

## PREPARING THE EDUCATIONAL PROCESS FOR THE ERA OF ARTIFICIAL INTELLIGENCE

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**Abstract.** The introduction of artificial intelligence technologies requires certain preparation from the society. The integration of various smart technologies is a key factor in this era. The article examines the problems of adapting the educational process to new technologies.

**Keywords:** artificial intelligence, big data, cloud computing, Internet of Things, intellectual systems.

The first industrial revolution is associated with the development of light industry, the second (Industrial Society) with the advent of heavy and chemical industries, and the third (Information Society) with the introduction of computers and the Internet. The fourth industrial revolution implements various technologies such as artificial intelligence, big data, cloud computing, and the Internet of Things (IoT). The integration of various intelligent technologies is a key factor in this era. The data is really important. Information and data make decisions during this period, a person or society must prepare for this. In Japan, this is known as the concept of Society 5.0. Society 5.0 is “a human-centered society that balances economic development with the solution of social problems through a highly integrated system of cyberspace and physical space.”

The Internet of Things provides cyber connectivity. Without the Internet and an intelligent server system, the IoT is limited to just sensors and actuators. Support for artificial intelligence with machine learning, the use of big data allows you to process data better and faster, extract it and make decisions. Intelligent decision support systems are used in a variety of applications ranging from tourism, finance and education. Cloud computing provides a dynamic infrastructure that provides artificial intelligence (AI) solutions without a huge upfront investment.

Digital transformation is changing the way organizations operate and deliver services. The use of multiple technologies such as artificial intelligence, machine learning, big data, IoT, cloud computing will provide improvements. Using these technologies, an organization can better describe situations, be more flexible in turbulent conditions, because it can better predict and apply the recommended strategies for the organization. Business process innovation driven by digitally driven business process reengineering is a key driver of digital transformation. AI is one of the main tools for innovation.

P - P - T (People - Process - Technology) are important when introducing a new technology. In many cases the People aspect is ignored, most organizations focus only on the Technology aspects. Staff need more time to develop, as well as more financial support. Employees are critical and determine the success of

technology adoption and adoption. Strategic workforce planning should be included in technology development as well as the implementation of artificial intelligence. Education is a key factor in employee training.

The automation system mainly consists of data input (sensors), automatic processing and output (actuators). Not all automation systems use AI, such as the Elevator, a simple line tracker used by a logistics system. Artificial intelligence can help make the automation process smarter, more efficient, and more accurate. AI-assisted automated processing can be performed using a machine learning algorithm. AI can learn from examples, such as situations in the environment.

Approaches in artificial intelligence:

- Symbolic approaches:

- Facts are expressed in symbols;

- Characters are transformed into other characters by a set of rules;

- Reasoning is carried out depending on the logical type;

- High-order logical heuristic search, state-space search, knowledge representation;

- Expert system, automatic theorem proving, design optimization using these approaches.

- Numerical approaches:

- Facts are represented by numbers;

- Numbers are processed using various algorithms, mainly artificial neural networks and now also known as deep learning;

- The number of results are expressed in the target form;

- Other methods such as genetic algorithms, fuzzy logic.

- Cognitive approaches (thinking like a human):

- This method imitates the process of human thinking and memorization.

- Examples: SOAR, CLARION, ACT-R.

A non-intelligent system can only find the answer based on the facts (data) available in the database. The answer must be stored in the system. It only produces information from data. An intelligent system can perform a thought process to get answers based on learned facts. The inference can be based on a rule or a data pattern.

Operational stages of machine learning:

- Training Phase: In this phase, the AI outputs a sample training set. The result of this step is a "model". A model is a set of values (neural network weights).

- Inference phase: In this phase, AI is used to evaluate, predict, control, and infer from the learning model based on the input test. The inference process is carried out using the "model" created during the training phase.

- Evaluation Phase: During the evaluation process, the algorithm is evaluated using various criteria.

The following types of learning strategies are suggested:

- Unsupervised training, training set consists of input patterns only, data points are not labeled. Algorithms organize data and group it based on the similarity of input patterns. Usually used when you don't know what the result should be, for example: Adaptive Resonance Theorem, Self-Organizing Map, Hopfield Network.

- Supervised training: The training set consists of an input and an expected output pattern, ie a set of labeled examples. This strategy is used when the result is known. After training, the system can perform classification, prediction, prescribing strategies, namely Perception, Forward, Backpropagation, Deep Learning, GAN.

- Reinforcement learning: Algorithms that learn from results and decide next actions. After each action, the algorithm receives feedback that helps it determine whether the choice made is right, neutral, or wrong. This is a good method for use in automated systems that need to make many small decisions without human intervention.

Implementation of AI can be carried out in primary or secondary schools using appropriate tools and teaching materials. However, the most important part of educational preparation at the national level is the training of teachers. It is far more important to teach students how to think computationally than how to use a computer.

Most programmers or students are not interested in learning mathematics, logic or statistics. They just want to learn how to program. Developing AI solutions requires an understanding of mathematics, statistics, and logic. The excitement around artificial intelligence is now pushing programmers to study mathematics and statistics. However, the way in which AI-enabled theoretical learning materials are provided needs to change.

Artificial intelligence has been developed using various disciplines such as philosophy, mathematics, economics, neuroscience, psychology, computing, control theory, as well as linguistics. Fundamentals of mathematics, statistics, logic and programming play an important role in the development of AI solutions. Natural language processing such as chatbots and sentiment analysis requires an understanding of linguistics and psychology. The neural network starts with control theory, and now that deep learning has become popular, most AI solutions are based on this approach. Therefore, it is necessary to move to a more interdisciplinary approach to education.

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