NEW POSSIBILITIES FOR THE PHOTOGRAMMETRY EDUCATION IN TURKEY

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ABSTRACT:

The goal of this paper is to present the state of photogrammetry education in Turkey and the methods used to teach the mathematical and physical basics of photogrammetry using visualization techniques that is easily understood by the students start to study photogrammetry and to show the sequences of the photogrammetric applications in a way that every step related to their basics will be shown. To apply visualization techniques for the photogrammetric education purposes some algorithms will be created in the Geodesy and Photogrammetry Dept. of TU Istanbul.

1. INTRODUCTION

Information technology and computer networks are becoming today an important part of the life. The computers and information technology are widely used to develop teaching possibilities. Although education is a complex process in which human and technical resources should be used very carefully, teaching and learning concepts have changed radically. Virtual education and distance learning methods will replace the classical education methods. Regarding this new concepts the education on all disciplines needs evaluation and development. Visualization techniques are one of the important factors of these developments. The general duty of WG VI/2 "Computer Assisted Teaching" is to determine state of science and Technology of Working Group Topics for the education of photogrammeters. The WG is collecting and developing non-commercial software for computer assisted teaching. Many conferences and seminars were held in various places. The WG VI/2 has been issuing Newsletters and these newsletters are distributed to the members of the WG and the others who are interested in Computer Aided Teaching.

2. THE STATE OF THE PHOTOGRAMMETRY IN TURKEY

Turkey is a country, which has applications in photogrammetry since many years and photogrammetrical methods are accepted as the official production method in 1937. %90 of the map required areas at 1/5000 scale are carried out by photogrammetric methods. In 1987 photogrammetric map production by private sector became possible. After that time numbers of private photogrammetric companies are established. High accuracy and efficiency can be obtained using modern analytical or digital photogrammetric Instruments. As a military organization General Command of mapping is in charge of 1/25 000 and smaller scale map production. Production of 1/25 000 scaled maps of Turkey consisting of 5558 sheets were completed by means of photogrammetric methods in 1972 and updated periodically.
As a base to the developments above the photogrammetry education in Turkey has a past of more than fifty years. The first surveying department in the university has opened at the year 1949 at the Yildiz University in Istanbul. The department has the name "Map and Cadastre Engineering". After a four-year study the students gained the Eng. Title. Twenty years later Faculties concerning Geodesy and Photogrammetry Engineering have been opened in the other universities. Today in twelve universities located in different regions of Turkey the Geodesy and Photogrammetry Education are going on. Technical University of Istanbul is one of the famous and accredited universities of Turkey. The Geodesy and Photogrammetry Department has been opened in TU Istanbul at the year 1969 and the old name "Map and Cadastre Eng. " changed to Geodesy and Photogrammetry Engineering. Today the name is going to change again to Geomatic Engineering, because the name "Geodesy and Photogrammetry Eng. is no more capable to define the duty of works done. This is a result of the developments in the field of Photogrammetry, Remote Sensing, GIS and other topics. Depending to these developments teaching and learning concepts have changed and the use of computer networks and information technology are widely used to develop teaching possibilities.

3. TRENDS OF THE EDUCATION

Rapidly developing virtual education and distance learning methods are replacing today the classical education methods. The rapid growing visualization techniques are one of the important factors of these developments. With the help of visualization techniques we are able to create computer graphics that display data, particularly multidimensional scientific data, for human interpretation. This technology becomes today an integrated part in the education and used to develop attractive presentations especially for three-dimensional cases, which the students have difficulties to understand.

4. COMPUTER-AIDED EDUCATION

4.1 Education

Education is a discipline that is concerned, in this context, mainly with methods of teaching and learning in schools or school like environments as opposed to various informal means of socialization (Encyclopaedia of Britannica)

4.2 Goals of Computer Aided Education

The use of computer networks and information technology are becoming an important part of the everyday work on almost any profession, especially in the scientific areas and changed education concepts and many universities and education organizations decided to plan new strategies concerning computer based technologies. As a result of these developments Computer Aided Education (CAE) methods came out. These methods have been utilized and developed more than for fifteen years in many universities and organizations. The goal of CAE is to develop the learning capacity of students and increase the teaching productivity and effectiveness of instructors with the help of advanced computer based technology. This technology should be an integrated part in the education. It is also desirable to use this technology to develop attractive courses for distance education. Another area of interest is to use computers, information technology and equipment to develop attractive and understandable demonstrations of basically tasks and typical projects in the field of photogrammetry.

4.3 Advantages of CAE

Using CAE methods students can state and explain the basic concepts in the subject easily and are able to participate in discussions of advanced concepts related to the subject content. With the visualization techniques computer graphics images are created and these images display the data and the mathematical relations of the interested subject for the interpretation, particularly of multidimensional cases. CAE provides also the substructure for interactively communication possibilities with international colleagues and presentation of the subject interested worldwide.

