Use of a Website and Virtual Laboratory for Teaching of Descriptive Statistics

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Abstract

Most of the statistical information in newspapers, magazines, business reports and other publications consists of data that are summarized and presented in a way that it is easy to read and understand. These summaries of data, which can be tabular, graphical or numerical are known as descriptive statistics. In addition, the presentations in tables and graphs to summarize data, numerical descriptive statistics are also used. Within this context, is developing a web page with a virtual laboratory of the themes of descriptive statistics, which proposes a study guide which aims to reorient and upgrade the approach that must address the study of statistical methods, awakening the topics that were developed so that cases raised to develop learning environments that would enable it to meet the knowledge and manipulate it. With this philosophy, applets, web sites with access to real data, software for free use and in general resources used in the web 2.0, referring to a second generation in the history of the web based on user communities, that foster collaboration and fast exchange of information between them. The technology allows us to enjoy the following principle of the use of the modern statistics. It is not as important to memorize formulas or perform complex arithmetic calculations by hand. One can instead focus on results with any type of technology, to give practical meaning to results through critical thinking. This has to make the students really have to make an effort to understand and interpret the results.

Keywords: descriptive statistics, central tendency, measures of variability, website.

Introduction

Most of the statistical information in newspapers, magazines, business reports and other publications consists of data are summarized and presented in an easy to read and understand. These summaries of data, which can be tabular, graphical or numerical, are known as descriptive statistics. In addition to presentations in frequency tables and graphs to summarize data it is also used numerical descriptive statistics. There are three important descriptive measures, which are measures of central tendency and variability measures. The graphs visually represent the information through the combined use of points, lines, numbers, symbols, coordinate systems, words, colors, shadows, etc. They are tools to think about the information they present. Usually they are very effective to describe, explore and summarize a group of numbers even when he grows up. In addition, all methods of statistical analysis and communication, a well-designed graphic is usually easy to build while it is a very powerful tool. The central tendency refers to the midpoint of a distribution, the measures most commonly used are the mean, median and mode. Scattering measurements refer to the separation of the data distribution, that is, to the extent that the observations are separated, the most common measures are variance, standard deviation and coefficient of variation. In a broad sense, descriptive statistics is defined as the art and science of collecting data, analyse, present and interpret. The information obtained to collect data, analyse, present and interpret provides students with a better understanding of the information, enabling better decisions.

Within this context, a website was developed with virtual lab topics of Descriptive Statistics, which proposes a study guide that aims to upgrade the approach with which to approach the study of statistical methods, arousing the desire to learn and resolve issues and cases raised. The topics were developed so that the cases raised in the developed learning environments that allow them to meet the knowledge, "manipulate" make it yours. With this philosophy applets, Internet sites with access to real databases, software and generally free to use the resources of the Web 2.0, which refer to a second generation in the history of the Web -based user communities are used that foster collaboration and agile exchange of information among them.

Technology allows us to enjoy the following principle of the use of modern statistics: it is not so important to memorize formulas or perform complex arithmetic by hand; however, you can concentrate on getting results with some kind of technology to give practical meaning

to the results through critical thinking. What students have to perform really have to make an effort to understand and interpret the results.

Development

2.1. Design

To support the teaching of Descriptive Statistics conducted a web page, which is organized as follows in the main menus are descriptive statistics, probability, statistical inference, virtual laboratory and a laboratory data analysis. In this paper we describe each of these sections. Figure 1 shows the main menu of the website done. Section Descriptive statistics are the submenus of Presentation of Information, measures of central tendency and variability and bivariate description data.

Fig 1. Main Screen Website.

In the display section of the information are the subjects of introduction, pie chart, bar chart, histogram, dot plot, stem-and- leaf Line graph, case studies and Aprendiendo.com latter are exercises that are solved with internet access. Figure 2 we section presenting the information to the subject of Descriptive Statistics, which students can enter.

Fig 2. Presentation of Information of the website developed.

