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Real Life Mathematical Applications In Artificial Intelligence

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Abstract : In this paper we discussed some of mathematical applications of artificial intelligence in the following real life areas namely Agriculture, Medicine, Master of business administration, Master of Computer Application, Bachelor of Business Administration, Civil Engineering (core subject), Veterinary Sciences, Army, Mechanics, Construction mainly in agriculture integration, crop monitoring and disease, in medicine rapid gene sequencing, artificial Intelligence in Disease.

Keywords: Management, different types of vaccines, IT Projects, Building Design, Constructions, Robotics, Military Technology.

Introduction : AI are used to involves using Internet of Things (IoT) sensors, drones and satellite imagery to collect data on soil moisture, temperature and Crop health. This data is then used to optimize irrigation, fertilization, and Pest control, resulting in improved crop yields and reduced waste. Nano technology is being used to develop targeted drug delivery systems for cancer treatment. Nanoparticles can be engineered to deliver chemotherapy drugs directly to tumor cells, minimizing damage to healthy tissues and reducing side effects for example, Doxil, a liposomal formulation of the chemotherapy drug doxorubicin, uses nanotechnology to target Cancer cells more effectively. MBA graduates can apply strategic management principles to drive business growth, analyze market trends, and make informed decisions for instance, companies like Tesla have successfully transitioned to sustainable business practices, offering valuable lessons for MBA students. Civil engineers play a crucial role in designing and constructing safe, durable, and energy- efficient buildings, such homes, schools, hospitals, and commercial buildings. They ensure that structures can withstand various forces and meet safety standards. The army utilizes virtual reality (VR) for training purpose, such as combat simulations, and medical training, for instance, the united states army uses UR combat simulators like virtual Battlespace 3 (VBS3) to provide realistic environments for training soldiers. This enhances their readiness and effectiveness in real-world scenario.

1) Agriculture:

- **Integration.** This involves using Internet of Things (IoT) sensors, drones and satellite imagery to collect data on soil moisture, temperature and Crop health. This data is then used to optimize irrigation, fertilization, and Pest control, resulting in improved crop yields and reduced waste.
- **Crop Monitoring and Disease**
- **Detection:** Artificial intelligence (AI) and machine learning algorithms analyze data from drones, sensors and cameras to identify pest infestations, diseases, and nutrient deficiencies early. This enables, farmers to take proactive measures to prevent widespread crop damage.
- **Automated Machinery and Robotics:** AI-Pow Robotic systems guided by AI are transforming labor intensive tasks like planting, weeding, and harvesting. These machines work faster and more efficiently, addressing labor shortages and reducing operational costs. Autonomous tractors equipped with AI navigate fields, optimize planting patterns, and work around the clock.

- **Weather Prediction and Risk**
- **Management:** AI models analyze historical and real-time weather data to predict climate patterns, helping farmers make informed decisions about planting and harvesting schedules. This also enables them to mitigate risks associated with extreme weather events, such as draughts or floods.
- **Drones in Agriculture :** Drones are being used for crop monitoring, soil analysis, and precision spraying of chemicals and inputs. They provide detailed aerial images and multispectral data, enabling farmers to detect crop stress, pest infestations, and diseases early. Drones can also optimize fertilizer and pesticide application, reducing chemical use and environment impact.

2. Medicine

- **Targeted Cancer Treatment:** Nanotechnology is being used to develop targeted drug delivery systems for cancer treatment. Nanoparticles can be engineered to deliver chemotherapy drugs directly to tumor cells, minimizing damage to healthy tissues and reducing side effects for example, Doxil, a liposomal formulation of the chemotherapy drug doxorubicin, uses nanotechnology to target Cancer cells more effectively.
- **Rapid Gene Sequencing:**
- Gene sequencing can identify genetic mutations that cause life-threatening conditions. Recent advancements in rapid gene sequencing have reduced the time it takes to produce results from weeks to just hours. This expedited approach enables doctors to provide timely and targeted treatments, improving patient outcomes.
- **Artificial Intelligence in Disease**
- **Detection:** AI - powered systems are being used to detect diseases like sepsis more accurately and quickly. The Targeted Real-time Early warning system (TREWS) developed at Johns Hopkins Medicine can detect sepsis nearly six hours sooner than traditional methods potentially saving hundreds of lives.
- **Immunotherapy for Cancer and Autoimmune Diseases:** Immunotherapy harnesses the power of the immune system to combat cancer and other diseases. This approach has shown promise in treating conditions like rheumatoid arthritis, cancer, and autoimmune diseases. Medication's like teplizum delay the onset of type 1 diabetes by binding to immune cells and partially blocking their ability to destroy insulin- producing cells.
- **Vaccines for Infectious Diseases:** Vaccines play a crucial role in preventing infections disease recent advancements include the development of RSV vaccines, which protect against respiratory syncytial virus, a leading cause of illness and death in older adults. Vaccines have also been instrumental in controlling outbreaks and eradicating deadly viruses like smallpox and polio.

