Artificial Intelligence in Education

शिक्षा में कृत्रिम बुद्धिमत्ता

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NEP 2020 highlights (Learn, Unlearn, Relearn)

- With scientific and technological advances, such as the rise of big data, machine learning, and artificial intelligence, many unskilled jobs may be taken over by machines,
- the need for a skilled workforce, with multidisciplinary abilities across the sciences, social sciences, and humanities, will be increasingly in greater demand.
- with the quickly changing employment landscape and global ecosystem, it is becoming increasingly critical that children not only learn, but more importantly learn how to learn.

What is Intelligence

Intelligence - ability to **learn** and **perform suitable techniques** to solve problems and achieve goals (Stanford Univ)

A modern factory robot is flexible, accurate, and consistent but not intelligent.

What is AI?

The branch of science and technology that is devoted to the creation of machines (Computer System, Robots, etc.) that learn and think as intelligently as human beings is known as Artificial Intelligence or AI.

What is AI (Artificial Intelligence)

Simulation of human intelligence processes by computer systems.
Characteristics of human behaviour:

- Understanding
- Reasoning
- Learning
- Solving Problems
- Effective communication

The Science and Engineering of making intelligent machines, especially intelligent computer programs - *McCarthy*

SIRI and Alexa are powered by AI

Applications of AI in Daily Life

Healthcare

Agriculture

Retailing

Productivity in Work

Personal Life

How AI systems work? 1

- by analyzing data and learning from patterns.
- use algorithms, or step-by-step instructions, to learn from data and make decisions
- The more data they are given and the more patterns they learn, the better they become at making decisions and performing tasks.
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Why sudden boom in AI Systems?

- significant improvements in computing power and data storage capabilities
- The growth of the internet, social media, and other digital technologies has led to the accumulation of vast amounts of data, which can be analyzed and used to train AI models.
- Advances in the AI research (Deep Learning)
- Advancements in Natural Language Processing (NLP): The ability of AI to understand and interpret human language

Technical Applications Areas of AI

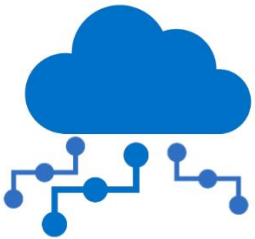
Image Processing

Sentiment Analysis

Natural Language Processing

Video Processing

Speech Recognition



Internet of Things (IoT)

Major areas/fields of AI

Machine Learning - how computer agents can improve their perception, knowledge, thinking, or actions based on experience or data

Robotics - puts artificial intelligence into practice using machines that perceive and interact with the physical world

