



University of Ljubljana
Faculty of Social Sciences

UNIFYING GRADUATE STATISTICS: A BIG UMBRELLA FOR A SMALL COUNTRY

Anuška Ferligoj
University of Ljubljana
Slovenia
anuska.ferligoj@fdv.uni-lj.si

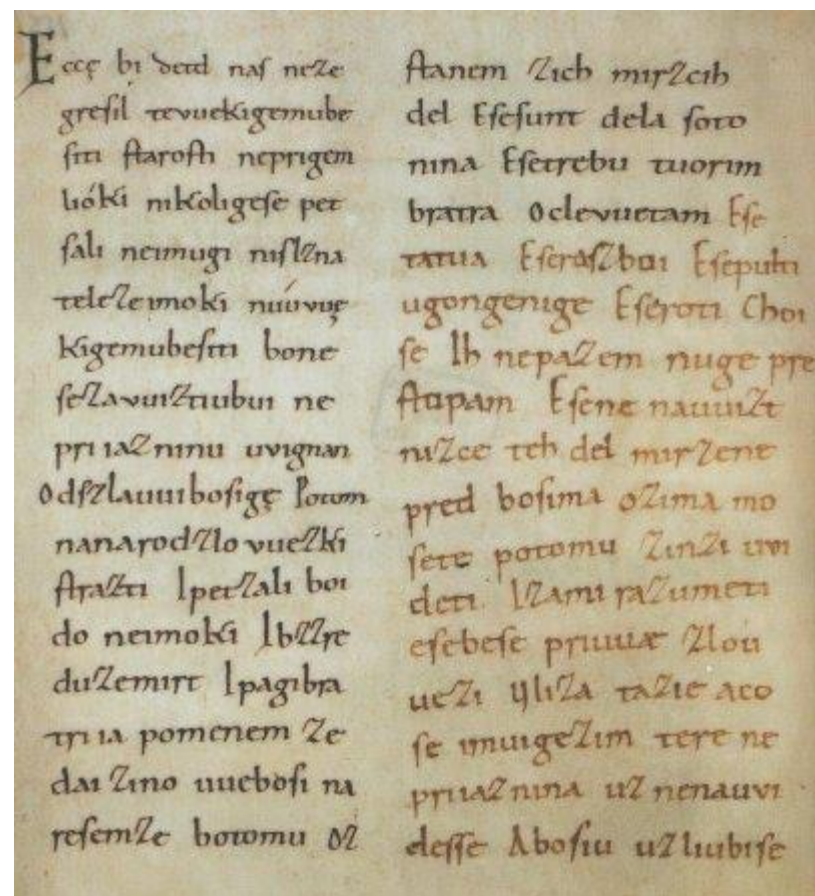


OUTLINE

- Brief history of Slovenia
- Some facts about Slovenia
- Universities in Slovenia
- University of Ljubljana
- Statistics in Slovenia
- Teaching statistics in Slovenia
- First University graduate program in statistics (2002 – 2009)
- PhD program on statistics (from 2009)
- Conclusion
- Future plans

BRIEF HISTORY OF SLOVENIA

- Slovenes settled in the 6th century
- A century later they founded the first Slovenian state – the duchy of Karantaniija
- In 745 Karantaniija became part of the Frankish state, the Slavs adopted Christianity and gradually lost their independence
- The Freising manuscript date from this period (the 10th century). It is the oldest preserved text in the Slovenian language



BRIEF HISTORY OF SLOVENIA

(cont.)

- In later centuries the Slovenian lands became part of the Habsburg and later the Austro-Hungarian monarchy
- In the mid-15th century the short period of the Principality of Celje, the last political entity based on Slovenian territory
- The Reformation established the foundations of the Slovenian literary language, bringing the first printed book in Slovenian in 1550 and in 1584, a Slovenian translation of the Bible





BRIEF HISTORY OF SLOVENIA

(cont.)

