ARTIFICIAL INTELLIGENCE(AI) IN THE FIELD OF EDUCATION
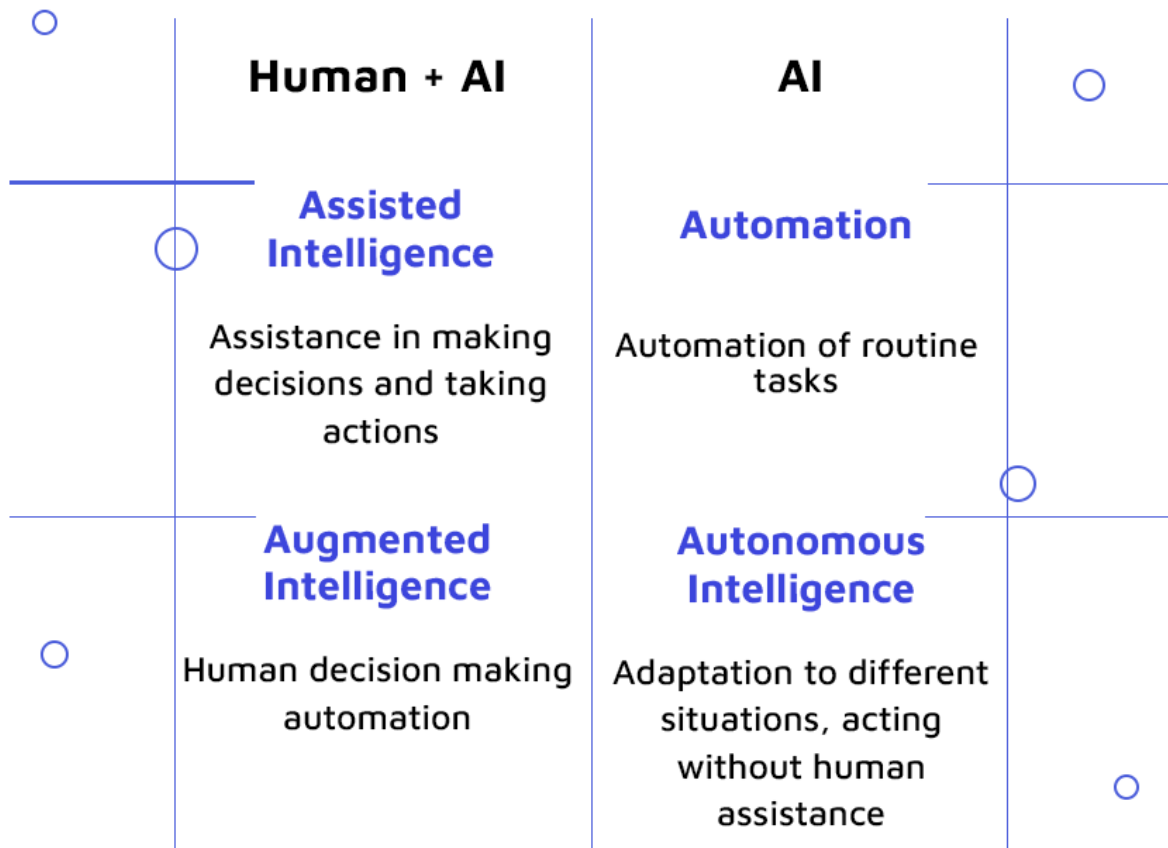
Human + AI	AI
Assisted Intelligence	**Automation**
Assistance in making decisions and taking actions	Automation of routine tasks
Augmented Intelligence	**Autonomous Intelligence**
Human decision making automation	Adaptation to different situations, acting without human assistance

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Abstract:

 Nowadays digital technologies have already become an internal part of our life. Like Mobile, laptops, Cleaning Robots, etc. They have changed our lifestyle and the way we get information, from across the world. Artificial Intelligence is a branch of science producing and studying machines aimed at the stimulation of human intelligence processes. The main objective of AI is to optimize routine processes, improving their speed and efficiency.

Introduction

The digital space is growing rapidly and it's evolving. It literally changed the way of looking at information, how we use it, look at it, utilize, and even to exchange it. As a consequence, the educational landscape has also begun to change. More and more internet education systems or courses are evolving. Examples LinkedIn learning, Udemy, ISC2, etc. Some schools & colleges in the USA, India, and France are offering online teaching due to the covid, and it is really a great initiative. Moreover, so many companies and other small organizations utilize Learning Management Systems (LMS) such as modules.

