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IMPROVED METHOD FOR DETECTING FALSE INFORMATION BASED ON EXPERT ASSESSMENT

The method of expert evaluation is an ancient scientific method that allows to obtain an objective assessment based on a certain set of individual expert opinions. The word "expert" (expertus) in Latin means "experienced", which, in turn, comes from the word "experire" - to explore. An expert is a person (specialist) entrusted with expressing an opinion on a controversial or complex case, as humanity has always tried to take into account the opinion of highly qualified specialists in various fields of life in difficult situations [2].

The article improves the method of detecting false information based on the method of expert evaluation. The Delphi expert evaluation method was chosen as the basic method for improvement. This is because it has undoubted advantages over methods based on conventional statistical processing of individual survey results. Unlike the existing approach, the improved method allows for the selection of experts rather than adjusting the answers of experts to obtain the required result.

The main feature is that the experts are selected by averaging the scores for each expert. Specifically, the self-assessment of the expert and the assessment of the same expert by the working group. This allows you to reduce the error of the expert's real assessment.

The ability to set the confidence interval for the assessment of false information will allow obtaining results that satisfy the task of detecting false information with proper accuracy. However, this leads to the task of optimizing the evaluation criteria and the time for solving the task. Therefore, the direction of further research is the task of optimizing the evaluation criteria.

The scientific novelty lies in substantiating and assessing the comparative importance of the factors limiting the appointment of each individual expert to detect false information using the method of group expert assessment.

Keywords: false information, expert opinions, quartile, median, confidence interval, limitations.

Introduction

Expert methods are used to determine the nomenclature of quality indicators, their weighting coefficients, to measure quality indicators and evaluate them using the organoleptic method. Evaluation of quality indicators by measuring, measuring, registration, and calculation methods is used to determine complex quality indicators at different levels of the hierarchy.

Expert methods are based on heuristic decision-making, which is based on the knowledge and experience gained by experts in a particular field in the past.

Expert methods have certain advantages and disadvantages.

The advantage is that they allow for decision-making when objective methods are not applicable. Another advantage is their recoverability.

Expert knowledge is a combination of a theoretical understanding of a problem and a set of heuristic rules for solving it. Practice shows that there are no universal heuristic rules. Developed on the basis of knowledge specific to a particular subject area, these rules are usually effective in their respective practical fields. Expert opinions are qualitative assessments based on information of a non-quantitative (qualitative) nature that can be obtained only with the help of specialists - experts. An expert is a highly qualified specialist who relies on his/her knowledge, experience, intuition and ability to evaluate complex factors (phenomena) and is able to create his/her own reasonable (intuitive) model of the analyzed phenomenon (problem) if he/she has the necessary initial information.

The Delphi ranking method is a group method in which a group of experts is individually interviewed about their assumptions about future events in various areas where new discoveries or improvements are expected. The proposed method of Delphi expert evaluation belongs to the class of group expert evaluation methods. The quality, validity, and reliability of the results of an expert survey are directly dependent on the qualifications of the experts.

The higher the qualifications, erudition, competence, and creative thinking of the experts, the more reasonable the forecast, and hence, most importantly, its practical value. It is virtually impossible to select a group of experts, each of whom would meet the necessary requirements. The

task of forming a stable expert group comes down to determining the size and structure of the group and assessing the competence of the experts. The essence of the expert evaluation method is a logical and intuitive analysis of the internal and external environment of the organization, development of alternatives and quantification of their quality. The generalized opinion of experts serves as the basis for making a choice.

Therefore, the study and improvement of models and methods for identifying sources of false information based on ranking methods and expert evaluation methods is an actual scientific task.

Literature analysis

Recruiting and engaging staff is an important problem in selecting qualified professionals, experts in all areas of life, without exception, especially in the field of management [1, 2].

Papers [3, 4, 7] discuss the method of ranking software development experts. But the main task of selecting experts, from the point of view of the authors, will be assigned to the project manager. It is the project manager who is responsible for appointing personnel to perform project work. This method has a subjective factor and can lead to erroneous appointments. It can lead to the appointment of a specialist who has more attractive social and external characteristics than professional ones. Therefore, it is necessary to select specialists without the influence of subjective preferences.

Papers [5, 6] present new methods for selecting specialists, such as the graphological method. The authors give examples of the use of graphological methods for determining a person's abilities (by his or her handwriting) for personnel selection. The purpose of this method is to assess the degree to which a person is suitable for the proposed position, to identify risk groups and advantage groups. The advantages of the method are contactless and efficient. Assessment indicators: ability to control one's behavior; ability to adapt in a team; ability to manage subordinates; diligence; perseverance; analytical thinking, mental characteristics; ability to make non-standard decisions. But the method is very new and needs further improvement.

