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ІТ-ПРОСТІР СЬОГОДЕННЯ: ТЕНДЕНЦІЇ, ІННОВАЦІЇ ТА ПЕРСПЕКТИВИ РОЗВИТКУ

Збірник тез доповідей
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конференції

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Редакційна колегія:

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61022, м. Харків, майдан Свободи, 4

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MINISTRY OF EDUCATION AND SCIENCE
OF UKRAINE
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**IT-SPACE OF TODAY:
TRENDS, INNOVATIONS
AND DEVELOPMENT PROSPECTS**

Collection of abstracts
of the II International Scientific and Practical
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4 Svobody Square, Kharkiv, 61022, Ukraine

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Skorin Yuriy

*Candidate of Technical Sciences, Associate Professor
Kharkiv National Economic University S. Kuznets, Ukraine*

USING NEURAL NETWORK AND DATA VISUALIZATION ALGORITHMS FOR MEDICAL ANALYSIS

The purpose of the study is to conduct a medical analysis of disease symptoms using neural networks, as well as data visualization algorithms. The practical significance of the study is the possibility of using the created web application, which will allow you to analyze various data sets in accordance with the necessary

parameters and present them in a visual form for further analysis. The results of the study confidently indicate that the use of applied neural networks and data visualization algorithms allow you to effectively display the results of the analysis and interact with them. Another important aspect is that with the help of developed software applications that help expand knowledge and provide tools for improving strategies to combat viral diseases, the data obtained can be effectively analyzed and used.

The relevance of the study lies in the search for certain methods of data analysis for the purpose of further visualization and determination of various patterns based on the obtained graphic images.

The purpose of the study is to study the dependencies of various indicators in virology using data analysis algorithms by creating a small web application. The object of the study is the methods of data analysis and algorithms for reducing dimensionality. The subject of the study is the implementation of the method of developing a graphic-information system based on the analysis of initial data.

To do this, it is necessary to solve the following tasks:

- setting a task for the development of this system, comparing algorithms and models to improve data quality and analysis; analyzing the spread of viral infectious diseases, studying viruses, visualizing data on viral diseases and tools for interacting with data;
- study of the obtained methods of virological datasets and the application of the obtained programs for the analysis of virus datasets;
- development of a software project, architecture of web applications, REST requests, data reduction system, databases, classes using various data analysis methods and visualization tools.

Modern information technologies make it possible to improve and even accelerate almost all areas of human activity. Modern technologies allow you to abandon rather boring tasks and immediately get results that will allow some companies to reduce both money and time. Therefore, data analysis is one of the fundamental aspects of modern information technology. Now there is a huge amount of data that needs to be analyzed, collected and stored in one form or another. An ordinary notebook and pen can be useful for a dozen or fewer entries. But, when the sample grows, the calculation immediately becomes inconvenient, and the usefulness of the time spent drops to almost zero. The data analysis has shown various solutions to such problems. Thanks to this, it is easy to filter out unwanted collected data, convert it into the desired form, or predict future statistics. It helps companies optimize results, reduce certain costs, identify the most effective ways to do business while storing large amounts of data. Businesses can also use data analytics to make the best business decisions and assist in conducting analysis of trends and customer satisfaction, which will lead to the creation of new and better products and ambassadors. The present shows that the topic of viruses is of great importance. Almost every day, a large number of new viruses appear, and the fight against them becomes an important part of our lives. But not all viruses are deadly or hostile, but some viruses can cause significant problems today. A thorough study of the entire range of viruses will help to better understand how they should spread and how

possible deaths can be prevented. As a rule, the first step in most scientific projects is to develop a hypothesis based on scientific research and justification, which determines the order of certain experiments, that is, the structure of the study. It is the hypothesis that determines not only the types of data that need to be collected, but also the amount of certain data needed to identify a significant difference. The degree of significance and strength are important determinations for both the research planning process and the process of statistical testing of scientific hypotheses. The degree of significance is defined as the probability of erroneously detecting a statistically significant difference and is usually set at 0.05 (hence less than or equal to 0.05), indicating a statistically significant difference. The power level is defined as the probability of detecting an existing statistically significant difference. Factors that are important for the study design process and can increase the power of the test: increase in sample size, increase in expected difference between groups, decrease in expected sample distribution, increase in the level of significance of the test.

In the case of a specific particular experiment, the justification for some of these factors can be quite difficult, but a well-thought-out study design can help with this. Consider an example of an experiment that compares the infectivity of mutant viruses with viruses of the "wild" type. Assuming that the mutation has almost no effect on infectivity, we can increase the power of the experiment by applying an analysis that includes not only one, but several rounds of viral replication.

However, often an increase in the ability to detect differences is achieved by increasing the reproducibility of the analysis to reduce data variation (and thus reducing the variance of the sample) and/or increasing the number of replications of the analysis to increase the sample size. Such considerations in the design of the study lead to a certain increase in the power of the study to determine the effect and provide more reliable conclusions.

The importance of obtaining statistical calculations in the development of the study design can be illustrated by the example of vaccine studies, for example, on animals. In such studies, the presence or absence of infection acts as an ideal criterion for the effectiveness of the vaccine. Thus, a study that aims to prove the effectiveness thereby requires sufficient sufficient capacity to detect a statistically significant difference in the proportion of infected animals in the vaccine group compared to infected animals in the control group.

Thus, clarifying the purpose of the study, was to create a small web application that uses neural networks and data visualization algorithms to analyze medical symptoms achieved by. The main problems of analyzing the spread of various viral diseases were also identified, the classification of viruses, as well as types and methods of antivirus protection were evaluated. An example of a COVID-19 study identifies the main symptoms that patients may experience. The task of conducting data analysis and visualization of the information system was set. The main problems of the present time were identified and certain ways to solve them were proposed. It was determined that the best option would be to compare various data and perform visual analysis. A web application based on the use of WSGI principles in the Python programming language was also implemented.

Various UML diagrams were constructed in order to determine the functionality and basic relationships in the created application. The main functions and code fragments that are responsible for the operation of the application, algorithms and data processing models, databases, as well as visual representation of data were described.

It has been found that the best models for processing binary data are precisely neural networks and decision trees as simple algorithms. Among graphical images, the best choice is bar charts and tree diagrams, which display as much data as possible, even if they are very small, and due to the interactive nature of the Python library, said data is displayed in the best possible way.

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Електронне наукове видання
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Можна використовувати в локальному та мережному режимах

ІТ-ПРОСТІР СЬОГОДЕННЯ: ТЕНДЕНЦІЇ,
ІННОВАЦІЇ ТА ПЕРСПЕКТИВИ РОЗВИТКУ

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