

On the base of the conducted survey and through the concrete system forming procedure, the author identified a few of the important trends connected with modelling of cadastre, as well as spatial data handling systems generally. In chapter 8, that is in the conclusion, object approach to spatial data modelling and their topological structuring as more or less direct consequence

of the modern spatial data base usage, are highlighted as being the most important. The second very important trend in this area is the application of multi-level program architectures and finally, the Internet is pointed out as a connection between the system and its users.

The last, ninth chapter of the master thesis, contains a list of references and URL's of the Internet resources.

Prepared by M. Lapaine

Dražen Tutić, MSc in Technical Sciences

Dražen Tutić defended his Master's thesis titled *New Improved Software for DeSKan Express 5.0* at the Faculty of Geodesy, University of Zagreb on 4th February 2005. The mentor was Prof. Dr. Miljenko Lapaine, and Prof. Dr. Nedjeljko Frančula, Prof. Dr. Miljenko Lapaine and Assist. Prof. Stjepan Husnjak were members of the committee for grading and defending of the thesis.



Dražen Tutić was born on 29th June 1973 in Zagreb. He finished elementary school in Kloštar Ivanić and graduated in electronics at the *Ruđer Bošković* high school in Zagreb. From 1991 to 1993 he studied at the Faculty of Electronics and Computing, University of Zagreb. He started his study of geodesy in 1993 at the Faculty of Geodesy, University of Zagreb, which he ends in 1998 with diploma thesis *The "Map Projections" Computer Program*. Since 1998 he has been with the Institute for Cartography at the Faculty of Geodesy, first as a professional collaborator and since 2001 as a scientific novice – assistant. He started postgraduate study of geodesy in 1998.

He was a collaborator at the scientific project *Croatian Cartographers – Scientific Basis*, and today he is a collaborator at the scientific project *Cartography and New Technologies*. Besides scientific, he worked at a few professional projects. He is an assistant in the courses *Map Projections*, *Cartography and GIS* and *Multimedia Cartography*.

His special interests include the application of computers in cartography, geoinformation systems and Internet cartography. He published 29 papers (26 as a co-author) and wrote a few computer applications. He has been a secretary of the *Croatian Cartographic Society* from its founding in 2001, and a member of the *Croatian Geodetic Society*.

He got state scholarship of the Ministry of Sciences and Technologies of the Republic of Croatia during his fourth year of studies. In 1997 he was awarded with the *Rector's Award* for student work titled *Elements of Spatial Data Quality*.

The Master's thesis is written in Croatian, it contains 115 pages of A4 format (59 figures, 7 tables). After the foreword and abstracts in Croatian and English, the rest of the thesis is divided into following chapters:

1. Introduction
 2. Overview of the existing methods for a scanner calibration
 3. DeSKan Express Color 5.0
 4. Determining the scanner characteristics
 5. The methods of calibration
 6. Proposed procedure for scanner calibration
 7. Conclusion
 8. Glossary
 9. References
 10. Appendix
- List of figures
List of tables
Biography

The main task of the work was to determine characteristics of the DeSKan Express Color 5.0 scanner, find the possibilities of calibration and to write new software for managing this scanner. It is a large format flatbed scanner that scans templates in parts (strips). It can be used for scanning maps, blueprints or similar graphic templates. One such scanner exists at the Faculty of Geodesy, University of Zagreb.

The second chapter gives an overview of the scanners, their properties and applications. Furthermore, an overview of existing methods for determining the errors which scanning involves and of the methods for calibration of these errors is given.

The third chapter describes the DeSKan Express Color 5.0 scanner, its mechanical construction and usage. The software features are also described. The example of typical usage of this scanner and the obtained results are

kao osnova sustava. Na kraju poglavlja prikazana je funkcionalnost sustava kojem je pristup omogućen standardnim web-preglednikom bez potrebe za instaliranjem dodatnih programa.

