

Data Visualization

INTRODUCTION

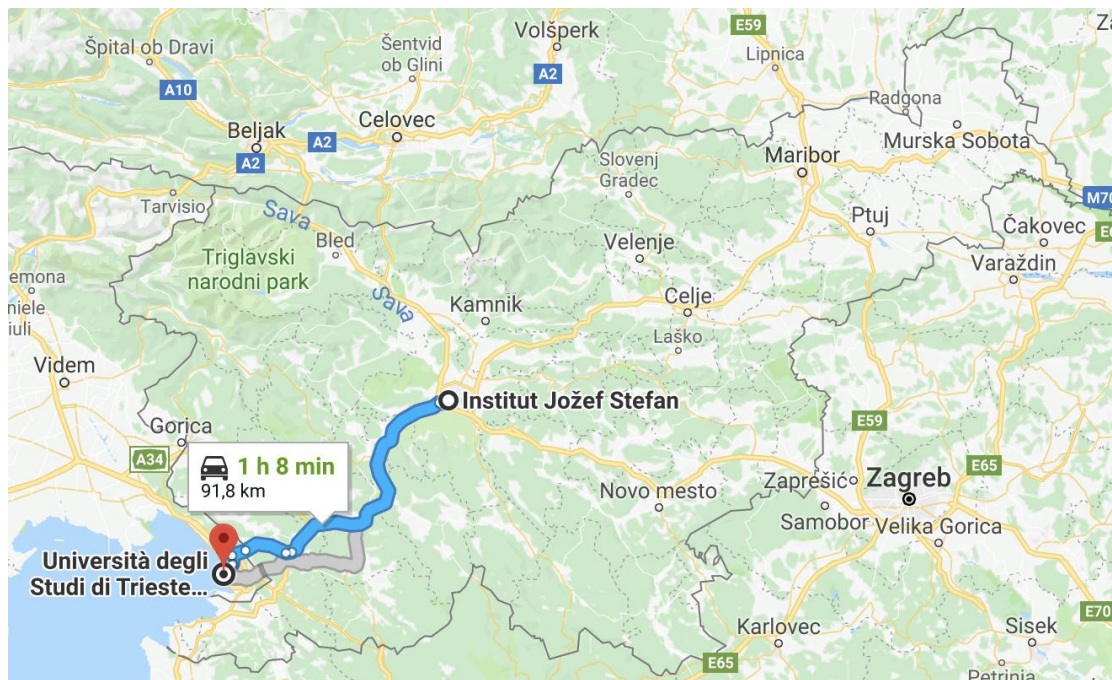
Lecturer: Tea Tušar



Research Associate at the Department of Intelligent Systems, Jožef Stefan Institute

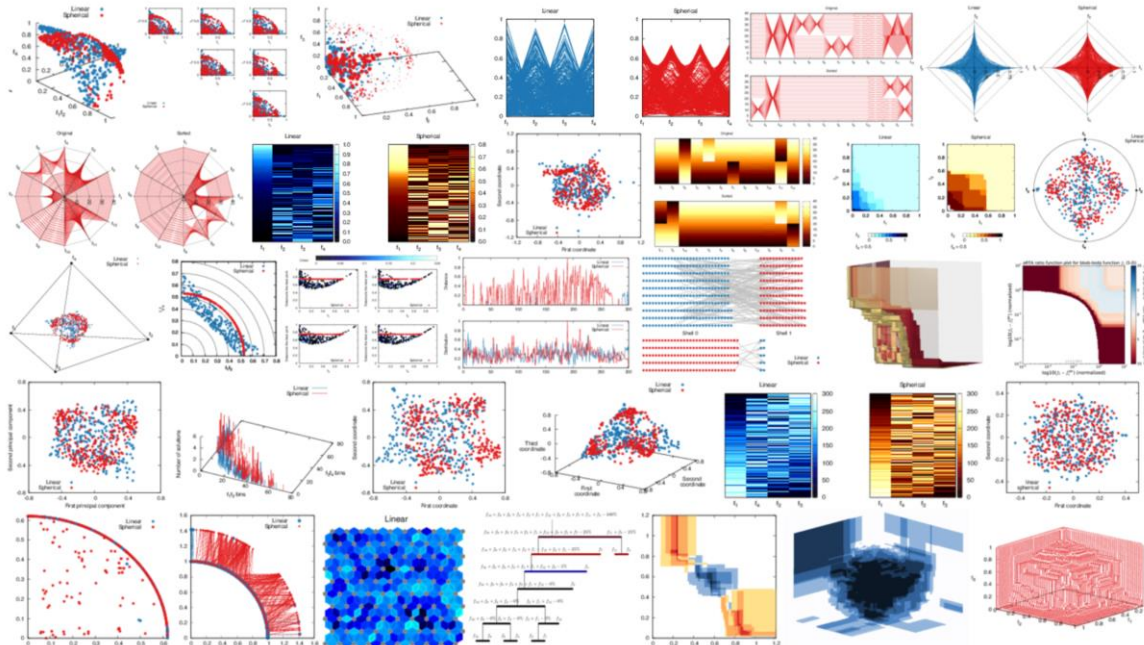
Assistant Professor at the Jožef Stefan International Postgraduate School

