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Capabilities of SPSS Software in High Volume Data Processing Testing

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Abstract: This article presents information and techniques on the capabilities of SPSS software in high-volume data processing testing, and discusses the main features of SPSS software capabilities in high-volume data processing testing.

Keywords: Monitoring of educational results, statistical package, package modules, high-quality graphics, factor analysis.

Introduction. Recently, information technologies are spreading widely in the education system. They are used in the preparation of graduates, supervision, final certification, self-study, self-control, etc. The most important condition for improving the quality of education is independent control of educational achievements. is a systematic analysis of objective data obtained from monitoring and diagnostics. The willingness of students to obtain results that match their capabilities and needs. The possibilities of mass testing technologies have made researchers more and more interested in solving various problems of education and self-management of educational activities.

Systematic and continuous evaluation, which makes conclusions about the student's readiness to continue studying, his participation in social and industrial activities, should play an important role in the development of monitoring of educational results. The challenge is that not only high-quality teaching is required, but also high-quality assessment, high-quality assessment tools and procedures, as well as providing motivation in conducting tests, so that the latent characteristics of the subjects are revealed, maximized. Therefore, assessment should be carried out as a specifically focused and systematic process of determining the set and level of training achieved, and the results should be quantified, regardless of how simple or difficult the assessment is.

In order to obtain quantitative indicators of the quality of training of test subjects, processing of a large amount of mass test data is required. Various software environments are used for this, among which SPSS Statistics ("statistical package for psychological sciences") takes a special place - this is "statistical package for psychological sciences". It is a leader in the market of commercial statistical products for applied research in pedagogical and psychological sciences. SPSS is a universal system for statistical analysis and data management. This acronym originally stood for Statistical Package for the Social Sciences. Then the original abbreviation was given a new interpretation:

In the early 1970s, Norman Nee, Dale Bent, and Hadlai Hull registered the SPSSR trademark for statistical software. The company of the same name was created by them in 1968. In 1975, the company was transformed into a corporation headquartered in Chicago (Chicago, IL, USA). The

corporation has developed many software products over the years, including SPSS/PC+TM, the first version of which appeared in 1984. In 2009, the package was released under the name PASW Statistics (Predictive Analytics Software - intelligent analytical software). became famous. Since July 2009, the package has been maintained by IBM (International Business Machines) under the name IBM SPSS Statistics. In 2013, the next version of the package was released - IBM SPSS Statistics 22, which works under various operating systems Windows, MacOsX,

By all accounts, SPSS is a sophisticated and powerful statistical package. Using the SPSS package, you can perform almost any data analysis, and the latest versions of the program are used in various scientific fields, including education. Today, SPSS is a software product and, at the same time, a protected trademark of the world-famous American company SPSS Inc., whose board of directors remains in Chicago. This package takes a leading place among programs designed for statistical processing of data in pedagogic and psychological sciences. Together with all software of this profile, it has gone through a long development path: first from the first versions of SPSS for mainframe computers, to versions oriented to PC-DOS/MS-DOS, and then to versions running on Windows environment. SPSS provides a user-friendly interface that makes the introduction and statistical analysis process accessible to the novice and accessible to the advanced user. The package data editor allows you to easily enter (in tabular form) and edit the input data. SPSS allows you to produce a variety of high-quality graphs and charts. With the help of the package, using tables, simple menus and dialog boxes, you can, firstly, analyze huge data files with thousands of variables, and secondly, do all this without writing commands in a programming language. With SPSS you can: manage data; data management; change data, create new variables; data analysis. it makes the process of introduction and statistical analysis accessible to beginners and accessible to the experienced user. The package data editor allows you to easily enter (in tabular form) and edit the input data. SPSS allows you to produce a variety of high-quality graphs and charts. With the help of the package, using tables, simple menus and dialog boxes, you can, firstly, analyze huge data files with thousands of variables, and secondly, do all this without writing commands in a programming language. With SPSS you can: manage data; data management; change data, create new variables; data analysis. it makes the process of introduction and statistical analysis accessible to beginners and accessible to the experienced user. The package data editor allows you to easily enter (in tabular form) and edit the input data. Possible areas of application of SPSS: survey data storage and analysis, marketing research and sales, financial analysis , etc. allows you to automate the work process. Stages of the analytical process implemented in SPSS: planning; data collection; provide access to information; preparing data for analysis; analysis; create reports; presentation and dissemination of results. In pedagogy, the package allows you to automate the processing and interpretation of test results.

The first version of SPSS for Windows was version 5.0. It was followed by 6.0, 6.1, 7.0, 7.5, 8.0, 9.0 and finally 10.0 and 11.5 and above. Starting with SPSS version 7.0, the shell is minimally Windows95 (NT).In addition to handling specific data types, SPSS can read data from almost any type of file and use it to create reports in the form of tables, graphs and charts, as well as to calculate descriptive statistics, complex statistical analysis and modeling possible.The package has a modular structure. Package modules are integrated sets of software products that enable comprehensive research from planning to data management, analysis, and presentation of results. Main SPSS modules: IBM SPSS Statistics Base, IBM SPSS Decision Trees, IBM SPSS Advanced Statistics, IBM SPSS Direct Marketing, IBM SPSS Bootstrapping, IBM SPSS Exact Tests, IBM SPSS Categories, IBM SPSS Forecasting, IBMxsss Compecasting, IBMxSSPes. , IBM SPSS Conjoint, IBM SPSS Neural Networks, IBM SPSS Custom Tables, IBM SPSS Regression, IBM SPSS Data Preparation. The content of the modules depends on the delivery option.