Temeljem provedenog istraživanja i kroz postupak formiranja konkretnog sustava, autor je prepoznao nekolicinu važnih trendova vezanih uz modeliranje kako katastarskih, tako i općenito sustava za upravljanje prostornim podacima. Tako su u osmom poglavlju, odnosno zaključku, kao najvažniji istaknuti objektni

pristup modeliranju prostornih podataka i njihovo topološko strukturiranje kao više ili manje neposredna posljedica upotreba suvremenih prostornih baza podataka. Drugi, za ovo područje veoma važan trend, je upotreba višeslojnih programskih arhitektura i konačno, naglašen je internet kao poveznica sustava i njegovih korisnika.

U devetom, završnom, poglavlju magistarskog rada dan je prikaz upotrijebljene literature i URL-adresa resursa s interneta.

Priradio M. Lapaine

Dražen Tutić, magistar tehničkih znanosti

Dražen Tutić obranio je 4. veljače 2005. na Geodetskom fakultetu Sveučilišta u Zagrebu magistarski rad pod nazivom *Poboljšanje upravljačkog programa za DeSKan Express 5.0*. Mentor je bio prof. dr. sc. Miljenko Lapaine, a u povjerenstvima za ocjenu i obranu magistarskog rada bili su prof. dr. sc. Nedjeljko Frančula, prof. dr. sc. Miljenko Lapaine i doc. dr. sc. Stjepan Husnjak.

Dražen Tutić rođen je 29. lipnja 1973. godine u Zagrebu. Osnovnu školu pohađao je u Kloštar Ivaniću, a maturirao u školi *Ruđer Bošković* u Zagrebu, električni smjer. Nakon mature, u razdoblju 1991-93, studirao je na Fakultetu elektrotehnike i računarstva Sveučilišta u Zagrebu. Geodetski fakultet Sveučilišta u Zagrebu upisao je 1993. i diplomirao 1998. godine s temom *Računalni program "Kartografske projekcije"*. Od 1998. radi u Zavodu za kartografiju Geodetskog fakulteta, najprije kao stručni suradnik, a od 2001. kao znanstveni novak – asistent. Poslijediplomski magistarski studij geodezije, smjer Fotogrametrija i kartografija, upisao je 1998. godine.

Kao suradnik sudjelovao je na znanstvenom projektu *Hrvatski kartografi – znanstvene osnove*, a sada je suradnik na znanstvenom projektu *Kartografija i nove tehnologije*. Osim na znanstvenim projektima, sudjelovao je i na više stručnih projekata. U nastavi sudjeluje kao asistent iz predmeta *Kartografske projekcije*, *Kartografija i GIS* i *Multimedijska kartografija*.

Posebni su mu interesi primjena računala u kartografiji, geoinformacijski sustavi te kartografija na internetu. Objavio je 29 radova (3 samostalno i 26 kao koautor) i napisao nekoliko računalnih programa. Tajnik je *Hrvatskoga kartografskog društva* od njegova osnutka 2001. godine i član *Hrvatskoga geodetskog društva*.

Na četvrtoj godini studija dobio je državnu stipendiju Ministarstva znanosti i tehnologije Republike Hrvatske. Godine 1997. dobio je *Rektorovu nagradu* za studentski rad pod naslovom *Elementi kvalitete prostornih podataka*.

Magistarski rad sadrži 115 stranica (59 slika, 7 tablica) formata A4. Rad je nakon predgovora i sažetka na

hrvatskom i engleskom jeziku podijeljen u sljedeća poglavlja:

1. Uvod
 2. Pregled saznanja o kalibraciji skenera
 3. DeSKan Express Color 5.0
 4. Utvrđivanje karakteristika skenera
 5. Postupci za kalibraciju
 6. Predloženi postupak za kalibraciju
 7. Zaključak
 8. Rječnik
 9. Literatura
 10. Prilozi
- Popis slika
Popis tablica
Životopis

Glavni cilj rada bio je utvrditi karakteristike skenera DeSKan Express Color 5.0, mogućnosti kalibracije i izrada novoga programskog sučelja za upravljanje tim skenerom. Riječ je o plošnom skeneru velikog formata koji predložak skenira po uzdužnim trakama, a može se primijeniti za skeniranje karata, nacрта, ili nekih drugih grafičkih sadržaja. Jedan takav skener nalazi se na Geodetskom fakultetu Sveučilišta u Zagrebu.