Computer vision - can understand images and video

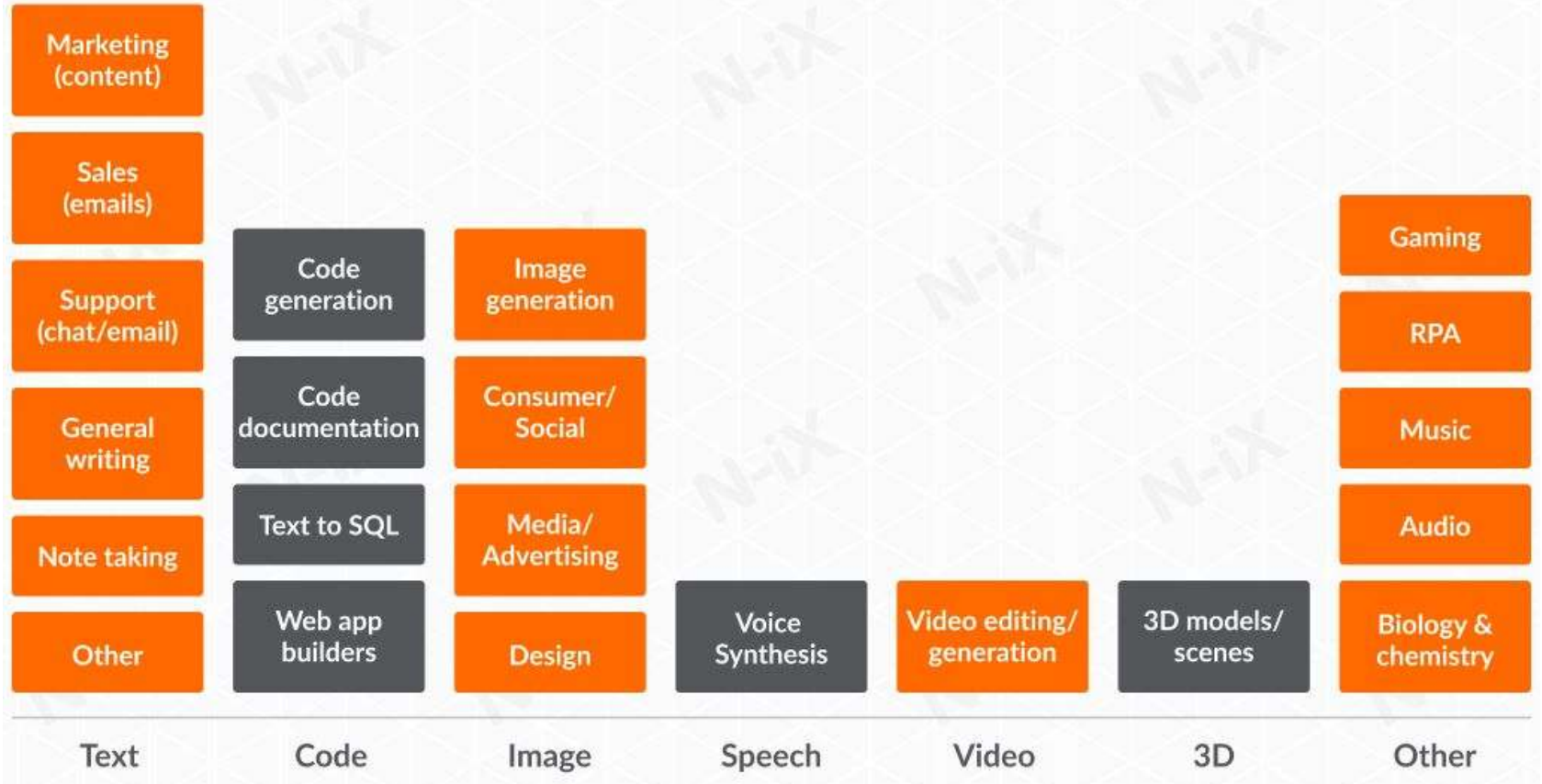
Natural language processing - understand written and spoken language; automatic translation of text from one language to another, or understanding text to produce knowledge about the world.

Expert Systems - learns and imitates a human being's decision-making ability.

Generative AI

It is a type of artificial intelligence that focuses on creating/generating new content.
It's a subset of machine learning, drawing from techniques like deep learning and reinforcement learning to generate output that con include text, images, music, video, and more.

Gen AI Use cases



Major Use Area of Generative AI

1. Retail	USE CASES:	• Customer service automation • Sales and product recommendations • 24/7 customer support
2. Healthcare	USE CASES:	• Diagnostics support • Symptoms checking and triage • Clinical trial matching
3. Finance and banking	USE CASES:	• Customer service automation • Fraud detection and security • Market analysis and investment suggestions
4. Education	USE CASES:	• Administrative automation • Personalized learning assistance • Language learning and practice
5. Supply chain management	USE CASES:	• Inventory management and queries • Shipment tracking and updates • Crisis management and contingency planning

Conversational AI

a type of AI that can simulate human conversation.

Happens through natural language processing (NLP), a field of AI that allows computers to understand and process human languages.