Students are utilizing tablets, laptops even mobile phones for taking notes instead of copybooks, and teachers are taking advantage of Virtual classrooms like Google Classroom, Power Schools, and BYJU's. Even though there is a large number of Massive Open Online Courses (MOOCs) for studying online such as Coursera. Even society, teachers, and parents are showing interest in distance education such as MOOCs. There are other factors that make this Artificial Intelligence (AI) in the education system more interactive than Virtual Reality (VR) and Augmented Reality (AR).

There are many definitions of AI that currently could be found in the literature. According to, "Artificial Intelligence is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment". Another key definition of this technology is presented in :

• AI is "the field of computer science to solving cognitive problems commonly associated with human intelligence, such as learning, problem-solving, and pattern recognition."

• AI is "the theory and development of computer systems that are able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages." Many projects dealing with AI are being launched all over the world.

Gartner, in its annual report on emerging technologies, presented information describing AI's arrival on the market as a promising technology. According to the report, "the ability to use AI to enhance decision making, reinvent business models and ecosystems, and remake the customer experience will drive the payoff for digital initiatives through 2025". They also showed that 59% of organizations are likely to implement AI strategies, as well as others have already made progress in piloting or adopting AI solutions. That could be referred to different domains including education.

On the other hand, it should be mentioned that the big reason why companies and the whole market want to use AI in their work – is to reduce their cost-cutting like manpower and resources. This is one of

the main concerns over AI usage as an employee. Even Stephen Hawking and Elon Musk have warned of AI's threats recently.

In the education sector, it's not straightforward. Since it's always that the necessary part of effective studying is an interaction with humans – social interaction. Indeed, the educational sector is considerably affected by AI. The report, which presents an investigation of how AI influences people and society, claims that AI applications are in wide use by educators and learners today. Such tools and technologies as teaching robots, intelligent tutoring systems, and adaptive learning systems. We can also mention such AI applications as adaptive skill building, scheduling, career education, and many others.

The objective of this paper is to identify the impact of AI on education and present a broad perspective on this topic. It also addresses how AI can help to decrypt student difficulties and understand how to help them, improve the imagination of a collectivity, and design a new educational experience.

AI in education can be used in several ways, such as:

1. **Personalized learning**: AI can be used to analyze student data and provide personalized learning experiences that target specific areas of weakness.
2. **Intelligent Tutoring Systems:** AI can be used to create intelligent tutoring systems that can adapt to the student's learning style, progress, and performance.
3. **Automated Grading and Feedback:** AI can be used to grade student work and provide automated feedback, which can save teachers time and improve student engagement.
4. **Adaptive Testing**: AI can be used to create adaptive tests that adjust to the student's performance level, providing a more accurate assessment of their knowledge.

1. ## Personalized learning using AI could cover a variety of topics, including:

Personalized learning and its benefits in AI algorithms and technologies to provide individualized learning experiences to students based on their needs, preferences, and learning styles. It maximizes student engagement, motivation, and outcomes by providing students with content and activities that gain their unique strengths, weaknesses, and interests. AI-powered personalized learning systems can analyze student data, such as performance on assessments and learning activities, to identify patterns and make predictions about what students know and what they need to learn. This information can then be used to dynamically adjust the content and difficulty of learning materials, provide real-time feedback and support, and guide students through their learning journey. By providing students with customized learning experiences, AI-powered personalized learning can help to reduce the achievement gap and increase student engagement and outcomes. This can also help to meet the needs of diverse student populations and support teachers by freeing up time and resources that would otherwise be spent on manual tasks such as grading and assessment.

However, we must be cautious about the development and deployment of AI-powered personalized learning systems, as there are important ethical and privacy considerations that must be considered. Additionally, the accuracy and effectiveness of these systems can be impacted by the quality and quantity of data available, and there is a risk of creating biased algorithms if the data used to train the models is not representative of the population.

Artificial Intelligence (AI) can be used in large amounts of student data to provide personalized learning experiences that target specific areas of weakness. We can achieve this weakness by learning algorithms that are specific if identifying patterns in the data. The outcome can be a variety of sources including assessments, class participation, online learning activities, etc. Once the student profile is created, the AI system can use to provide a personalized learning experience that targets the student's areas of weakness. For example, if a student is weak in a certain subject, The AI system can recommend instructional materials and activities that focus especially on that subject. Additionally, the AI system can also provide real-time feedback and assessments based on user inputs to track the student's progress and adjust their personalized learning experience as needed.

Overall, the use of AI to analyze student data and provide personalized learning experiences has the potential to greatly improve the educational experience for students. By tailoring instruction to the specific needs and abilities of each student, the AI system can help students to overcome their weaknesses and achieve their full potential.