3. MBA (Master of Business Administration).

- **Strategic Management:** MBA graduates can apply strategic management principles to drive business growth, analyze market trends, and make informed decisions for instance, companies like Tesla have successfully transitioned to sustainable business practices, offering valuable lessons for MBA students.
- **Financial Management:** MBA professionals can utilize financial analysis, planning and management to optimize business performance. JPMorgan Chase's digital initiatives, such as mobile banking and fintech partnerships, demonstrate the importance of adapting to technological advancements in finance.
- **Marketing Management :** MBA Professionals can apply operations management principles to streamline business processes, manage supply chains, and improve productivity Toyota's Just-in-Time (JIT) revolution is a notable example of efficient operations management.
- **Human Resource Management**
- MBA graduates can develop HR strategies, manage talent, and foster a positive work environment understanding quality of work-life (QWL) and implementing affective HR policies and crucial for organizational success.

4. MCA (Master of Computer Applications).

- **Software Development:** MCA graduates can design, develop, and maintain software applications for various industries, such as finance, healthcare, and e-commerce. They can work on projects like mobile app development, web development, or enterprise software solutions
- **Data science and Analytics:** With a strong foundation in programming and data structures, MCA professionals can work in data science, analyzing and interpreting complex data to inform business decisions. They can apply machine learning algorithms, data visualization techniques, and statistical modeling to drive business insights.
- **Artificial Intelligence and Machine Learning:** MCA graduates can develop intelligent systems that can learn, reason, and interact with human's. They can work on projects like natural language processing, computer vision, or predictive modeling, and apply AI and ML techniques to solve real-world problems.
- **Cyber security:** MCA professionals can work in cyber security, protecting computer systems, networks, and data from cyber threats. They can develop secure software applications, implement security protocols, and respond to security incidents.
- **IT Project Management :** MCA graduates can manage 17 projects, overseeing the development, implementation, and maintenance of software applications and systems. They can apply project management methodologies like Agile, scrum, or waterfall to ensure projects are delivered on time, within budget, and to the required quality standards.

5. BBA (Bachelor of Business Administration) :

- **Management and Leadership:** BBA graduates can apply their knowledge of management principles, leadership styles, and organizational behavior to lead teams and make informed decisions in various industries.
- **Marketing and Brand Management:** BBA professionals can develop and implement effective marketing strategies, manage brand reputation, and analyze, consumer behavior to drive business growth.
- **Financial Management :** BBA graduates can apply financial principles can apply financial principles, analyze financial data, and make informed decisions about investments, funding, and risk management
- **Human Resource Management:** BBA professionals can develop and implement HR. strategies-manage talent acquisition and retention, and foster a positive work environment
- **Entrepreneurship and Business Development:** BBA graduates can apply their knowledge of business principles, market analysis, and strategic planning to start and grow their own businesses or develop new business opportunities within existing organizations

6. Civil Engineering (Core Subject) :

- **Building Design and Construction:** Civil engineers play a crucial role in designing and constructing safe, durable, and energy- efficient buildings, such homes, schools, hospitals, and commercial buildings. They ensure that structures can withstand various forces and meet safety standards
- **Road Infrastructure Development:** Civil engineers plan, design, and construct road networks to facilitate efficient transportation and connectivity. They consider factors like population growth, traffic patterns, and economic development to create safe and reliable transportation routes.
- **Water supply and Distribution systems:** Civil engineer's design and manage water supply systems, providing clean and safe drinking water to homes, industries and communities. They also develop strategies for water treatment and conservation
- **Wastewater Treatment:** Civil engineer's work on designing and operating wastewater treatment systems, protecting public health and the environment by removing contaminants and pollutants from wastewater Streams.
- **Dam construction and Management:** Civil engineer's design and manage dams, which play a critical role in water resource management, flood control, and energy Production. They ensure that dam's are safe, efficient, and environmentally sustainable.

7. Veterinary science :

- **Artificial Intelligence in Disease Diagnosis:** AI-powered machine learning models can analyze vast amounts of data, such as medical images and lab results, to detect diseases faster and help veterinarians set the most effective treatment plans. This technology has the potential to revolutionize veterinary care, especially in areas like disease diagnosis and Predictive modeling.
- **Nanotechnology in Drug Delivery and Imaging.** Nanoparticles can be used to deliver targeted therapies, improving treatment outcomes and reducing side effects. Nanotechnology also enhances imaging techniques, allowing for earlier techniques, disease detection and more accurate diagnoses
- **Recombinant DNA Technology in vaccine Development:** Genetic engineering enables the creation of vaccines that can't be obtained from live or dead microbes, for instance, the Hepatitis-8 vaccine is produced using recombinant DNA technology, showcasing its potential in preventing diseases
- **Precision Livestock farming:** AI and data analytics can optimize livestock production, improving animal welfare and farm efficiency. This approach enables farmers to make data-driven decisions, reducing the risk of disease outbreaks and enhancing overall productivity,
- **Advanced Diagnostic Tools:** Veterinary science leverages cutting-edge diagnostic tools, such as multi-omics approaches, to detect diseases and develop personalized treatment plans. These innovations have far-reaching implications for animal health and human medicine.