- During the period of the Illirian provinces (1809-13, half of Slovenia was part of the French Empire), Slovenian national consciousness began to strengthen, reaching a peak in the year of revolutions (1848) with the demand for the unification of all Slovenes in a single kingdom within the Austrian Empire
- After the First World War in 1919, the main part of the Slovenian ethnic territory joined the Kingdom of Serbs, Croats and Slovenes (later the Kingdom of Yugoslavia)
- After the end of the Second World War in 1945, Slovenes got their own republic within the Federal People's Republic of Yugoslavia
- Two years later the territory of Primorska was returned within Slovenia

BRIEF HISTORY OF SLOVENIA

(cont.)

- After the first democratic elections and the plebiscite for an independent state (88.5% of registered voters voted in favour) in 1990, Slovenia declared independence on 25 June 1991
- In 1992, Slovenia became a permanent member of the UN
- On 1 May 2004 Slovenia became EU Member State
- On 1 January 2007 Slovenia takeover of the common European currency – Euro
- On 1 June 2010 Slovenia became a member of the OECD



Coat of arms of Slovenia



SOME FACTS ABOUT SLOVENIA

- Area: 20,273 km² (153rd out of 223 countries in the world)
- Population
 - 2009 estimate: 2,054,199 (144th)
- GDP (per capita)
 - 2009 estimate: 24,417 \$
- Slovenia has 85,5% of the EU27 average GDP (PPP) per capita
- 40% of Slovenia's land mass is elevated land
- The highest point in Slovenia is the 2,864 m high Mount Triglav
- 66% wooded areas



SLOVENIA IN PICTURES



ICOTS 8, Ljubljana, Slovenia, 11 – 16 July 2010



UNIVERSITIES IN SLOVENIA

1. [University of Ljubljana](#) (1919)
2. [University of Maribor](#) (1975)
3. [University of Primorska](#) (2003)
4. [University of Nova Gorica](#) (2006)

UNIVERSITY OF LJUBLJANA (UL)



ICOTS 8, Ljubljana, Slovenia, 11 – 16 July 2010



UNIVERSITY OF LJUBLJANA (UL)

(cont.)

- Founded in 1919
- 50.000 undergraduate and graduate students
- It covers 64% of all university student population in Slovenia
- Over 300 different undergraduate and graduate study programs
- App. 6.000 higher education teachers, researchers, assistants, and administrative staff
- 23 faculties and 3 arts academies
- It is listed amongst the top 500 universities in the world according to the ARWU Shanghai, THES_QS, WEBOMETRICS rankings



FACULTIES AT UL

- Biotechnical Faculty
- Faculty of Economics
- Faculty of Architecture
- Faculty of Social Sciences
- Faculty of Electrical Engineering
- Faculty of Pharmacy
- Faculty of Civil Engineering and Geodesy
- Faculty of Chemistry and Chemical Technology
- Faculty of Mathematics and Physics
- Faculty of Maritime Studies and Transport
- Faculty of Computer and Information Science
- Faculty of Social Work



FACULTIES AT UL

(cont.)

- Faculty of Mechanical Engineering
- Faculty of Sports
- Faculty of Public Administration
- Faculty of Arts
- Faculty of Medicine
- Faculty of Natural Sciences and Engineering
- Faculty of Education
- Faculty of Law
- Theological Faculty
- Veterinary Faculty
- Faculty of Health Studies



ACADEMIES AT UL

- Academy of Music
- Academy of Fine Arts and Design
- Academy of Theatre, Radio, Film, and Television