Paper [7] describes the method of interviewing an employee who performs work, which is used to obtain information necessary for analyzing the workflow. It gives the analyst and the employee the opportunity to talk to each other. During the conversation, the employee can also ask the analyst various questions. In this way, the analyst explains to the employee how the information will be used. The interview can be conducted with one employee, a group, or a supervisor who has knowledge of the workflow. Usually, a standard set of questions is used, which allows you to compare answers. The vulnerability of this method is that the information may be inaccurate.

Therefore, it is necessary to use new approaches that will allow us to identify the criteria in the selection of expert personnel that directly affect the implementation of tasks within the assigned task.

At the same time, these works do not fully reflect the issues of methodological analysis of the factors determining the competence of experts to identify false information. Therefore, it is necessary to use new and improved methods that will allow to identify those criteria in the selection of personnel that directly depend on each individual employee both within his or her role and the impact of these factors on the implementation of tasks within the project. Based on the above, the analysis of the factors determining the competence of experts to detect false information is an urgent scientific task.

The aim of the article

The purpose of the article is to develop an improved method for detecting false information based on the Delphi expert evaluation method.

The main section

The Delphi expert survey procedure for identifying inaccurate information can be divided into several steps.

Step 1. Form a working group. The task of the working group is to organize the procedure for recruiting experts, develop questionnaires, and limit the scope of the study.

Step 2. Formation of the expert group. Participants should be carefully selected according to the topic under consideration. It is recommended to invite mixed groups of experts - representatives of industry, academia, research institutes, etc. The group should also be mixed and include

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representatives of different genders and different age groups. The number of participants depends on the number of topics, areas, expected response or participation rate, and other issues. If a small survey is conducted using computers, the number of participants may be small (10-15). If a national survey is to be conducted, a large number of participants are needed, and often up to a hundred responses are required for a single topic.

Step 3. Formulating questions. The first questionnaire can be completely unstructured and allow for any answers. Experts express their opinions and ideas on the topic of the survey in writing After the group's forecasts have returned to the organizers, the working group combines them, identifies them and makes a list that becomes the basis for the second questionnaire [2-4]. This is how the questionnaires are formed to identify false information. That is, at the end of the third stage, we get a list of questions that screen out false information from the truth.

Step 4. Conducting an expert review. Experts are sent a consolidated list of information sources and asked to evaluate the data and justify their decision. After the forecasts and assessments made by the group members are returned to the organizers, the analytical group conducts statistical processing of the data: they refine the list of events and analyze the characteristics of the series, i.e. calculate medians and quartiles. In other words, they perform mathematical processing of the data. Thus at the fourth stage, the final number of experts is selected, or rather, a group of qualified experts is selected who can really assess the quality of information with a given confidence. This is done by the method of selecting experts, after the revised estimates, the organizer should change the expert or experts who received significantly lower confidence scores. Subsequently, summarize the group's scores by calculating new medians and new quartiles, summarize the arguments presented by both sides, and prepare new questions based on this. The examination is repeated until all the estimates are within the defined area of confidence [5-8].

It should be clarified that the median is the value of the predicted attribute taken by the central term of a series ordered in ascending or descending order. If the number of experts is odd, the median is the middle member of the series, and if the number of experts is even, the median is equal to the average of the two central experts' scores.

A quartile is the value of the predicted attribute possessed by the members of the row under the number representing 1/4 of the entire row (lower quartile) and 3/4 of the entire row (upper quartile). The confidence region itself is equal to the interval from the minimum score plus the quartile to the maximum score minus the quartile.

Practical application of the method

As an example of the use of the proposed method for detecting false information, we will take 20 experts at the first stage.

We provide each expert with a questionnaire to evaluate the information and a self-assessment questionnaire. I would especially like to note that the level of self-assessment of experts is additionally checked. Additionally, the working group determines the level of expert evaluation. Finally, the expert's rating is the average of the self-assessment and the working group's assessment. This allows for a much more objective assessment of the expert than the classical method.

The expert’s assessment will be evaluated on a scale from 0 to 10, and the criterion of the truthfulness of the information will be evaluated by experts on a 100 percent scale. The quality criterion will be the length of the confidence interval of 11 percent. Let's say the first step is completed, a working group has been selected and has fulfilled its duties. The second step involved interviewing the working group of 15 experts. In the third step, the experts determined the degree of truthfulness of the information. The results are summarized in the table. Table 1: Results of the expert selection. In table 1, X_i – average level of expert assessment. Y_i - assessment by the relevant expert of the degree of truthfulness of the information.