In conclusion, the use of AI to enhance personalized learning has the potential to revolutionize the education sector by providing students with tailored learning experiences that address their individual needs and abilities. By analyzing vast amounts of student data, AI systems can provide real-time feedback, assessments, and recommendations for instructional materials and activities. This can help students to overcome their weaknesses and achieve their full potential.

However, it is important to note that the use of AI in education must be carefully planned and implemented to ensure that it enhances, rather than replaces, human interaction and engagement in the learning process. Additionally, privacy and security concerns must be addressed to ensure that student data is protected.

Based on the potential benefits and challenges of using AI in education, the following recommendations can be made:

i.   Develop clear ethical guidelines for the use of AI in education, including guidelines for data privacy and security.
ii.   AI systems are integrated into the learning process in a way that enhances human interaction and engagement, rather than replacing it.
iii. Professional development opportunities for teachers to understand and effectively use AI in their classrooms.
iv.   Continuously evaluate and adjust the use of AI in education to ensure that it is meeting its intended goals and providing positive outcomes for students.

Overall, the use of AI in education has the potential to greatly enhance personalized learning, but it must be approached with caution and care to ensure that it is used in a responsible and effective manner.

2. ## Intelligent Tutoring Systems (ITS) use of AI in could: cover a variety of topics, including

Intelligent Tutoring Systems (ITS) and their capabilities are computer-based educational systems that use AI to provide personalized learning experiences. These systems use algorithms and data analysis to adapt to the individual needs, strengths, and weaknesses of each student. ITSs use a variety of techniques, including natural language processing, machine learning, and artificial neural networks, to deliver targeted, real-time feedback and assessments to students.

One of the keyways in which ITSs use AI to enhance personalized learning is by tracking a student's progress and adjusting their learning experience in real-time based on their performance. For example, if a student is struggling with a particular concept, the ITS can provide additional support and resources to help the student understand the material. If a student demonstrates mastery of a concept, the ITS can move on to more advanced material to challenge the student and keep them engaged.

Another way ITSs use AI to enhance personalized learning is by adapting to each student's learning style and pace. For example, if a student is a visual learner, the ITS can provide videos and other visual aids to help the student understand the material. If a student is struggling to keep up with the pace of the class, the ITS can provide additional support and resources to help the student catch up. Intelligent Tutoring Systems (ITS) use AI to create personalized learning experiences by adapting to each student's learning style and pace. To achieve this, ITSs use a variety of machine-learning algorithms to track student progress and make real-time adjust key payments to the learning experience. One of the keyways that ITSs use AI to adapt to the student's learning style is by using natural language processing to understand the student's responses and provide targeted feedback. For example, if a student consistently provides answers that are too short or vague, the ITS can provide feedback to encourage the student to provide more detailed responses.

ITSs use AI to adapt to the student's learning style is by using machine learning algorithms to analyze student data and identify patterns in student behavior. Based on this analysis, the ITS can adjust the learning experience to better suit the student's needs

For example, if a student is struggling to keep up with the pace of the class, the ITS can provide additional support and resources, such as extra practice exercises, to help the student catch up. On the other hand, if a student is consistently demonstrating mastery of the material, the ITS can provide more advanced material to challenge the student and keep them engaged.

The use of AI in Intelligent Tutoring Systems (ITS) has the potential to greatly enhance personalized learning by providing students with tailored learning experiences that address their individual needs, strengths, and weaknesses. By tracking student progress, analyzing student data, and adjusting the learning experience in real-time, ITSs can help students overcome their weaknesses, achieve their full potential, and become more engaged in the learning process.

However, the use of AI in ITSs must be carefully planned and implemented to ensure that it enhances, rather than replaces, human interaction and engagement in the learning process. Additionally, privacy and security concerns must be addressed to ensure that student data is protected.

Based on the potential benefits and challenges of using AI in ITSs, the following recommendations can be made:

i.   Develop clear ethical guidelines for the use of AI in ITSs, including guidelines for data privacy and security.
ii.   Ensure that ITSs are integrated into the learning process in a way that enhances human interaction and engagement, rather than replacing it.
iii.   Provide professional development opportunities for teachers to understand and effectively use ITSs in their classrooms.
iv.   Continuously evaluate and adjust the use of ITSs to ensure that they are meeting their intended goals and providing positive outcomes for students.

3. Automated Grading and Feedback:

Automated grading and feedback is a process of using technology, particularly artificial intelligence (AI), to grade student assignments and provide feedback to students in real time. Automated grading and feedback systems use machine learning algorithms to analyze student submissions, compare them to a pre-determined set of criteria, and assign grades based on the student's performance. The systems can also provide feedback to students, highlighting areas of strength and areas that need improvement.