5. TOOLS FOR THE COMPUTER AIDED EDUCATION

5.1 Visualization Techniques

Visualization is an important technique in understanding of spatial data. Three-dimensional objects can be created and manipulated just as easily as two-dimensional plots. Other parameters can be mapped onto objects through the use of "color," "glyphs," or "isosurfaces," thus increasing the dimensionality of the image. Traditional tools for visual communication of resource issues have included simple graphic devices such as maps, line charts, sketches, photographs, and renderings. The new tools include coloured computer maps, 3D models, animations, and interactive virtual reality environments used to explore design ideas Computer animation or animation respectively is a film sequence that is generated from a limited succession of previously defined camera viewpoints. Interactions are not possible during an animation. Today, the visualization is now used in a variety of disciplines. Because visualization is used to illustrate and investigate numerical data with images, photogrammetry, which interests with images, is strongly influenced by developments of the visualization techniques. Visualization is used by photogrammetry as well as for presentation and for the teaching purposes as the use of techniques for the display of mathematical relations and photogrammetric operations. Important advantages of the visualization are interactivity and animation possibilities. A good visualization technique must provide the following features: Portability: The visualization software and hardware used should be portable and run on all kind of computers. The visualization technique should be flexible, allowing the user to visualize the data in a customized way with a minimum amount of work due to configuration settings. The user should be able to change all the parameters of the visualization process while illustrating and investigating the data. Virtual Reality is the interactive real-time-walk-through of the model. For two-dimensional images VRML is important software for modelling. For three-dimensional cases it can easily be integrated into WWW pages to present three-dimensional data sets with optional user interaction. The most important software developed for visualization purposes is JAVA It has created the possibility to write and compile software once and run it on different platforms without modification. JAVA is close coupled with HTML and VRML and creates portable and interactive applications based on the Internet.

6. TRENDS OF THE PHOTOGRAMMETRY EDUCATION IN TURKEY

Photogrammetry is a science, which grows with a great speed and is strongly dependent to the modern technology. All the developments in the technology must be adapted to photogrammetry immediately. Therefore we cannot reach with the classical teaching methods to the speed of technology. From this point of view teaching photogrammetry using modern digital technology becomes the reality of today. There are many ways to teach photogrammetry using the visualization techniques. One of the most important phases of teaching photogrammetry is the use of interaction ability of Internet. Via Internet we can present photogrammetry in a way that is easily understood by the people having no idea about photogrammetry. Applications of different photogrammetric techniques can be visualized and the realization of the mathematical relations can be seen step by step.

Regarding these concepts computer aided methods have been utilized and developed systematically already more than for ten years in the Photogrammetry Division of TU Istanbul.By this way the education curriculum have changed and new strategies with the computer based technologies have planned. For this reason new courses are added to the curriculum. These are as follows:

- Computer Graphics and Data Visualization
- Machine Vision and Image Matching Techniqies
- Advanced Computer Programming in Geomatics
- Spatial Databases

To present photogrammetry on an easy way the basic geometric conditions has to be explained in a clear way. Often too many variables are introduced at once, which makes the photogrammetric model difficult to overview. It is important to follow the process step by step, from the photographing to the detail measurements in the oriented terrain model. Using Java programming language such kind of animations are created by the Photogrammetry Division of TU Istanbul. Software called " Fotogegit" is prepared and presented to the students to teach the basic concepts of photogrammetry. It is developed in HTLM

and organized in different parts. The selected model in the first part includes photogrammetric principles of stereoscopy, three dimensional measurement, analytical concepts and error analysis supported with JAVA animations. Animations show the structure of the perspective projection and the model concept of photogrammetry. Co-ordinates measured by the user can be added to the application and so we are able to provide the contribution of the user or student.

With the network and Internet applications the students have reached today a wide range of communication and participation possibilities throughout the entire education process. This would then lead them to a life long lasting continuous professional development process, which should be the main goal of professional education. For this reason we have in our www server some tutorials as Power Point applications to inform our former students about the developments in photogrammetry. These Power Point applications include the each year renewed photogrammetry courses .The students can reach this documents in the university network without any restriction, but other interested in photogrammetry have to use a passport, which they got after a registration, to reach via internet. Using Email opportunities a dialog can be set up.

7. CONCLUSIONS

Concluding, the opportunities of the WWW are there to be increased. The www technology as such is not difficult to adopt, the problem is how to do it in a way, which improves the education. Further, the variety of educational resources and methods, which have been presented here, are applied to enhance the quality of education in the Photogrammetry Division of TU Istanbul. Communication and participation possibilities of the universities must be continuously developed and information sources must be reached as good as possible. Further researches must be done to critic the types of educational resources and methods, which have been presented here, with a view to enhance the quality of university education.

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