STATISTICS IN SLOVENIA

- **Statistical Office of the Republic of Slovenia**

Established on 19 August 1944 by the Slovene National Liberation Council

- **Statistical Society of Slovenia**

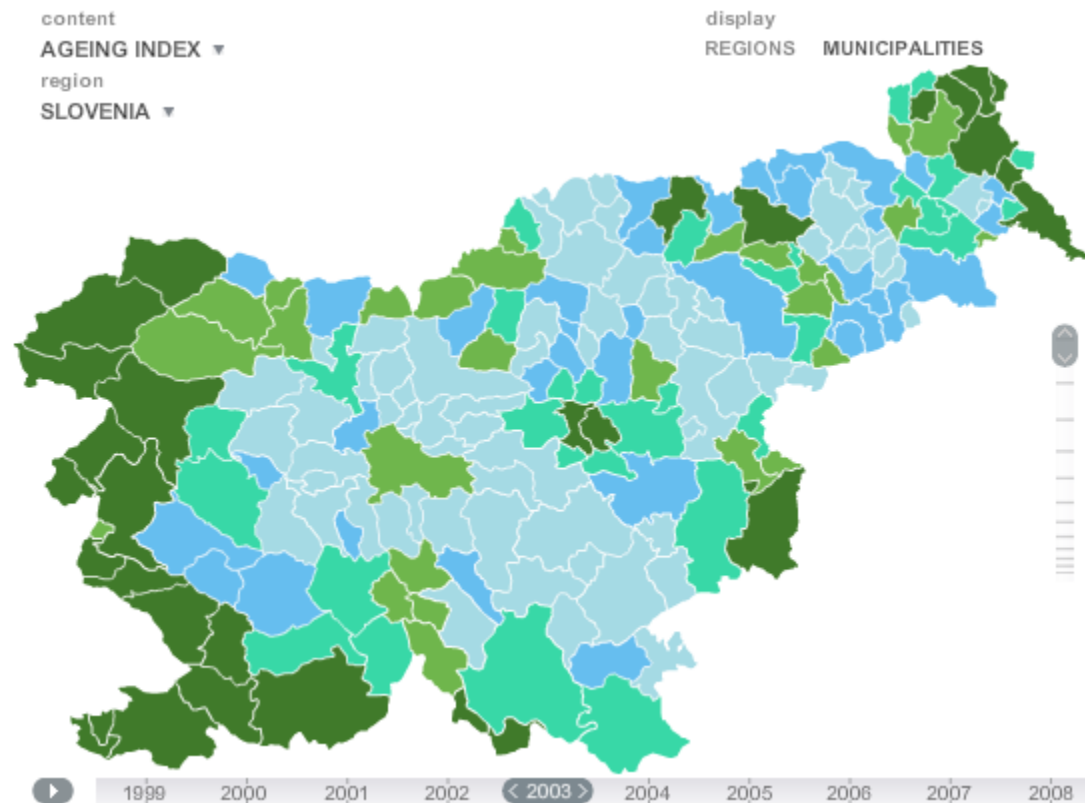
Established on 14 December 1977, before this date the Slovenian statisticians were members of the Yugoslav Statistical Society established in 1953