Based on the data in Table 1, let's perform the calculations. To do this, use the following expressions.

Table 1

The results of the selection of experts and their assessment of the veracity of the information

Expert number	Evaluation level of experts	Assessment of the truthfulness of information	
	X_i	Y_i	Y_i*X_i
1	9	81	729
2	8	78	624
3	7	65	455
4	7,5	79	592,5
5	8,5	69	586,5
6	6,9	59	407,1
7	7,3	78	569,4
8	8,1	77	623,7
9	6,7	90	603
10	7,2	87	626,4
11	6,5	60	390
12	8	67	536
13	9,2	82	754,4
14	9,5	75	712,5
15	6,6	80	528
Sum	116	1127	8737,5
Avg. val.	7,73	75,13	75,32

Average group assessment:

$$S_{m\_group} = \frac{\sum_{i=1}^{n} X_i}{n}, \quad (1)$$

where X_i – average level of the expert's assessment, which consists of the expert's self-assessment and the working group's assessment in units from 0 to 10.*n* – number of experts. For the data in Table 1, these values are $S_{m\_group} = 7,73$.

The average value of the information veracity assessment:

$$S_{m\_truth} = \frac{\sum_{i=1}^{n} Y_i}{n}, \quad (2)$$

where Y_i – assessment by the relevant expert of the degree of truthfulness of the information, in percentage terms, *n* – number of experts. For the data in Table 1, these values are $S_{m\_правд} = 75,13$.

Weighted average assessment of the truthfulness of information:

$$S_{m\_assess} = \frac{\sum_{i=1}^{n} X_i * Y_i}{\sum_{i=1}^{n} X_i}. \quad (3)$$

For the data in Table 1, these values are $S_{m\_assess} = 75,32$.

The median is calculated as the arithmetic mean between the average scores ordered in ascending or descending order. For Table 1, $M_e = 75.13$. The quartile is calculated by the expression:

$$Quartile = \frac{\max(Y_i) - \min(Y_i)}{4}. \quad (4)$$

For the data in Table 1, the quartile will be 7.75.

Then the lower bound of the confidence interval: 59+7,75=65,75 %, upper 90-7,75=82,25%. The confidence interval ranges from 65.75% to 82.25%, i.e., 15.5%. This does not meet the applied criterion, according to our criterion, the interval should not exceed 11%.

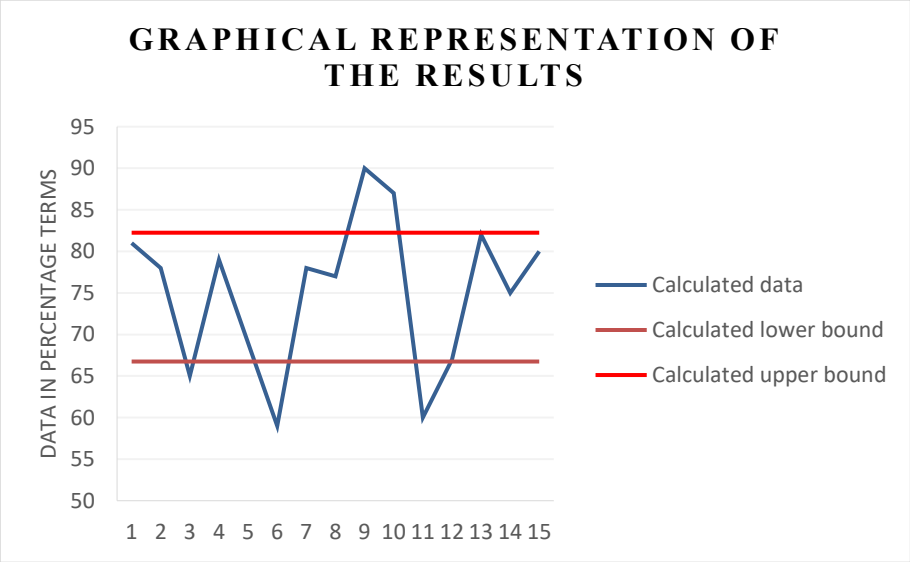

Fig. 1. Graphical representation of the calculation results for the first group of experts

Table 2

The results of the selection of experts and their assessment of the veracity of information (attempt 2)

Expert number	Evaluation level of experts	Assessment of the truthfulness of information	
	Xi	Yi	Yi*Xi
1	9	81	729
2	8	78	624
3	7,5	79	592,5
4	8,5	69	586,5
5	7,3	78	569,4
6	8,1	77	623,7
7	6,7	90	603
8	7,2	87	626,4
9	9,2	82	754,4
10	9,5	75	712,5
11	6,6	80	528
Sum	87,6	876	6949,4
Avg. val.	7,96	79,64	79,33

The analysis of the graphical results of Fig. 1 for the data in Table 1 proves the error of the experts' choice by the working group. The confidence interval for the expert assessment of the recruited group of experts does not meet the specified criterion.

