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Other toponymic issues

**Digital data collection and registration on geographical names during
field work***

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Digital data collection and registration on geographical names during field work

Abstract

For clarification of spatial features, geographical names data collection and registration are imperative and fundamental during mapping. Field and headquarter-based works regarding features classification and annotation on aerial photographs or maps, especially in producing land cover topographic maps in scale of 1:25000, are done with high precision and technique in National Cartographic Center (NCC) of Iran.

This work has already been done with the traditional method of manual data registration on printed aerial photographs and paper maps while using devices like pocket stereoscope, rapid pen and other clarification mediums.

In this method considering the quality of field and headquarter-based work (in map production line), too many errors happen inevitably.

To solve failures and difficulties of annotation and to organize geographical names collection, experts in NCC have opted for work method changing. After studies and analysis, they have presented the plan of digital data collection and registration concerning geographical names during field work.

The result of the plan was the development of software for digital annotation of photographs and maps. The use of this software and special hardware facilities has reduced considerably existing errors in digital registration of geographical names.

Besides comparing traditional and digital annotation, the method of digital data collection and registration and also characteristics of software and hardware used in digital method are discussed in this paper.

Introduction

In photogrammetric mapping, data on geographical names are collected via annotating aerial photographs. Although the use of gathered geographical data in revising maps is possible too.

Clarification in mapping and cartography is a series of field and quarter-based works including classification and toponymy of natural and artificial features. These works are done according to the scale and the theme of the map. So, works in clarification are performed in two phases of features classification and toponymy.

In clarification, field worker shall have the capability to identify features according to scientific specification of nature and class of a spatial feature so as to be able to collect accurately and correctly geographical data for mapping and establishing National Topographic Database (NTDB) or Geographical Names Database (GNDB). Therefore, trained and experienced workforces of clarification shall be present in a region to register geographical names on aerial photographs, satellite images or maps by the help of installed signs, referring to official documents or asking local trusted people.

Traditional clarification (manual annotation)

If clarification has been done by the help of printed aerial photographs, clarification operator shall, after adaptation of photo with defined work limit and index, draw the match line of the effective region and specify features on the photographs. This will help him not only to set work area but to avoid repetition or lack of clarification. Then, he can classify and annotate features with a 3D view using a pocket stereoscope and knowledge and technique of photograph interpretation.

If there are high quality printed satellite images from the region, clarification will be performed like aerial photographs but without a 3D view.

If clarification has been done using map plot, there will be certainly no need to classify features. When mapping (through photogrammetric method), features are drawn and just need to name placement. Indeed, if clarification operator faces express errors in identifying and drawing features, he can correct them.

In all three states of clarification, name and type of geographical features are inserted on an aerial photograph, satellite imagery or map using a pen in a manual procedure. Besides, name of the features and their transcriptions will be registered on names cards enclosed to each photograph.

Disadvantages of traditional clarification method

Traditionally data collection and registration (manual annotation) contains many disadvantages and difficulties such as:

A) Difficulty of reading names

In Farsi alphabet, like many alphabets existing in the world, it is difficult to read correctly the name of a place or feature due to non-use of accents especially for inexperienced individuals.

B) Difficulties in writing names

Considering that data are inserted manually on aerial photographs, maps or names cards, sometimes difficulties arise due to a bad handwriting and the illegible writing of the field worker in producing maps. For example, the lack of a good grounding of clarification operator in local accents, phonemes and special sounds that are used in these accents, it may result in writing incorrectly names of places or features. On the other hand, apparent similarities of certain Persian letters (for example: “ف”, “ق”, “غ”) and lack of precision in manual writing can make difficult a correct toponymy. Although the use of transcription system enacted by “Iranian Committee on the Standardization of Geographical Names (ICSGN)”, which is designed on Latin letters and has reduced in a great extent the difficulty of pronouncing geographical names, but difficulties regarding registration on paper, incorrect writing, illegibility of handwritings, inadequate archiving, and data transfer error from names cards to digital maps or databases are among the main challenges in writing and pronouncing correctly geographical names.

Digital clarification (digital data collection and registration)

To organize geographical data collection and in order to realize aims like minimizing human error, facilitating data saving and access, as well as automatically controlling and supervising geographical names and features, experts of the National Cartographic Center (NCC) have suggested the solution of digital data collection and registration concerning geographical names during field works. According to this solution, special software and hardware were developed to make it possible to digitally collect and register geographical data during field works.

A) Software characteristics

In the software designed, menus, windows and tools are used by clarification operator in order to save and manage geographical names in GIS-based environment. This software helps him save in real time GPS positional data of places and features and transfer data via offline mediums or online networks to databases. The software is provided with multimedia capabilities to save sound and image.

In this software, it's possible to display and use geo-referenced vector data (CAD Files) and raster data (digital photos and images). This software also supports specialized fonts and characters of Iranian National Transcription System.

B) Hardware characteristics

For an optimized data registration, we use a tablet PC which is light, shock resistant, equipped with an anti-reflex screen to have an image with high clarity in open environments, touch screen which increases the speed of data entry, proper graphic card, memory card, and a processor to load and display heavy map files, digital aerial photographs or satellite images.

C) Operation method

The operator of data collection on geographical names goes to selected places after installation of the software on tablet PC. The operator becomes aware of his/her location by activating GPS receiver. Observing position of desired feature on digital image or map (which is visible on screen) he/she starts the feature classification and toponymic data registration.

The operator enters data like location, Persian name, transcription, other name, old name, feature type and other explanations via user interfaces. The data is accordingly saved in an attribute table. Saved geographical data can be transferred to other databases existing in NCC of Iran such as National Geographical Names Database and National Topographic Database. Registered data can also be used for digital edition and cartography of all kinds of maps in different scales and themes.

In addition, the operator can use, in this software, various points and lines symbols in different colors, forms and sizes to display all kinds of features. He can also draw or edit geometric necessary elements by help of the tools provided in the software.

Advantages of digital data collection and registration

Apart from accuracy increase, digital collection and registration of data relating to geographical names during field operations has advantages to follow:

- Increase in the speed of clarification
- Economic gain through eliminating costs for printing map plot and aerial photographs as well as the need for fewer workforces.
- Elimination of human errors in retyping or transferring data from an annotated photograph to the map plot.
- Use of standard fonts of MS Windows for transcription purposes.
- Troubleshooting bad writing and illegibility of manuscript annotations on aerial photographs and names cards.
- Compatibility of geographical data registration process with digital map production line.

- Ensuring an easy, fast registration, processing and retrieving geographical data.

Conclusion and suggestion

As one the essential stages of mapping, clarification shall be improved dynamically and continuously. Considering development of the technology of producing digital maps, improvement and clarification tools are inevitable. On this basis, field and headquarter-based clarification in the National Cartographic Center of Iran was improved in line with evolution in other parts of digital map production.

Execution of plan for digital data collection and registration on geographical names during field work has undoubtedly minimized clarification errors in a great extent. This will improve the quality of existing data on maps and databases at the end. Although complete organization and coordination of activities related to geographical data collection in the country will be subject to respect some preliminary requirements. Creating necessary structures to conduct and supervise over clarification, backing and encouraging private sector regarding clarification, editing and updating instructions, working out modern methods of clarification, academic training on features definition and classification and other scientific topics related to toponymy of places and geographical features are among activities which necessitate more serious effort and resolution.