STATISTICAL OFFICE OF RS

Interactive Statistical Atlas of Slovenia

- Statistical regions / Municipalities
- Over 100 indicators
- Time series

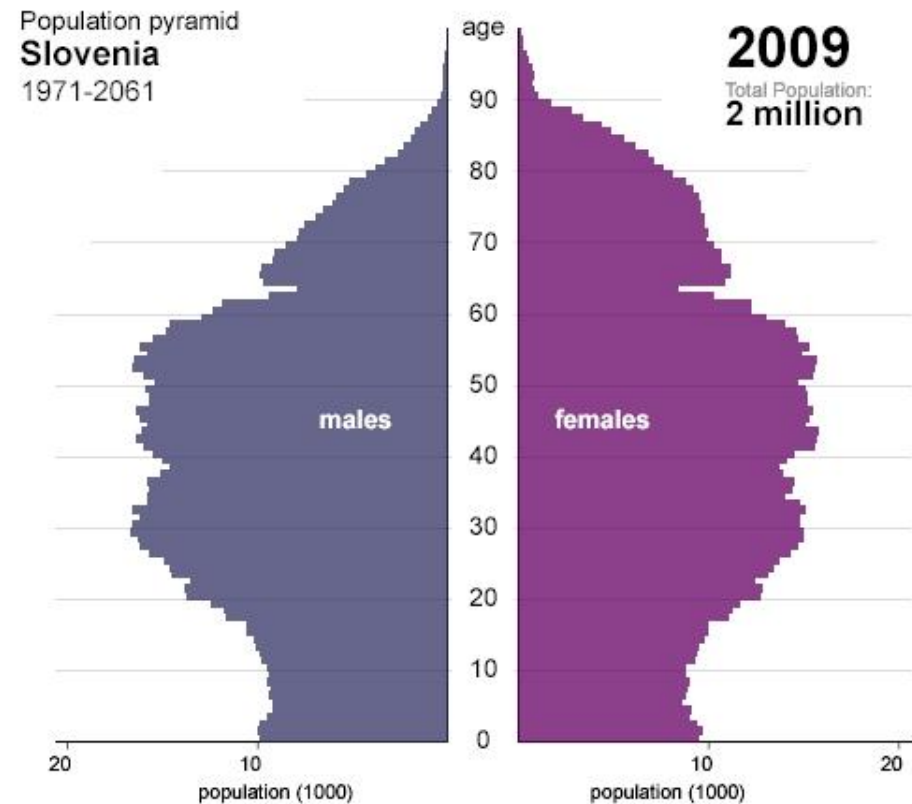




STATISTICAL OFFICE OF RS

Population pyramid

- Sex and age structure of Slovenia
- Interactive
- Developed by UK Office for National Statistics





STATISTICAL SOCIETY OF SLOVENIA

- **Slovenian Terminological Dictionary** (1994, 2001, 2002)
(1551 statistical terms with explanations, glossary and foreign terms in four languages: English, French, German and Italian).
- **Journal Metodološki zvezki** (Advances in Methodology and Statistics) from 2004
- **Newsletter Bilten** from 1978
- Organization of the annual international conferences
 - **Applied Statistics** in Ribno in September (before in Bled and Preddvor) from 1986
 - **Statistical Days** in Radenci in November from 1990
 - **Austrian, Slovenian, Italian, Hungarian, and Croatian Young Statisticians Meeting** from 1996



TEACHING STATISTICS IN SLOVENIA before 2002

- Courses on statistics are in almost all undergraduate and graduate education programs
- There was only one university lecturer with the PhD in statistics obtained abroad. All others graduated in information sciences or other scientific fields
- In Slovenia no education program at any university level in the past offered students a well-rounded education in statistics
- Our goal was to organize first a graduate program in statistics to properly educate university lecturers and researchers



FIRST GRADUATE PROGRAM IN STATISTICS 2002 - 2009

- Slovenia, as a small country, has limited human resources
- In 1995 we decided that a single interdisciplinary graduate program in statistics would be appropriate to provide opportunities for lecturers of statistics employed by different faculties at the University of Ljubljana to join forces and thus contribute their share to the integration processes at the university level
- In 2002 statisticians active in the Statistical Society of Slovenia with the help of the Statistical Office of Republic of Slovenia established the country's first university graduate (masters and doctoral) program on statistics.



FIRST GRADUATE PROGRAM IN STATISTICS – MAIN GOALS

- To deepen and broaden basic knowledge of statistical theory
- To deepen and broaden knowledge of statistics representing foundations of empirical research in individual scientific fields
- To deepen and broaden statistical knowledge specifically required by individual students
- To further develop statistical knowledge related to individual scientific disciplines regularly using the statistical tools



FIRST GRADUATE PROGRAM IN STATISTICS (cont.)

FACULTIES:

- Biotechnical Faculty
- Faculty of Economics
- Faculty of Mathematics and Physics
- Faculty of Medicine
- Faculty of Social Sciences

MODULES:

- biostatistics
- mathematical statistics
- official statistics
- social statistics



FIRST GRADUATE PROGRAM IN STATISTICS (cont.)

- The master's degree program took two years (four semesters) and required 120 credits.
- The doctoral degree program took four years and required 240 credits. Organized pedagogic processes in form of lectures and seminars took place for the master degree level. The remaining two years were spent on students' individual research projects using statistical knowledge.



FIRST GRADUATE PROGRAM IN STATISTICS (cont.)

Core courses and the seminar:

- Probability and statistics
- Information technology in data analysis
- Multivariate analysis
- Seminar on official statistics

We organized the [Seminar in mathematics](#) for those having a weaker mathematical background.

For the students coming from the Faculty of Mathematics and Physics that had no experience with data analysis we organized the [Introductory course of statistical data analysis](#).



FIRST GRADUATE PROGRAM IN STATISTICS - MODULES

- ***Module 1: Biostatistics*** (Biotechnical Faculty and Faculty of Medicine)

Theoretical foundations of the most frequently applied modern statistical methods in medicine and biology. Core module courses were: **Statistics in medicine** and **Design and analysis of experiments**.