In order to obtain data that will meet our criterion, we will repeat all steps one through three, and set a task for the working group to select experts who will meet the proposed criterion. The results of the second selection of experts are shown in Table 2.

For the data in Table 2, values are $S_{m\_group} = 7,96$, $M_e = 79,64$, $S_{m\_assess} = 79,33$, $Quartile = 5,25$.

Then the lower bound of the confidence interval is : 69+5.25=74.25%, and the upper limit is 90-5.25=84.75%. The confidence interval is in the range from 74.25% to 84.75%, i.e., 10.5%. This is in line with the applied criterion, according to which the interval should not exceed 11%.

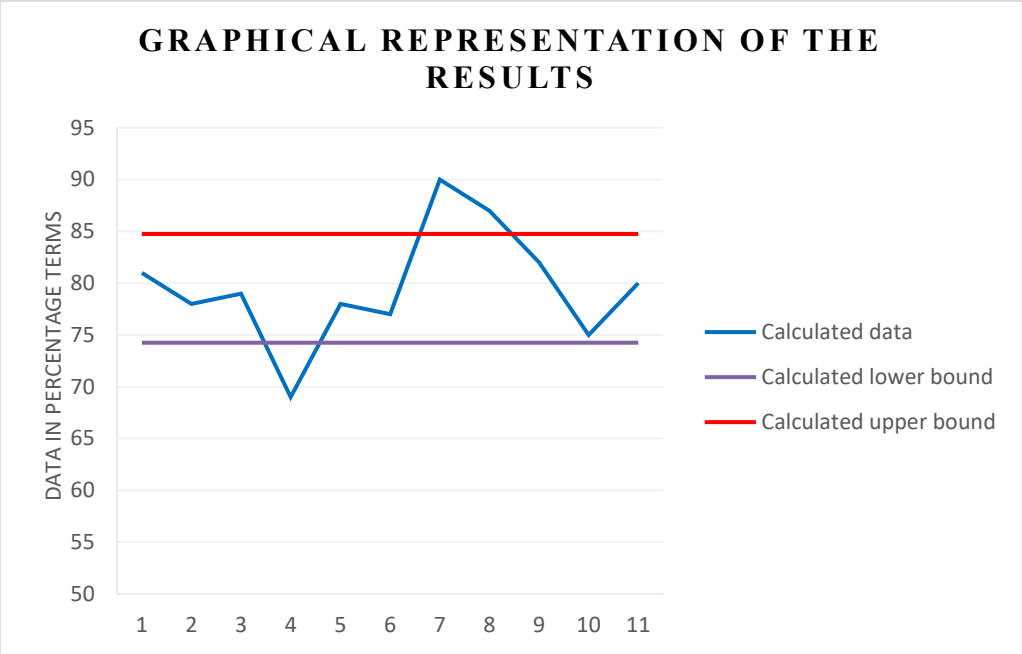

Fig. 2. Graphical representation of the calculation results for the second group of experts

The analysis of the graphical results of Fig. 2, for the data in Table 2, proves the error in the selection of experts by the working group. The confidence interval in the expert evaluation of the recruited group of experts satisfies the specified criterion. That is, the group of experts that assesses the veracity of information makes it with a confidence interval of 10.5%, which satisfies the evaluation criterion we proposed.

Thus, in contrast to existing methods, the author proposes the selection of experts and a method for assessing false information according to the established trust criterion.

Conclusions

The method of detecting false information based on the Delphi expert evaluation method has been improved. The considered Delphi method of expert evaluation has undoubted advantages over methods based on conventional statistical processing of the results of individual surveys. Unlike the existing approach, the improved method allows for the selection of experts. This is done by averaging the expert's estimates.

It is the expert's self-assessment and the expert's assessment by the working group. This reduces the error of the expert's assessment. The ability to set a confidence interval for assessing the falsity of information will allow you to obtain results that satisfy the task of assessing false information.

However, the improved method has a number of drawbacks. Among them, for example, is the choice of an additional evaluation criterion, which is to solve the problem of task optimization, namely, if the confidence interval is generally large, it will take less time to complete the evaluation, while the accuracy will be much lower, and vice versa, if the confidence interval for the evaluation is small, it will take a lot of time, which is also not favorable. Thus, the direction of further research is to optimize

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