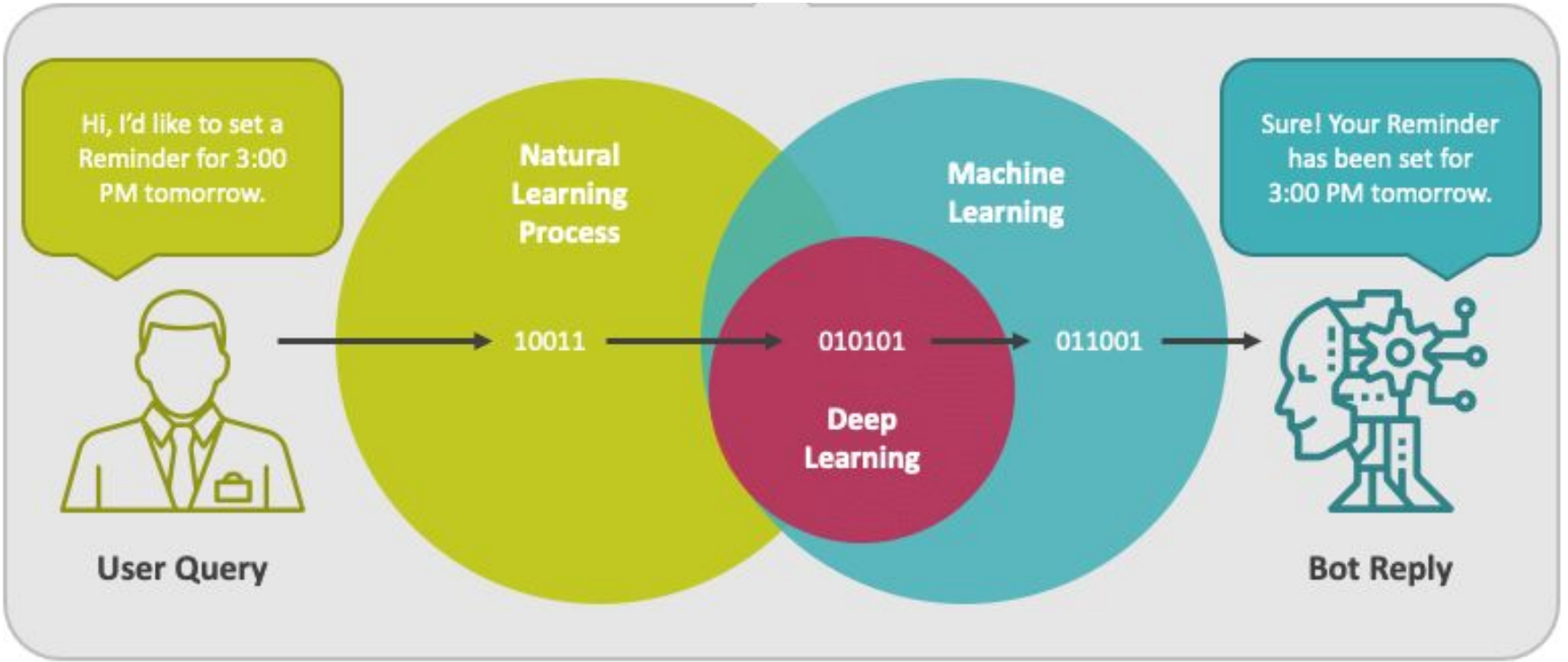
“*synthetic brain power that makes machines capable of understanding, processing and responding to human language*.”

- Can you help me (*service request)?*
- I have a question *(information request).*
- I need to get this *done (action request).*
- I want to see this request *(info request).*
- What should I do *(decision request).*
- Let me know when X occurs *(notification request).*

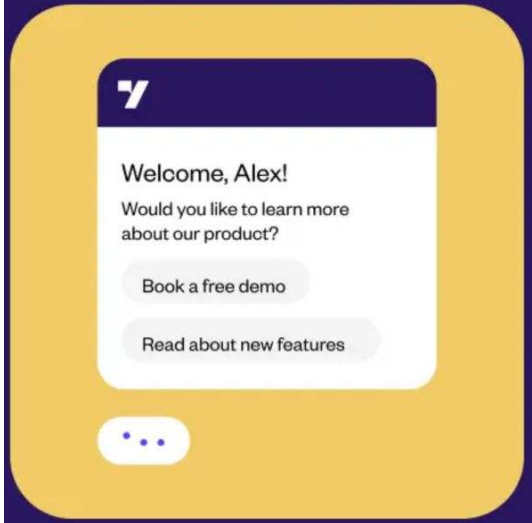
- What does the person want?
- What language are they using?
- Are people, places, and details mentioned?
- What is the kind of request?
- Does the user seem happy or upset?
- Have we interacted before?