In each of these sections for each subject performed the theoretical part, it is one of the contributions that have been developed amicably, in the form of questions and answers, giving primary importance to the concepts and the selection of statistical methods is. In Figure 3 we can see the theme of pie chart on the website. These themes will guide studies, for both students and for teachers, which may affect an upgrade of the teaching staff, as well as uniform knowledge of all teachers, departmental evaluations can be generated, which will affect positively reducing the failure rate of students in the subjects of descriptive statistics.
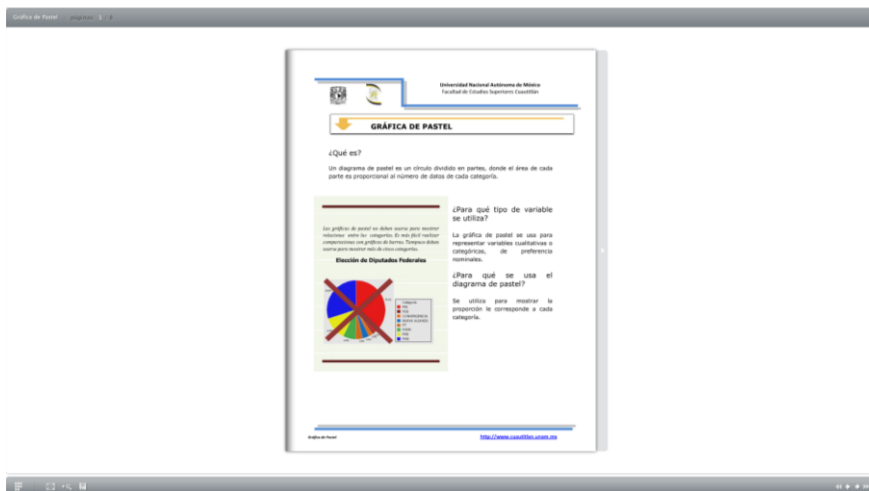

Fig 3. Theoretical theme pie chart

In sections of information presentation, measures of central tendency and variability and bivariate data describing a section of exercises called Learning took place dot com. This section provides the student with an interactive environment, using resources available on the Internet, so that the cases illustrated in the develop learning environments that allow them to meet the knowledge; "manipulate" make it yours. Based on this target websites with access to actual data files, software and free use of the resources of the Web 2.0, which refer to a second generation in the history of the Web-based user communities that encourage agile collaboration and exchange of information between them. In Figure 4 we can see the dot com for learning exercises for filing of information.

Fig 4. Learning exercises dot com.

2.2. Data Analysis Laboratory

The Data Analysis Laboratory was built on the site and has specific calculators for different statistical methods, as well as links to download the free software license. Also provides students with an interactive environment because you can access the actual data files, which you can download and process with calculators and software, making care more about the selection of the statistical method and interpretation of results, by calculations that lead to them.

Through this laboratory is provided with modern teaching approach, i.e., taught to use all available technology and to focus on what is important. Figure 5 shows the section of the data analysis laboratory on the website developed.

Fig 5. Data Analysis Laboratory

2.3. Virtual Lab

The virtual laboratory has nine descriptive statistics applets, each of these enables students to understand statistical concepts through simulations. This laboratory allows viewing and practice of all concepts of descriptive statistics also show and performs graphics that can be manipulated. The theory section allows us to understand and grasp the concepts of probability and statistics for eventual application in laboratories and test that theory. In Figure 6, the laboratory's website homepage shown.

Fig 6. Virtual Lab Descriptive Statistics.

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Conclusions

In the above it described a virtual electronic system with applications in the development of non-contact practice sessions on the subject of Descriptive Statistics. This system has been designed for implementation in learning Topic Descriptive Statistics. This environment improves knowledge that students should acquire in the use of new technologies. They have detailed the use of the laboratory as well as the possibility that the student knows the theory of each of the topics in this page. These modules work together theoretical knowledge and conduct virtual practices solidify the knowledge of descriptive statistics. With the help of new technologies, the teaching of these subjects is provided, in order for students to have a more clear and concise concepts of the above idea. Using the Data Analysis Laboratory students solve directly the case studies, which downplays the math, but should focus on teaching the interpretation of the results obtained through the use of new technologies.

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