$\mathfrak{F}$ is called *normally hereditary class or class, closed under taking normal subgroups*, if the following condition is satisfied: if G $\in \mathfrak{F}$ and N $\trianglelefteq$ G then N $\in \mathfrak{F}$. A class $\mathfrak{F}$ is called *closed under taking products of normal $\mathfrak{F}$-subgroups* if the following condition is satisfied: if N_1 and $N_2 \lhd$ G, N_1 and $N_2 \in \mathfrak{F}$, then $N_1 N_2 \in \mathfrak{F}$ [1].

Definition. Let $\mathfrak{F}$ and $\mathfrak{H}$ be Fitting classes, then $\mathfrak{F} \vee \mathfrak{H}$ is a Fitting class generated by union $\mathfrak{F} \cup \mathfrak{H}$.

Let $\mathbb{P}$ be a set of all primes, $\pi \subseteq \mathbb{P}$, $\pi' = \mathbb{P} \setminus \pi$. The symbol π(n) denotes the set of all prime dividing *n*. Symbol π(G) = π(|G|) denotes a set of all prime devising of the order of the group G. Let $\sigma = \{\sigma_i | i \in I\}$ is a some partition of the set $\mathbb{P}$, that is, $\mathbb{P} = \bigcup_{i \in I} \sigma_i$ and intersection $\sigma_i \cap \sigma_j = \varnothing$ for all $i \neq j$. Let $\Pi \subseteq \sigma$ is a subset of σ, $\Pi' = \sigma \backslash \Pi$, $\sigma(n) = \{\sigma_i : \sigma_i \cap \pi(n) = \emptyset\}$ и $\sigma(G) = \sigma(|G|)$. A number $n \in \mathbb{N}$ is called *Π-number* if $\pi(n) \subseteq \bigcup_{\sigma_i \in \Pi} \sigma_i$. A group G is called Π-group if σ(G) ⊆ Π. Subgroup H is called *Hall Π-subgroup* if |H| is a Π-number and index |G:H| is a Π′-number. A group G is called *Π-soluble*, if every chief factor of G is either a Π′-group or a σ_i-group for same $\sigma_i \in \Pi$ [3].

Let $\Pi \subseteq \sigma$. The symbol $\mathfrak{S}_\Pi$ denote class of all Π-soluble groups.

Definition. Let H is a Hall Π-subgroup of group G. The Fitting class $\mathfrak{F}$ we will called *Π-Hall closed* if from G $\in \mathfrak{F}$ follow that H $\in \mathfrak{F}$.

Let $\mathfrak{F}$ is a non-empty Fitting class. Then the class $\mathfrak{F}^*$ denote as a smallest of the Fitting classes containing $\mathfrak{F}$ that is $(G \times H)_{\mathfrak{F}^*} = G_{\mathfrak{F}^*} \times H_{\mathfrak{F}^*}$ for all groups G and H. The class $\mathfrak{F}_*$ denote as an intersection of all Fitting classes $\mathfrak{X}$ for which $\mathfrak{X}^* = \mathfrak{F}^*$ [4].

Let $\mathfrak{F}$ is a Fitting class. The symbol $K_\Pi(\mathfrak{F})$ denote class of all Π-soluble groups whose Hall Π-subgroups belong to the class $\mathfrak{F}$.

Is the proved

Theorem. Fitting class $\mathfrak{F}$ is a Hall Π-closed if and only if

$$\mathfrak{F} = (\mathfrak{S}_\Pi \cap \mathfrak{F}) \vee (K_\Pi(\mathfrak{F}_*) \cap \mathfrak{F})$$

Conclusion. In this paper obtained new characterization Hall Π-closed Fitting classes.

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DEFINITION OF ANOMALIES IN SCIENCE AND TECHNOLOGY

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Keywords: anomaly detection method, matrix decomposition, anomaly value.

The problem of automating the process of detecting anomalous values of a data array is important in engineering practice. It is known that anomalous values can significantly distort the functioning of mathematical models for data analysis, which can lead to a decrease in reliability and incorrect operation of the entire system.

Material and methods. As a computer system for organizing the process of automating the process of determining anomalous values, we have chosen the Wolfram Mathematica system. It allows you to apply machine learning methods to solve this problem.