- ***Module 2: Statistics for Social Sciences*** (Faculty of Social Sciences)

Topics from methodology and statistics specific for the field of social sciences. Core module courses were: **Survey errors** and **Categorical data analysis**.



FIRST GRADUATE PROGRAM IN STATISTICS – MODULES (cont.)

- **Module 3: Mathematical Statistics** (Faculty of Mathematics and Physics)

Both development and application of new statistical methodology demand familiarity with mathematical foundations of statistics. The two core module courses were: **Mathematical statistics** and **Stochastic processes and time series**.

- **Module 4: Official Statistics** (Faculty of Economics)

The module focused on an in-depth study of theoretical and conceptual foundations for measurement of economic and other social phenomena constituting the field of official statistics. The two core module courses were: **Index numbers** and **National accounting**.



FIRST GRADUATE PROGRAM IN STATISTICS – ELECTIVE COURSES

Each student was free to choose two elective courses either

- from the list of elective courses: Longitudinal research, Econometrics, Statistical methods in ecology, Demographic statistics, analysis, and models, Network analysis, Data mining and knowledge discovery, Industrial statistics, Financial mathematics,
- from the list of core courses offered in other modules,
- from the list of courses taught in the framework of any graduate study program at the University of Ljubljana,
- from the list of courses offered at the ECPR, Essex and Michigan Summer Schools in Social Science Data Analysis and Collection
- from the list of courses taught at graduate study programs abroad.



FIRST GRADUATE PROGRAM IN STATISTICS (cont.)

The first graduate education program in statistics was quite successful.

The first five doctoral degree diplomas were awarded and the program became extremely important for statistical education and research in Slovenia.



DOCTORAL PROGRAMS ACCORDING TO BOLOGNA SCHEME

- The strategic goal of European Union for the first decade of the 21st Century was ‘to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion’ (European Commission, 2000).
- The European Commission (2003) stated that universities play a vital role in the ‘Europe of knowledge’. To achieve this, the Bologna process was promoted with the goals of modernizing higher education for the better employability of graduates, diversifying study programs, promoting mobility of students, and internationalizing academic programs.
- As the other universities in Europe did, the University of Ljubljana reformed all levels of the education programs according to the Bologna scheme.



DOCTORAL PROGRAM IN STATISTICS ACCORDING TO BOLOGNA SCHEME

- Consistent with the Bologna scheme, we had to transform our graduate program in statistics.
- On the basis of good experience in the past years, and of the noticeable advantages of the interdisciplinary approach, the Interdisciplinary Doctoral Program in Statistics is also organized at the university (and not at the faculty) level.



DOCTORAL PROGRAM IN STATISTICS GOALS

- Also, in the reformed doctoral program in statistics, the main goal is to further educate experts who have some fundamental knowledge in statistical theory, some experience in the field of statistics or some general statistical knowledge, specific to an individual scientific discipline.
- The goal is that the doctoral graduates will be qualified for creative and independent research work in statistics and for solving statistical problems for future employers.



DOCTORAL PROGRAM IN STATISTICS

(cont.)

- The duration of the Interdisciplinary Doctoral Program in Statistics is three years (180 ECTS credits), and according to the Bologna educational scheme, this represents the third cycle of education.
- The program consists of organized classes (60 credits) and individual research work for the doctoral thesis (120 credits).



DOCTORAL PROGRAM IN STATISTICS

(cont.)

MODULES (three of them are new modules):

- Biostatistics
- Statistics for Social Sciences
- Mathematical Statistics
- **Economics and Business Statistics**
- Official Statistics
- **Psychological Statistics**
- **Technical Statistics**



DOCTORAL PROGRAM IN STATISTICS

(cont.)

FACULTIES (two new ones):

- Biotechnical Faculty
- Faculty of Arts
- Faculty of Economics
- Faculty of Electrical Engineering
- Faculty of Mathematics and Physics,
- Faculty of Medicine
- Faculty of Social Sciences



DOCTORAL PROGRAM IN STATISTICS

(cont.)