AI

Conversational


Hi, I'd like to set a Reminder for 3:00 PM tomorrow.
Natural Learning Process
Machine Learning
Deep Learning
10011
010101
011001
Sure! Your Reminder has been set for 3:00 PM tomorrow.
User Query
Bot Reply

Types of Conversational AI



AI Chatbots

Voice bots

Interactive voice assistants

AI in Education

Use of Computers in Education are primarily aimed towards:

- increasing accessibility - Learning resources can be accessed from anywhere, at any time
- facilitating personalized learning inside and outside the classroom. Learning can be tailored and adapted to each student's goals and abilities through personalized programs,
- Time-consuming, tedious tasks such as record keeping or grading multiple-choice tests can be completed through AI automation, and
- exploring fundamental questions about how people learn

Personalized Learning

- tailor learning experiences to the unique needs, preferences, pace and abilities of each learner.
- analyzing data about individual learners, AI can provide insights into areas of strengths and weaknesses, identify learning styles, and provide customized recommendations for content, resources, and activities.
- Leads to more engaging, relevant, and effective learning experience
- bridge the skills gap that exists between different learners

Adaptive Learning

- AI algorithms observe you to detect how you prefer to learn as an individual or as a chort
- Goal is creating entire learning journeys or flows that adjust to each learner based on their interests, learning preferences, needs, skills, and what they wish to learn

Universal Access

- Real time text to speech, Speech to text conversion
- text to text, speech to speech conversion from one language to another
- Will make the classroom accessible to people who speak different languages or those having visual or hearing impairments

From a policymaker's perspective

Potential application categories of AI in Edu:

(i) education management and delivery;

(ii) learning and assessment;

(iii) empowering teachers and enhancing teaching; and

(iv) lifelong learning.

Education management and delivery

AI systems are designed to automate aspects of school administration, including admissions, timetabling, attendance and homework monitoring, and school inspections.

a data-mining approach ‘learning analytics’ is used to analyse the big data generated in learning management systems to provide information for teachers and administrators, and sometimes guidance for students.

some learning analytics predict which students are at risk of failure.

Education management and delivery

visual dashboards are used to inform data-driven decision making

Many AI based applications collect huge amounts of student interaction data, use machine-learning techniques to ‘search for patterns’. The aim is to teach the software to identify when children are confused or bored, in order to help them become engaged.

Learning and assessment

Broad aim to provide every learner, wherever they are in the world, with access to high-quality, personalized, and ubiquitous lifelong learning.

Learning and assessment

Other categories of AI based systems for learning and assessment are:

Dialogue-based tutoring systems (NLP)

Exploratory learning environments

Automated writing evaluation

AI-supported reading and language learning (Babbel, Duolingo)

Smart robots

Educational virtual and augmented reality

Intelligent Tutoring System

Works is by providing step-by-step tutorials, individualized for each student, through topics in structured subjects such as mathematics or physics.

It determines an optimal pathway through the learning materials and activities by drawing on expert knowledge about the subject and cognitive sciences,

Respond to individual students' misconceptions and successes

As the student engages with the learning activities, the system uses knowledge tracing and machine learning to automatically adjust the level of difficulty and provide hints or guidance according to the individual student's strengths and weaknesses

Empowering teachers and enhancing teaching

AI applications aim to help teachers reduce workloads by automating tasks such as assessment, plagiarism detection, administration and feedback.

AI-driven discussion forum monitoring (AI Assistant)

AI-powered teaching assistants

Empowering role of teachers

it is widely agreed that as AI tools become more available in classroom, it is likely that teacher roles will change.

What is not yet clear is how this will happen.

Teachers will need to build new competencies to enable them to work effectively with AI, and undertake appropriate professional development to foster their human and social capabilities.

Lifelong learning

AI-driven lifelong learning companions

AI-enabled continuous assessment

AI-enabled record of lifelong learning achievements - AI-driven e-portfolio

Ethical Concerns Related to AI systems

1. Fairness: should be designed to avoid bias and discrimination and ensure equal treatment for all individuals, regardless of their race, gender, age, or other personal characteristics.
2. Transparency: should be transparent and explainable, with clear documentation of how they make decisions and recommendations.
3. Privacy: respect the privacy of individuals and protect their personal data from unauthorized access or misuse.
4. Accountability: Those who develop and deploy AI systems should be accountable
5. Safety: to ensure the safety and well-being of users and others who may be affected by their use.

Way Forward

- Educators need to develop a better understanding of AI's impact, including on education and training.
- educators and students should have a basic understanding of AI and data usage to be able to engage positively, critically and ethically with this technology and to exploit its full potential.
- European Commission published Ethical Guidelines (https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6338) on the Use of Artificial Intelligence (AI) and data in teaching and learning for teachers

Thank You