Zhu Zhongbiao
student of higher education
Simon Kuznets Kharkiv National University of Economics
Kharkiv, Ukraine
Supervisor: Candidate of Technical Sciences, Associate Professor
Skorin Yuriy

SOFTWARE AND ALGORITHMIC IMPLEMENTATION OF THE VORONI DIAGRAM METHOD FOR VISUALIZATION AND ANALYSIS OF BUSINESS DATA

The paper considered various areas of application of Voronoi diagrams, it was found that they are used in many fields, for example, in cartography, architecture, biochemistry and others. Tasks that require the implementation of this method are established.

Based on the study of the environment, a list of tasks that need to be solved to achieve the goal was determined. A detailed analysis of the industry is carried out, during which the requirements for input and output data are formulated and described.

Based on the results of the analysis, an object-oriented model was built. Based on the data obtained, the corresponding mathematical methods for constructing Voronoi diagrams have been determined.

Based on the results of the design of the object-oriented type, tools for the implementation of the automated system are selected. Requirements for hardware and software were formulated. Compiled a user manual for the developed software product.

The Voronoi diagram is an important tool for solving many problems.

In general, it is a plane partition in which each area corresponds to a specific group of points that are closer to one element than to others.

Voronoi diagrams allow you to visualize complex data, making it easier to understand and analyze it.

They can be used to reveal hidden patterns and patterns in data, which is very useful for making informed decisions.

Voronoi diagrams:

– help determine the optimal location of stores to minimize competition and maximize profits;

– are used to plan the location of public institutions, such as schools, hospitals, etc.;

– help determine the optimal location of base stations to ensure maximum coverage when solving the issue of optimizing wireless networks.

Versatility, intuitive visualization, and the ability to detect hidden patterns make Voronoi diagrams an indispensable tool for analyzing data and making informed decisions.

Based on the above, the purpose of the study was formulated, namely, the software implementation of the system for searching for the nearest elements by the method of constructing a Voronov diagram.

To implement the methods of system classes, the following algorithms were built:

– algorithm for calculating the area; algorithm for independent location of points;

– algorithm for uploading data to a file;

– algorithm for editing points.

Based on the results of object-oriented design, the tools for the software implementation of the automated system were chosen. As a programming language in the Visual Studio Code development environment, a formalized programming language, namely, C#, was chosen.

On the basis of the object-oriented model, a software product was created, which is implemented in accordance with the principles of object-oriented programming and consists of ten classes.

Hardware and software requirements are formulated.

A user manual has been developed for a software product that has been developed within the framework of these studies.

The instructions describe the user's capabilities when working with the software product, reveal the purpose of windows and commands, and also provide forms corresponding to the screen.

References:

1. Satyan, L. Devadoss. Discrete and Computational Geometry / L. Devadoss Satyan, O'Rourke Joseph // Princeton University Press, 2011. – 272 p.

2. Kenneth, E. Kendall. Systems Analysis and Design, Global Edition / E. Kendall Kenneth, E Kendall Julie // Pearson Education, 2019. – 578 p.

3. Franz, Aurenhammer, Rolf Klein, Der-Tsai Lee. Voronoi diagrams and delaunay triangulations. World Scientific Publishing Company, 2013. – 348 p.

4. Franco, P. Preparata, Michael I. Shamos. Computational Geometry: An Introduction. Springer Science & Business Media, 2012. – 398 pages.

5. George, T. Heineman, Gary Pollice, Stanley Selkow. Algorithms in a Nutshell. O'Reilly Media, 2008. – 362 p.

6. Martin Grötschel, Laszlo Lovasz, Alexander Schrijver. Geometric Algorithms and Combinatorial Optimization (Algorithms and Combinatorics). Springer, 2011. – 374 p.