- Interdisciplinary Doctoral Program in Statistics is both horizontally and vertically linked to other study programs at the University of Ljubljana.
- International exchanges take place on the basis of international contracts and bilateral agreements. International exchanges are also possible through collaboration in mobility programs for students and professors.
- The program is open to foreign students.



DOCTORAL PROGRAM IN STATISTICS

(cont.)

- In the first year, students, within the framework of two obligatory courses and three elective courses, obtain fundamental theoretical knowledge and expertise of scientific work.
- In the second year they must complete the module's obligatory course and the doctoral thesis proposal has to be presented at the end of the third semester.
- The focus of the third year is research work, preparation and defence of the doctoral thesis.



DOCTORAL PROGRAM IN STATISTICS

obligatory core courses

- **Mathematical Statistics** is obligatory for mathematical module students, and **Methodology of Statistical Research** is obligatory for all other students.
- **Modern Statistical Approaches** is obligatory for all students. The aim of the course is to provide an overview of some of the most contemporary topics of statistics, from which the students can choose their doctoral thesis topics. The lectures are given by local and foreign experts in each selected topic. The course also includes consulting for users of statistical methods.
- Students have another obligatory course from the selected module.



DOCTORAL PROGRAM IN STATISTICS

internationalization

The following statisticians from abroad lectured at the course
Modern Statistical Approaches in 2009/10:

- PER KRAGH ANDERSEN (University of Copenhagen, Denmark)
- BOJAN BASRAK (University of Zagreb, Croatia)
- LYNNE BILLARD (University of Georgia, USA)
- ANDREW GELMAN (Columbia University, USA)
- LARS LYBERG (Stockholm University, Sweden)
- TAMAS RUDAS (Eötvös Loránd University, Hungary)
- PETER SCHMIDT (University of Gießen, Germany)
- TOM SNIJDERS (University of Oxford, UK)



DOCTORAL PROGRAM IN STATISTICS

elective courses

Students are allowed to select 10 ECTS from the following lists of the elective courses:

- From the list of 23 elective courses of the Doctoral program in Statistics
- From other doctoral programs at the University of Ljubljana and comparable programs of foreign universities.
- Elective credits can be selected also from the university pool of the generic skills courses, listed at the web site of the University of Ljubljana.



DOCTORAL PROGRAM IN STATISTICS

elective statistical courses

- Categorical data analysis
- Customer data analysis
- Data mining
- Data mining and knowledge discovery
- Demography, analysis and models
- Design and analysis of experiments
- Econometric analysis of panel data
- Environmental statistics,
- Internet mediated research
- Linear algebra for multivariate methods
- Modern psychometric test theory
- Multivariate analysis
- Network analysis
- Network analysis in business and economics
- Reliability and life testing
- Research challenges of national accounts
- Statistical background of bioinformatics
- Statistical computing
- Statistical quality control
- Stochastic processes
- Survey methodology
- Theory of index numbers
- Times series
- Econometrics



CONCLUSION

Slovenia, being a small country with limited human capital, had to find its own ways to organize education programs of specific scientific fields as statistics.

Fifteen years ago, when we began to prepare the graduate program in statistics we searched for appropriate ones at other universities abroad and we had to consider our specifics and lecturers available at University of Ljubljana.

As we have quite good relationships with the statisticians around Slovenia we were able also with their help to organize a successful graduate program of statistics.

As we do not have a separate organizational unit (e.g., department or institute) of statistics at the University of Ljubljana, we use the graduate program of statistics as a meeting point of lecturers and researchers on statistics at the University of Ljubljana.



FUTURE PLANS

The first graduate program on statistics included Master's and doctoral level of the study.

Till now, we organized only the doctoral program in statistics reformed according to the Bologna principles.

We still work on the master's program on statistics.

Unfortunately, the mathematical statistics module is organized separately at the Faculty of Mathematics and Physics. The mathematical statistics module had always some special requirements in our statistical programs.

The other modules will be included in the Interdisciplinary Master's Program of Applied Statistics. We plan to start with the Master's program in the year 2011.

We plan an international collaboration between our Master's program Applied Statistics and several similar ones in European Union.