8. Army :

- **Virtual Reality Training:** The army utilizes virtual reality (VR) for training purposes, such as combat simulations, and medical training, for instance, the United States Army uses VR combat simulators like virtual Battlespace 3 (VBS3) to provide realistic environments for training soldiers. This enhances their readiness and effectiveness in real-world scenarios.
- **Artificial Intelligence in military Technology:** AI is transforming military operations by enabling Command and control, Predictive maintenance, and enhanced cyber security. AI-powered systems can analyze vast amounts of data, predict equipment failures, and provide real-time insights, giving the army a strategic advantage
- **Advanced Sensors and surveillance:** The army employs various sensors, including infrared, acoustic, and radar sensors, to detect and track targets, enhancing situational awareness. These sensors can be integrated with AI to improve speed, accuracy, and predictive capabilities, enabling the army to respond effectively to threats.
- **Robotics and Autonomous systems :** Robots are used in various military applications, such as Search and rescue missions, mine clearance, and transportation. For example, search and rescue robots can navigate challenging terrain to locate missing personnel, while mine clearance robots can detect and deactivate landmines, reducing the risk to human soldiers.
- **Mobile Applications and Communication:** The army uses mobile apps for navigation, survival skills, and medical training. Apps like Army first Aid and survive provide critical information for soldiers in the field, enhancing their ability to respond to emergencies and survive in challenging environments.

9. Mechanics :

- **Automotive Engineering:** Mechanics plays a crucial role in designing and developing safe, efficient, and reliable vehicles. This includes engine design, chassis and suspension systems, aerodynamics, and safety systems like anti-lock braking systems (ABS). Mechanical engineers optimize engine components, gear ratios, and torque transfer mechanisms to enhance power output, fuel efficiency, and emissions performance.
- **Aerospace Engineering:** Mechanics is essential in designing and analyzing aircraft in designing and analyzing aircraft and spacecraft components, such as propulsion systems, structural components, and thermal management systems. Aerospace engineers work on optimizing these systems for efficiency, thrust, and safety, considering factors like combustion dynamics and thermal management.

- **Robotic's and Automation:** Mechanics is used to design and develop robotic systems that can perform tasks with precision and efficiency. This includes designing robotic arms, grippers, and other mechanical parts, as well developing control systems and sensors to enable robots to interact with their environment
- **Heating, Ventilation and Air Conditioning (HVAC) systems :** Mechanics is applied in designing and installing HVAC systems that provide comfortable and controlled indoor environments. This includes designing heating and cooling systems, air distribution and ductwork, and noise control systems to minimize unwanted sounds and vibrations.
- **Biomechanics and Medical Devices:** Mechanics is used to design and develop medical devices like prosthetics, orthotics, and implants. Biomechanical engineers study the mechanics of biological systems, including the human body, to develop. devices that can assist individuals with mobility impairments or Injuries. They also work on designing safety equipment, like helmets and seat belts, to protect occupants during collisions.

10. Construction :

- **Bridge construction:** Construction of bridges is critical for facilitating transportation and connectivity over waterways, valleys, or other obstacles. Civil engineers design and build bridges that are safe, durable, and aesthetically pleasing, taking into account factors like traffic volume, environmental impact, and structural integrity.
- **High-Speed Rail Infrastructure:** Construction of high-speed rail infrastructure requires to ensure safe and specialized expertise and techniques, to ensure safe and efficient transportation. This includes designing and building tracks, tunnels, and bridges that can support high-speed trains, as well as implementing advanced signaling and safety systems.
- **Renewable Energy Infrastructure:** Construction plays a vital role in building renewable energy infrastructure, such as wind farms, solar panel installations, and hydroelectric power plants. Civil engineers design and build foundations, towers, and other structures that support these systems, helping to reduce reliance on fossil fuels and mitigate climate change.
- **Airport Design and Constructions:** Construction of airports requires careful planning and execution to ensure safe and efficient air travel. Civil engineers design and build airport facilities, including runways, terminals, and baggage handling systems, facilitate global connectivity and economic development.
- **Water supply and distribution systems :** Construction plays a vital role in designing and building water supply and distribution systems that provide clean and safe drinking water to communities. Civil engineers abness water quality and quantity, design treatment plants, and build distribution networks to ensure reliable access to this essential resource.

References:

1. Artificial Intelligence Mathematics: The All in One Textbook (Haneul Choi Mathematics - Haneul Choi
2. Mathematics Behind Artificial Intelligence and Machine Learning - Sayaji Hande, Digambar Shirke
3. Engineering Mathematics and Artificial Intelligence: Foundations, Methods, and Applications (Mathematics and its Applications) - Herb Kunze, Davide La Torre, Adam Riccoboni & Manuel Ruiz Galán
4. Mathematics for Machine Learning and AI - Dr. Ganesh Kumar Thakur, Dr. Bandana Priya
5. Mathematics for AI: The Hidden Language of Machines - Gilbert Gutiérrez
6. Mathematics for artificial intelligence: Foundation of linear algebra and probality (Data Science) Anshuman Mishra
7. Why Machines Learn: The Elegant Math Behind Modern AI - Anil Ananthaswamy