U drugom poglavlju daje se kratki pregled skenera, njihovih svojstava i primjena. Slijedi pregled saznanja o kalibraciji skenera, tj. utvrđivanju pogrešaka uzrokovanih postupkom skeniranja te načinima uklanjanja tih pogrešaka.

Treće poglavlje opisuje skener DeSKan Express Color 5.0, njegovu konstrukciju i način upotrebe. Posebno se opisuju mogućnosti programskog sučelja. Dan je primjer tipične upotrebe takvog skenera i dobivenih rezultata. Na kraju toga poglavlja utvrđeni su nedostaci za koje se smatra da se mogu otkloniti.

given. The drawbacks in the scanning process and results, which are subject of the improvement, are listed at the end of this chapter.

The fourth chapter deals with the results of the measurements, i.e. determined scanner characteristics. Radiometric and geometric characteristic are studied separately. Chromatic aberration is measured and analysed independently.

Generic mathematical tools, which can be used for scanner calibration, are described in the fifth chapter. The emphasis is on the tools that are used in the new method of calibration.

The sixth chapter describes the new procedure of calibration, and gives the reasons for taking exactly this procedure. Then the results of such new procedure are shown. Also, the possibilities for further improvements in quality of scanning are given. The new calibration

procedure gives better radiometric and geometric accuracy, and makes the scanning process shorter. The results of the calibration of the chromatic aberration should be given special mention. The new application interface and its usage are presented at the end of this chapter.

The appendix to this thesis describes existing and newly produced software used in various stages of analysis. It is followed by an example of results of original and new scanning procedures. The CD with the new application interface is also a part of the thesis.

The committee for grading concluded that the thesis gives valuable contribution to the scanning technology and improvement of the particular software.

Readers who would like to find out more about this thesis can find more information at the Internet site of the Croatian Cartographic Society <http://www.kartografija.hr>.

Prepared by M. Lapaine



Croatian Cartographic Society

established in 2001

www.kartografija.hr

- ➔ CCS is a society of not only professionals, but also of other people with special interest in cartography.
- ➔ CCS's activities cover Croatian territory, but it also co-operates on professional level and exchanges both scientific and practical cognitions with other related associations.
- ➔ CCS uses its own publications and a journal to inform the general public about its activities. It also organizes scientific and professional conferences and co-operates with corresponding societies and

Cartography and Geoinformation

a journal published annually in both Croatian and English

- ➔ The journal publishes scientific and professional papers, reviews of books, software, conferences, exhibitions and more.
- ➔ Printed in full color with many illustrations (approx. 200 pages per issue).

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Četvrto poglavlje opisuje rezultate mjerenja, tj. utvrđene karakteristike skenera. Posebno su obrađene radiometrijska i geometrijska karakteristika. Poseban dio bavi se kromatskom aberacijom.

Peto poglavlje bavi se općenitim matematičkim alatima koji se mogu upotrijebiti za kalibraciju rezultata skeniranja. Naglasak je na onim postupcima koji su upotrijebljeni u novom načinu kalibracije.

Šesto poglavlje, opisuje novi postupak kalibracije, razjašnjava razloge zašto je izabran baš takav postupak, kakvi su rezultati predloženog postupka i koje su daljnje mogućnosti za unapređenje kvalitete. Novi postupak kalibracije i poboljšanja uvedena u postupak skeniranja rezultiraju većom radiometrijskom i geometrijskom točnosti i općenito smanjuju vrijeme skeniranja. Posebno

treba istaknuti postupak utvrđivanja iznosa i smanjenje utjecaja kromatske aberacije. Opisano je i novo programsko sučelje te njegova upotreba.

Prilog ovome magistarskom radu opisuje postojeće i novonapisane računalne programe koji su upotrijebljeni za različite zadatke. Slijedi prilog u kojemu su dani rezultati skeniranja novim postupkom i usporedbe sa starim. Poseban prilog na CD-u je računalni program novoga sučelja.

Povjerenstvo za ocjenu procijenilo je da je pristupnik svojim istraživanjem dao vrijedan doprinos tehnologiji skeniranja i unapređenju odgovarajućeg softvera.

Čitatelje koji žele saznati nešto više o ovom magistarskom radu upućujem na internetske stranice Hrvatskoga kartografskog društva <http://www.kartografija.hr>

Pripremio M. Lapaine



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