The main blocks of SPSS:

A data editor is a flexible spreadsheet-like system for defining, entering, editing, and viewing data.

Viewer - Makes it easy to view results by allowing you to show and hide individual output elements, change the order in which results are displayed, and move presentation-ready tables and charts to and from other applications.

Multidimensional mobile tables - used to display analysis results. You can explore charts by scrolling through rows, columns, and layers to discover important insights that might be missed in standard reports. You can also compare groups by dividing the tables so that only one group is displayed at a time.

High-quality graphics - a tool for creating full-color, high-resolution charts: pie and line charts, histograms, scatterplots, 3-D graphs and more.

Database Access is a database reader designer that allows you to load data from any source with just a few mouse clicks.

Data transformation is a data transformation tool that helps prepare data for analysis. Easily collect data, combine categories, add files, merge, combine, split, move and make other changes.

Reference system:

- detailed electronic textbook;
- contextual help in dialog boxes helps to understand specific tasks;
- pop-up definitions in mobile tables explain statistical terms;
- the statistics teacher helps to find the necessary procedure, - examples of analysis help to interpret the results.

Command language. Although many tasks can be performed using the mouse and dialog boxes, SPSS also has a powerful command language that allows you to save and automate many repetitive tasks. The command language also allows you to use some functions that are not available through menus and dialog boxes. Complete command language documentation is integrated into the help system and is available as a separate PDF syntax manual document, accessible from the Help menu.

The package structure includes the data definition, data transformation, and object selection commands. It implements the following statistical data processing methods:

- summary statistics for individual variables;
- graphs for frequencies, summary statistics, and any number of variables;
- Construct N-dimensional contingency tables and take connectivity measures; means, standard deviations, and sums by group;
- analysis of variance and multiple comparisons;
- correlation analysis; discriminant analysis; one-way analysis of variance;
- general linear model (GLM) analysis of variance;
- factor analysis;
- cluster analysis;
- hierarchical cluster analysis;
- hierarchical log-linear analysis;
- multivariate analysis of variance; non-parametric tests; multiple regression;
- optimal scaling methods and more.

In addition, the package allows you to draw various graphs - bar and pie charts, box charts, scatter plots and histograms, etc. Until recently, personnel training and quality control in the field of education were carried out using traditional methods, mainly by persons conducting the educational process, which does not contribute to its improvement from the point of view of management theory. Today, mass test data is automatically processed by many computer programs. One of these programs is SPSS, which allows for efficient, accurate and time-saving quantitative processing of mass test results in any subject. Frequency analysis allows you to determine the following: the frequency of each answer option to the test question; the percentage frequency of the answer to the total number of respondents (the percentage of correct answers to the given question obtained as a percentage of the total number of answers); acceptable percentage (missing values are excluded); accumulated percentage values (this is the sum of percentages of acceptable values). SPSS has many different procedures that can be used to analyze the relationship between two variables. Relationships between variables on a nominal scale or on an ordinal scale with a small number of categories are best represented in random tables. For this purpose, SPSS performs a chi-square test, which tests whether there is a significant difference between the observed and expected frequencies. In addition, various indicators of connectivity can be calculated. The advantage of non-parametric methods is significant when there are outliers (too large or small values) in the data. SPSS provides users with a large number of non-parametric tests. Factor analysis is a procedure for reducing a large number of variables associated with available observations into smaller independent influencing quantities called factors. In this case, highly correlated variables are combined into one factor. Variables of different factors are weakly correlated with each other. Thus, the goal of factor analysis is to find complex factors that explain as fully as possible the observed relationships between existing variables. Factor analysis is possible if a number of criteria are met. Qualitative data cannot be factorized. The variables should be independent and their distribution should be close to normal. The relationship between the variables should be approximately linear, and the initial correlation matrix contains few correlations with a magnitude higher than 0.3; the sample of subjects should be large enough. Ability analysis (also: question analysis or task analysis) helps select questions (tasks) for tests. Various criteria are used to determine which assignments are appropriate and which are not for a particular test. To do this, a preliminary version of the test with all proposed tasks is offered to a certain population (samples) of respondents, and an analysis of these tasks is carried out. Using this analysis, inappropriate items are excluded, and the rest are included in the final test form. The tests are divided according to the type of personality trait being studied, ie educational level, aptitude test and personality test. A test task mainly consists of two parts: a problem or question and a solution to the problem or answer. With the emergence of mass centralized tests in our country, forms of independent attestation of students appeared: blank and computer tests, teletests, unified state exams. A distinctive feature of such control of students' level of preparation is a procedure based on a pedagogical test as a measurement tool with certain metric properties: accuracy, reliability, ability to differentiate, validity, etc. Modern testing methods now make it possible to carry out the final certification of graduates at a sufficiently high level with the help of new-generation tests of pedagogical counters or control-measurement materials (CMM) of the same level of difficulty at the same time throughout the country. extensive use of information technology.In addition, modern technologies and software products for automated verification of test results significantly increase the objectivity and reliability of educational statistics, simplify the work of inspectors, compare and contrast average certification scores in any area and for any sample of test takers. provides an opportunity, allows to analyze the level of preparation and the reasons that ensure it. Using the SPSS computer program, test results can be accurately and quickly processed. The reliability of the data was ensured by calculating significant differences using the Student's T-test using the SPSS 17 for Windows computer program.

Conclusion. The SPSS program is an effective tool for practical work in the field of pedagogical and sociological analysis, providing fast and accurate data processing. The main feature of this

program is that the analysis results can be presented visually in the form of various types of tables and diagrams, distributed to network users, and the obtained results can be implemented in other software systems.

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