УДК 004.8 DOI: https://doi.org/10.30837/IYF.PCEIP.2024.079

# УДОСКОНАЛЕННЯ СИСТЕМИ СОРТУВАННЯ НОМЕРІВ У ГОТЕЛЬНОМУ СЕРВІСІ

Чередниченко І.С.
Науковий керівник – к.т.н., доц. каф. КІТС Сердюк Н.М.
Харківський національний університет радіоелектроніки,
м. Харків, Україна
e-mail: ihor.cherednychenko@nure.ua

This work is devoted to improving the system of sorting rooms in the hotel service by using genetic algorithms (GA) and neural networks (NN) in order to improve efficiency and convenience for customers.

Artificial intelligence (AI) is increasingly becoming a part of our daily lives, and travel is no exception. The field of tourism is undergoing significant changes thanks to the progressive developments in the field of machine learning and data analysis. AI simplifies the process of finding and booking hotels, tickets and other services by providing recommendations based on travelers' preferences. Algorithms analyze a large volume of data and trip history, adapt the budget and individual wishes of the user, offering the best option as a result [1].

In the world of data science and software engineering, finding optimal solutions to complex problems is a constant challenge. Genetic algorithms (GAs) and neural networks (NNs) are two powerful techniques that have revolutionized the field of optimization. Optimization – is searching for values that minimize or maximize a given objective function. The objective function $h\theta$, also known as the prediction function, is the result of a preparation or training process. For example, in machine learning, when training artificial neural networks, the dependence of the network's output error on the state of its weights is used as the objective function to be minimized. In this case, will be the previously known network outputs.

Using neural networks is not a bad solution for optimization problems. A neural network – is a computational model inspired by the structure and function of the human brain. It consists of interconnected nodes, called neurons, organized into layers. Each neuron receives inputs, performs calculations, and produces an output. Neural networks are capable of learning from data and making predictions or decisions based on the learned patterns. Training a neural network involves adjusting the weights based on a learning algorithm, such as backpropagation, to minimize the difference between predicted outputs and the desired outputs. Once trained, a neural network can generalize and make accurate predictions on unseen data [2].

The process of booking a hotel room is simple, but quite responsible. It is at this stage that you will be able to choose the necessary amenities, type of

accommodation and room categories in the hotel. Often, an uncomfortable room, a terrible view from the window, or other minor inconveniences can spoil the vacation experience. To avoid such disappointments, it is important to take seriously the choice of hotel and the room itself at the very beginning of travel planning. In order to choose a suitable option, it is important to consider, first of all, the purpose and duration of the trip. If you are going to a specific country for more than a week, it is recommended to pay attention to rooms with a higher level of comfort. For a one-day stay in the country, the standard will be quite enough. A genetic algorithm will easily help you with this rather difficult choice [3].

A genetic algorithm is a search and optimization method inspired by the principles of natural selection and genetics. It simulates the process of evolution to find optimal solutions to complex problems. The algorithm starts with a set of potential solutions called individuals.

A genetic algorithm goes through a series of iterative steps, known as generations or iterations, to develop and improve the population. These steps include:

- Selection: Is based on their physical fitness, which shows how well they solve a problem;
- Crossover: exchanging genetic information or combining genes to create new ones;
- Mutation: random changes to maintain diversity and explore new areas of the search space;
- Evaluation: The fitness of the offspring is evaluated using a fitness function;
- Eliteness: The best individuals from the current population are preserved.

Through these steps, the genetic algorithm gradually improves the quality of the solutions until an optimal or near-optimal solution is found [4].

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