savings. Also, it can provide improved public services, such as AI-based citizen services which lead to faster response times and more personalized assistance, thereby enhancing the overall quality of public services.

A data-driven government and AI can enable governments to make better use of data policy, formulation, strategic planning, and other purposes. If we look at what the main challenges and ethical considerations are, we see that AI in government has the potential to introduce some problems. When implementing AI solutions governments must understand concerns regarding privacy, data security, ethical use of AI, and the digital divide. Ensuring that all citizens benefit from AI technology and that sensitive data is protected is vital.

One of the challenges of AI is privacy concerns. The vast amount of data required by AI systems leads to a rise of concerns about individual privacy, data security and ethical use of information. AI systems may reduce unfair outcomes by inheriting biases from the data they are trained on. It is important to ensure fairness within AI. Also the rapid development of AI technologies requires robust regulations to ensure safe and ethical deployments.

If we look at the future of AI and AI-driven government, as technology continues to evolve AI-driven government is expected to play an increasingly central role in public administration. The use of AI in predicting and mitigating natural disasters, improving cybersecurity, and enhancing environmental monitoring is on the horizon. Moreover, governments will continue to focus on ensuring that AI benefits are equally distributed across all societies.

Integrating AI into government operations holds great promise for achieving a more efficient, transparent, and citizen-centered public administration. However, successful integration of AI requires a commitment to ethical use, data security, and close collaboration with the private sector and civil society. By working together, we can ensure that everyone benefits from the advance of AI.

Artificial Intelligence is without a doubt one of the most exciting frontiers of technology, and its impact on our world will only continue to grow.

Thank you.

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