Including increased efficiency and accuracy, and the ability to provide immediate feedback to student's use of automated grading and feedback has several benefits. This system can grade large volumes of assignments in a fraction of the time it would take a human grader, and with greater consistency and accuracy. Additionally, automated feedback systems can provide students with detailed, actionable feedback that can help them improve their performance and better understand the material.

Also, some limitations and challenges associated with automated grading and feedback systems, including the potential for bias and the difficulty of evaluating more complex or creative assignments. Additionally, while automated grading and feedback systems can provide immediate feedback to students, they cannot replace the human connection and engagement that is so important in the learning process.

There are several potential challenges and limitations associated with automated grading and feedback systems:

i.   Automated grading and feedback systems are only as unbiased as the criteria and algorithms used to grade the assignments. If the criteria and algorithms are biased, the grades and feedback provided by the system will also be biased.
ii.   Difficulty in grading creative assignments: Automated grading systems are typically better suited for grading assignments that have a clear set of criteria and a right or wrong answer. It can be challenging for automated grading systems to accurately grade more complex or creative assignments, such as essays or projects, that require subjective judgment.
iii.   Lack of human interaction and engagement: Automated grading and feedback systems cannot replace the human connection and engagement that is so important in the learning process. While the systems can provide immediate feedback, they cannot provide the same level of personal attention and support that a teacher or human grader can provide.

iv.   Privacy and security concerns: The use of automated grading and feedback systems involves the collection and storage of student data, which raises privacy and security concerns. It is important to ensure that student data is protected and that the systems are implemented in a way that meets privacy and security standards.

v.   Technical challenges: Implementing automated grading and feedback systems can be technically challenging, requiring the use of specialized software and hardware. Additionally, the systems may require ongoing maintenance and updates to ensure they continue to function effectively.

The following are some best practices for using automated grading and feedback systems:

i.   Develop clear criteria and algorithms: To ensure that automated grading and feedback systems are fair and accurate, it is important to develop clear criteria and algorithms for grading assignments. This will ensure that the grades and feedback provided by the system are consistent and based on a pre-determined set of standards.

ii.   Continuously evaluate and adjust the systems: Automated grading and feedback systems should be continuously evaluated and adjusted to ensure they are fair, accurate, and effective. This may involve making changes to the criteria and algorithms used to grade assignments, or making changes to the systems themselves.

iii.   Address privacy and security concerns: The use of automated grading and feedback systems involves the collection and storage of student data, so it is important to ensure that student data is protected and that the systems are implemented in a way that meets privacy and security standards.

iv.   Provide professional development opportunities for teachers: To ensure that teachers are able to effectively use automated grading and feedback systems in their classrooms, it is important to provide professional development opportunities that help them understand and effectively use the systems.

v.   Use the systems to enhance, not replace, human interaction: Automated grading and feedback systems should be used to enhance, not replace, human interaction and engagement in the learning process. While the systems can provide immediate feedback, they cannot replace the human connection and engagement that is so important in the learning process.

vi.   Consider alternative approaches for grading complex or creative assignments: For assignments that are more complex or creative, it may be more appropriate to use alternative approaches, such as human grading or a combination of automated grading and human feedback.

4. Adaptive Testing:

Adaptive testing is a method of using technology, particularly artificial intelligence (AI), to deliver assessments that adapt to the individual needs and abilities of each student. The goal of adaptive testing is to provide a more personalized and efficient testing experience for students by adjusting the difficulty of the questions based on the student's performance.

In adaptive testing, students begin by answering a series of questions, and the difficulty of the questions is adjusted based on the student's answers. If a student answers a question correctly, the system will present a more difficult question. If the student answers a question incorrectly, the system will present a less difficult question. This process continues until the system has enough information to determine the student's ability level.

Adaptive testing has several benefits, including increased efficiency, accuracy, and fairness. By tailoring the assessment to the individual needs and abilities of each student, adaptive testing can provide a more accurate measurement of the student's abilities, and reduce the amount of time required to complete the assessment. Additionally, adaptive testing can help reduce the impact of test anxiety, as students are only presented with questions that are at their level of difficulty.

However, there are also some limitations and challenges associated with adaptive testing, including the potential for bias and the difficulty of evaluating more complex or creative assignments. Additionally, adaptive testing requires a large amount of data to be effective, which can be challenging to collect and maintain. The technology behind adaptive testing: This section would likely discuss the technical details of how adaptive testing systems work, including the algorithms and statistical models used to generate test questions and assess student performance.