When processing data in modern measuring systems, the signals are distorted by noise of various nature. To solve the problem of identifying a component of the process, various filtering algorithms are used, which makes it possible to identify anomalous values and remove them [1].

Anomaly detection refers to finding unexpected values in data. Under the anomaly we will understand the deviation of the behavior of the analyzed information-measuring system from some standard expected behavior of the system [2].

In philosophy, the anomaly is understood as a deviation from the norm, rules, from the general pattern, irregularity [3].

There are three main types of scientists' attitudes towards anomalies. The first approach is that the detected anomaly can be practically ignored, i.e. move to the "periphery" of scientific knowledge, for a certain period without having a significant impact on the state and development of science. While successfully developing, the accepted theory constantly retains a conceptual and practical-applied perspective, the value of which in the minds of scientists immeasurably exceeds the value.

The second approach of scientists considers the anomaly as a “puzzle”, requiring a modification of the accepted theory: the introduction of additional assumptions, the improvement of the mathematical apparatus, etc. This approach is often used in physics.

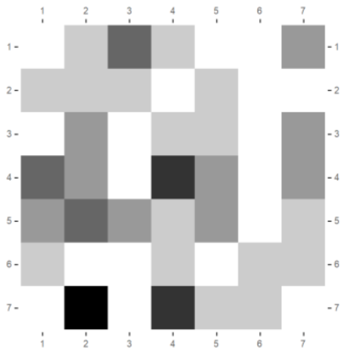
According to the third approach, the anomaly can be recognized as a counterexample, indicating the falsity or limitations of the theory, the impossibility of the research program.

Findings and their discussion. The main idea of the outlier detection method based on matrix decomposition is to use the singular value decomposition of the original data matrix.

Let's assume that the original data set looks like this, as shown in Fig.1(a).

$$\begin{pmatrix} 1 & 1 & -2 & 3 & 2 & 1 & 3 \\ 0 & 1 & 0 & 2 & 3 & 1 & 1 \\ 2 & 1 & 1 & 2 & 4 & 1 & 4 \\ 5 & 1 & 1 & 7 & 1 & 1 & 0 \\ 1 & 1 & 3 & 5 & 6 & 1 & 2 \\ 0 & 1 & 1 & 2 & 1 & 1 & 2 \\ 4 & 10 & 2 & 1 & 4 & 1 & 3 \end{pmatrix}$$

a



b

Figure 1 – Initial sample. Anomalous values highlighted in dark

The best matrix is obtained from the singular value decomposition of the matrix M by the formula:

$$M=ULV^T,$$

L is an mxn matrix with non-negative entries, whose entries on the main diagonal are the singular values of the matrix U and V are two unitary matrices consisting of left and right singular vectors, respectively.

In Wolfram Mathematica, the singular value decomposition can be obtained using the following formula:

{u,l,v}=SingularValueDecomposition[M1];

Approximate matrix

$$M_k=U_kL_kV_k^T,$$

U_k, L_k, V_k are obtained from singular value matrices by cutting off up to k first columns. The ArrayPlot [Abs [M1-M2] //Chop] command allows you to graphically highlight the anomalous values of the matrix (Fig. 1b).

Elements that are very different from the corresponding elements of a matrix of small rank will be considered anomalous.

Conclusion. The process of anomaly detection is a very important issue in predicting equipment breakdowns, identifying abnormal demand for consumed products.

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DETERMINING THE GOALS OF THE GREENHOUSE SYSTEM ON THE BASIS OF THE SYSTEM-ANALYTICAL APPROACH

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Keywords: greenhouse, system analysis, system modeling, goal tree.

The emergence of automatically controlled greenhouses and conservatories has revolutionized agriculture, increasing the efficiency of growing heat-loving plants in cold climates. At the heart of any automatic greenhouse are sensors, actuators, monitoring and control systems, which makes it possible to optimize many factors and conditions for the growth of crops. In most cases, greenhouses are used in conditions where efficiency should approach the maximum. With the minimum expenditure of resources, it is necessary to obtain as much yield as possible [1, p. 91].

Maximum efficiency with minimal human involvement can be achieved by developing a decision-making algorithm for the greenhouse management system. To develop such an algorithm, it was decided to apply the methods of system analysis. As a result of structural and functional decomposition, derivation of goals, system