Problem-oriented tutorial “Basic course of statistical research”.

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1. General theoretical background

Popularity of personal computers and various universal software packages have made the methods of mathematical statistics available for people of different specialities. In order to use mathematical statistics correctly and effectively, it is necessary to have a general picture of the possibilities of statistics and presumptions for using different methods, as well as skills necessary for analysing the results. The researchers of the Institute of Mathematical Statistics have helped scientists of other specialities in setting out empirical problems, arranging data, and helping them with statistical processing of their data and analysing the results. In these contacts with people representing the applied fields of mathematical statistics, the lack of tutorials in Estonian language has been pointed out.

The Institute of Mathematical Statistics University of Tartu has extensive experience in working out such methodological materials. During the years the researchers of the institute have compiled various teaching aids but the extent of their distribution has been limited and some of them are outdated; the materials are also difficult to find and they are often written for a small group of specialized users. The latest of the publications, the tutorial *Statistilise andmetöötluse algõpetus* (’Elementary Course in Statistical Data Processing’) written by group of authors (A.-M. Parring, M. Vähi, E. Käärik) satisfies the needs of many users, but presumes preliminary statistical knowledge of the user and thus is not suitable for a practician with no special background. *Matemaatiline statistika. Algkursus koolidele* ('Mathematical Statistics. Elementary Course for Schools') by K Hiob is also meant for wider range of users, but this publication focuses on methods rather than on problems. Namely, this publication is based on descriptions of statistical methods, rather than on problems needing practical solutions; therefore, the presentation of the material is more theoretical and many users with no special knowledge cannot tie the theory with their practical tasks without additional assistance.

2. Main purposes

The main purpose of the project is to compile a methodological material for an elementary-level user interested in planning and carrying out statistical researches, and drawing statistically correct conclusions. The tutorial is meant to fill the constantly growing gap between wide spread of computers with growing opportunities they are offering and limited skills of people to use these possibilities. Together with planned computerisation of education system, the lack of such material will become a problem already in schools. Therefore, this tutorial is first of all useful for the teachers who have

access to computers and is working on ecological monitoring (teachers of geography and biology), collecting the data of children's athletic results (teacher of physical education) or data concerning the physical development or health of the children (school physician), carries through sociological or psychological polls or helps local researchers in organising their empirical data. Therefore, this project is oriented towards schools, but the tutorial would be helpful also for many beginners who are in need of collecting their data or compiling a questionnaire.

3. Research methodology

Material meant to assist finding solutions for a certain problem must be presented in an essentially different way that it is done in the present textbooks and manuals. The earlier textbooks usually focus on methods, when the users need material focused on problems, and no such materials are available in Estonian at present. Thus the novelty of the present project lies in focusing on problems rather than on methods in presenting the material. The tutorial could be used also as a facultative literature for high school students as well as for university students of various specialities.

The material is not oriented on specific software or computer type (however, the examples are presented using some more widespread software). The tutorial is a compact material about

- how to plan any kind of practical research (giving a survey of sample theory and design of experiment)
- how to enter data into files and how to treat data correctly (types of variables, problems of coding, etc.)
- what is data checking (analytical and graphical methods)
- what are the elementary methods of data processing (frequency tables, mean values, connections, etc.)
- what is data presentation (histograms, bar and pie charts, etc.)
- what are the methods of drawing right and correct statistical conclusions (hypothesises and their testing).

Besides this, also elementary methods of rapid analysing and concluding applicable even without a computer (ordered sample, quartiles) are presented. All the material is complemented with examples about solving two practical problems: carrying out an ecological research, and compiling and analysing a small questionnaire.

4. Presumable significance

It is evident that widespread use of computers in schools is not only a connection with the world and use of ready-made software in teaching process, but also a possibility to teach the use of computers in different fields and learn more about our surrounding environment through the computer. However, the latter cannot take place without suitable methodological materials and tutorials - and this is just the purpose of this tutorial, oriented primarily for high school teachers. The motivation here is to develop a thinking human being, i.e. people who are not entering data into the computer blindly and getting back answers they can do nothing with, but understand what they are doing and why they are doing this.

REFERENCES

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