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12. Sikora C. G. S., Tiacci L. Incorporating car-sequencing rules in the planning of mixed-model assembly lines. *International Journal of Production Research*. 2024. DOI: 10.1080/00207543.2024.2396021.
13. Soysal-Kurt H., Isleyen S. K., Gokcen H. Balancing and sequencing of mixed-model parallel robotic assembly lines considering energy consumption. *Flexible Services and Manufacturing Journal*. 2025. Vol. 37. P. 38-66. DOI: 10.1007/s10696-024-09533-1.
14. Wang X., Guo J., Wang L., Zhang Z. Digital twin-enhanced framework for optimizing high-mix/low-volume manufacturing. *International Journal of Computer Integrated Manufacturing*. 2025. DOI: 10.1080/0951192X.2025.2496890.
15. Zacharia P., Nearchou A. C. The robotic assembly line balancing problem under task time uncertainty. *International Journal of Advanced Manufacturing Technology*. 2025. Vol. 137. P. 2991-3011. DOI: 10.1007/s00170-025-15324-1.

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ARTIFICIAL NEURAL NETWORKS AND RECURRENT DEEP LEARNING MODELS FOR TIME-SERIES FORECASTING

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Neural networks are sets of algorithms inspired by the human brain and designed to recognize patterns. They interpret sensory data through machine perception, labeling, or clustering of raw input data. They can identify numerical patterns contained in vectors into which all real-world data-images,

audio, text, or time series must be transformed. Artificial neural networks (ANNs) consist of a large number of interconnected processing elements, or neurons, that work together to solve problems. ANNs are used for predictive modeling, adaptive control, and other applications in which they can be trained on datasets. They are also used to solve artificial intelligence tasks. Networks can learn from experience and draw conclusions from complex and seemingly unrelated sets of information. An ANN consists of interconnected units, or nodes, called artificial neurons, which loosely model neurons in the brain. They are connected by edges that model brain synapses. An artificial neuron receives signals from connected neurons, processes them, and then sends a signal to other connected neurons. The "signal" is a real number, and the output of each neuron is calculated using a nonlinear function of the sum of its inputs, known as an activation function. Neurons and edges typically have weights that are adjusted during training. A weight increases or decreases the strength of the signal transmitted through a connection. Neurons are generally organized into layers. Different layers may perform different transformations on their input data. A network is usually referred to as a deep neural network if it contains at least two hidden layers.

Signals pass from the first layer, the input layer, to the last layer, the output layer, possibly through several intermediate, or hidden, layers. A recurrent neural network is any network that contains a cycle in its network connections, meaning that the value of some unit depends directly or indirectly on its own previous outputs used as inputs. Although such networks are powerful, they are difficult to analyze and train. However, within the general class of recurrent networks, several constrained architectures have proved highly effective for language processing applications. Consider a class of recurrent networks known as Elman networks, or simple recurrent networks. These networks are useful in their own right and also serve as the foundation for more advanced approaches, such as Long Short-Term Memory (LSTM) networks, which are discussed later in this section. When we use the term RNN,

we refer to simpler, more constrained networks, though it is often used more broadly to denote any network with recurrent properties, including LSTM networks. The hidden layer contains a recurrent connection as part of its input. That is, the activation value of the hidden layer depends on both the current input and the hidden layer's activation at the previous time step. In conventional feedforward networks, the current input vector (xt) is multiplied by a weight matrix and then passed through a nonlinear activation function to compute the hidden unit outputs. This hidden layer is then used to calculate the corresponding output, (yt).

Unlike the previously described window-based approach, sequences are processed by feeding each element into the network in turn. Subscripts are used to represent time; therefore, (xt) denotes the input vector (x) at time step (t). The key difference from a feedforward network is the recurrent connection shown by the dashed line in the figure. This connection augments the input used to compute the hidden-layer activation with the hidden-layer value from the previous time step. The hidden layer from the preceding time step provides a form of memory or context that encodes previous processing and informs decisions made at subsequent time steps.

Importantly, this approach does not impose a fixed-length limitation on the preceding context. The context represented in the previous hidden layer may contain information extending back to the beginning of the sequence. The addition of this temporal dimension makes RNNs more complex than non-recurrent architectures. Language models predict the next word in a sequence based on a given preceding context. For example, suppose the preceding context is “Thank you for all the,” and we want to determine how likely it is that the next word will be “fish.” Language models allow us to assign such a conditional probability to every possible next word, thereby producing a probability distribution over the entire vocabulary. Probabilities can also be assigned to complete sequences by combining these conditional probabilities using the chain rule. Language models process an input sequence one word at a

time, attempting to predict the next word based on the current word and the previous hidden state. Thus, unlike n-gram models or feedforward language models with fixed context windows, RNNs do not suffer from a strictly limited-context problem, because the hidden state can, in principle, represent information about all previous words back to the beginning of the sequence.

Література:

1. L. E. Gryzun, V. V. Tokariev. Mobile applications design for digital education: IT-students' engagement experience on conditions of online learning the course "Mobile technologies". Proceedings of the 2nd Workshop on Digital Transformation of Education, located with the 18th International Conference on ICT in Education, Research, and Industrial Applications: (ICTERI 2023). CEUR Workshop Proceedings, 2023. Ivano-Frankivsk. Ukraine, pp. 110-123.
2. Токарєв В. В. Розробка ефективної методики хмарного тестування / В. В. Токарєв // Modern engineering and innovative technologies: the International periodic scientific journal. – 2025. – Issue No41. Part 1. – С. 146-151.
3. Tokariev V. V. Intelligent design of corporate information systems. Chapter 6 / V. V. Tokariev // Science and education as the basis for the modernization of the world order: Innovative technology; Computer science; Security systems; Transport development; Architecture and construction; Medicine; Agriculture; Geography, demography and astronomy. Monographic series «European Science». – 2025. – Book 45. – Part 2.
4. I. Ilina, V. Tokariev, A. Yakovliev, I. Shevchenko. Використання системи підтримки прийняття рішень для організації гуманітарної логістики, Системи управління, навігації та зв'язку. 2024. № 1 (75), сс. 88-91. 5. Ільїна І. В., Токарєв В. В., Яковлєв А. В., Шевченко І. І. Використання системи підтримки прийняття рішень для організації гуманітарної логістики, Системи управління, навігації та зв'язку, 2024, № 1 (75), сс. 88-91.

5. Tokariev V. V. Methods and algorithms for multilevel control of mobile rehabilitation platforms / V. V. Tokariev // Intellectual capital is the foundation of innovative development: Innovative Technology, Computer Science, Security, Physics and Mathematics, Agriculture. Monographic series «European Science». – 2026. – Book 48. – Part 2. – Chapter 3. – P. 72-101.

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LSTM ARCHITECTURE AND WEIGHTED DECISION-MAKING FOR CRYPTOCURRENCY PRICE FORECASTING

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Long Short-Term Memory (LSTM) is an advanced version of a conventional recurrent neural network (RNN) designed to capture long-term dependencies in sequential data. A conventional RNN operates in such a way that the activation of its hidden state is primarily influenced by nearby local activations, which corresponds to “short-term memory,” whereas the network weights are affected by computations performed over long sequences, corresponding to “long-term memory.” Therefore, the RNN architecture was redesigned to include an activation state capable of preserving information over long time intervals, leading to the term Long Short-Term Memory. LSTM networks are specifically designed to overcome the problem of long-term dependencies. Retaining information over extended periods is their standard mode of operation rather than a capability they find difficult to learn. The cell

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[1. Інформаційні системи і технології]

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