The use of adaptive testing in education has grown in recent years as a way to provide a more personalized and efficient testing experience for students. Adaptive testing adjusts the difficulty of the questions based on the student's performance, providing a more accurate measurement of the student's abilities and reducing the amount of time required to complete the assessment.

In education, adaptive testing is used in a variety of contexts, including high-stakes standardized tests, formative assessments, and online learning platforms. By tailoring the assessment to the individual needs and abilities of each student, adaptive testing can help reduce the impact of test anxiety, provide immediate feedback, and support differentiated instruction.

Additionally, adaptive testing can also help educators to gain a better understanding of students' strengths and weaknesses, allowing them to tailor their instruction and support to meet the needs of each student. This can help to improve student engagement and motivation, as well as improve overall student achievement.

However, it is important to note that adaptive testing is not a panacea, and it must be used in conjunction with other strategies and techniques to support student learning. Additionally, it is important to ensure that adaptive testing is used in a way that is fair, accurate, and consistent with privacy and security standards.

Adaptive testing has several benefits that make it a valuable tool for enhancing the educational experience for students. Some of the key benefits of adaptive testing include:

i. Increased accuracy: By tailoring the assessment to the individual needs and abilities of each student, adaptive testing can provide a more accurate measurement of the student's abilities.

ii. Increased efficiency: Adaptive testing can reduce the amount of time required to complete the assessment by adjusting the difficulty of the questions based on the student's performance.

iii. Reduced test anxiety: Adaptive testing can help reduce the impact of test anxiety, as students are only presented with questions that are at their level of difficulty.

iv. Immediate feedback: Adaptive testing can provide immediate feedback to students, allowing them to correct their mistakes and improve their understanding of the material.

v. Improved instruction: Adaptive testing can help educators to gain a better understanding of students' strengths and weaknesses, allowing them to tailor their instruction and support to meet the needs of each student.

vi. Improved student engagement and motivation: By providing a more personalized and efficient testing experience, adaptive testing can improve student engagement and motivation, as well as improve overall student achievement.

vii. Increased fairness: Adaptive testing can help to ensure that assessments are fair and unbiased by adjusting the difficulty of the questions based on the student's performance.

To ensure that adaptive testing is used in a way that is effective and supports student learning, it is important to follow best practices for its implementation. Some of the best practices for using adaptive testing include:

i. Thorough testing and validation: Before implementing adaptive testing, it is important to thoroughly test and validate the assessment to ensure that it is accurate, reliable, and fair.

ii. Clear instructions and guidance: Students should be provided with clear instructions and guidance on how to complete the adaptive test, including how the difficulty of the questions will adjust based on their performance.

iii. Personalized feedback: Adaptive testing should provide personalized feedback to students, including specific suggestions for improvement and areas of strength.

iv. Integration with other instruction and support: Adaptive testing should be used in conjunction with other strategies and techniques to support student learning, such as differentiated instruction and tutoring.

v. Use of diverse test items: To ensure fairness and accuracy, it is important to use a diverse set of test items that represent a range of skills and abilities.

vi. Privacy and security: Adaptive testing should be designed and implemented in a way that protects student privacy and security, including secure storage and transmission of test results and personal information.

vii. Ongoing monitoring and improvement: Adaptive testing should be regularly monitored and evaluated to ensure that it is being used effectively and that any necessary improvements are made.

By following these best practices, adaptive testing can be used to enhance the educational experience for students and support their learning and development.

Reference:

Some resources you can use to learn more about the topic include:

- The Journal of Educational Technology Development and Exchange (JETDE)
- The Journal of Educational Technology Systems (JETS)
- The Journal of Educational Technology (JET)
- The Journal of Educational Technology Research and Development (JETRD)

Conclusion:

Artificial intelligence (AI) will benefit parents who are always concerned about their children's social life. AI technology allows them to monitor their child's interaction online more closely than ever before. Schools use software that analyses data points such as how well different students comprehend material; then groups kids accordingly based on what they need. AI brings the ability to have 24/hours access to teachers and lessons anytime, anywhere. AI can be used as an educational tool that guides students toward their goals by providing personalized feedback on homework, quizzes, etc. Artificial Intelligence (AI) has the potential to make everyone's life easier through automation as it can do menial tasks, so you don't need to spend time doing tedious activities. The future of education is here! AI is a crucial driver for change in education. Every student will have equal access no matter their learning ability or disability; this makes a massive difference since not all children learn at the same pace or possess similar skill sets. With the help of AI, students can make their future bright.