Both in Ljubljana, Slovenia



Background

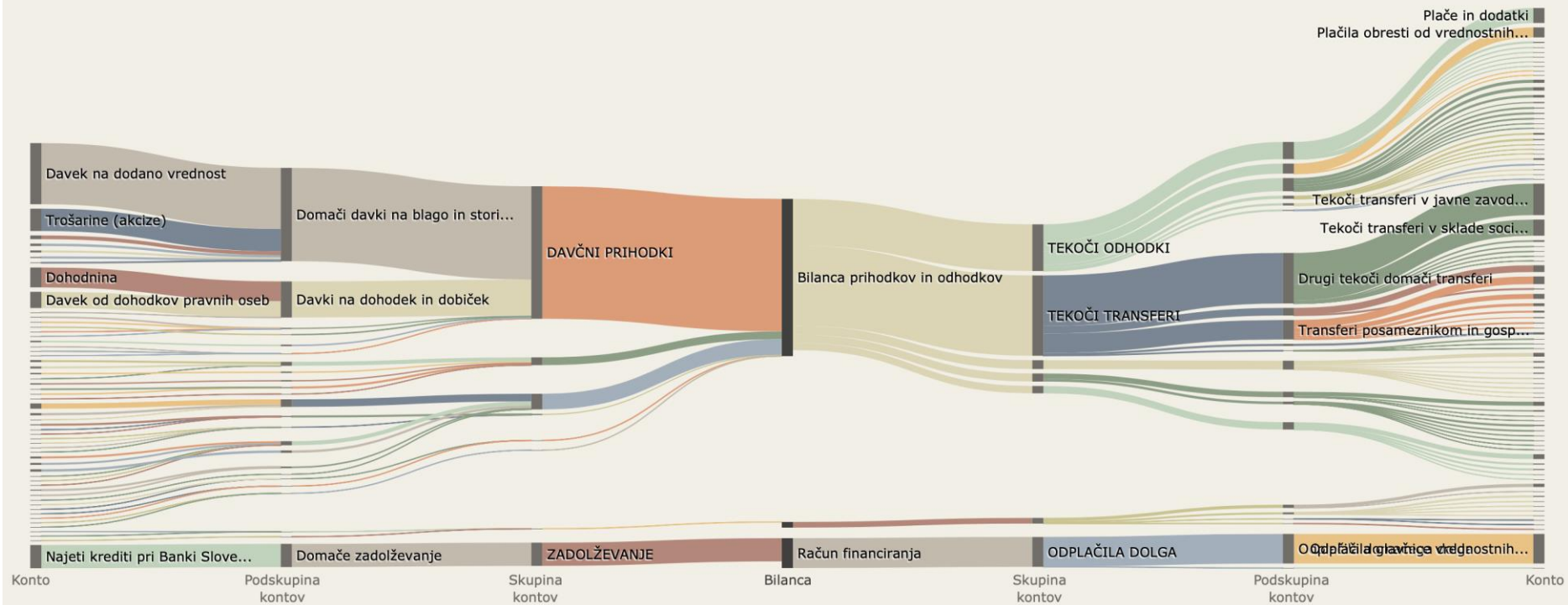
- BSc in Applied Mathematics
- MSc In Computer Science
- PhD in Information and Communication Technologies
- PhD dissertation: Visualizing Solution Sets in Multiobjective Optimization



State budget

Splošni del proračuna

Vključuje prihodke in odhodke proračuna izkazane po ekonomski klasifikaciji



Contact

By email

- tea.tusar@ijs.si
- Subject: [DataVisualization] ...

Via Teams

After lessons

About the course

Objective: **To develop a strong foundation on data visualization**

- Understand why and how visualization works
- Spot lying visualizations
- Learn to make trustworthy and accessible visualizations
- Gain knowledge beyond the usage of some tools (but also use tools to construct an interactive visualization)
- Learn to make better presentations

Prerequisites (not mandatory for completing the course)

- Basic knowledge of Python and scientific Python

Syllabus

- **Foundations:** defining data visualization, historical visualizations, the purposes of data visualization and the three principles of good visualization design
- **Data abstraction:** dataset types, attributes types and semantics
- **Task abstraction:** goals and tasks, actions and targets
- **Human visual perception:** memory, visual encoding, visual order, color perception and color specification
- **Designing a visualization:** steps of visualization design, basic charts, visualizing multivariate data, uncertainty and missing data, interactivity, storytelling and tools
- **Examples:** (un)trustworthy and (in)accessible visualizations, visualizing COVID-19
- **Creating interactive visualizations in Python**

Participation

What is meant by participation

- Attending the online lectures
- Asking questions, answering to my questions

Important for you

- Keeps you engaged
- Helps you understand the course material better

Important for me \Rightarrow important for you

- I can explain examples/concepts in more detail when needed
- Helps me give the best possible lectures

Three assignments

- After lectures 1, 2 and 9 – each due in six days
- Not obligatory, but will influence the exam grade in case of being between grades

Exam (in project form)

Groups of 2 or 3 students

Design visualizations on some topic (free choice)

- Prepare visualizations up to one week before the exam
- Present visualizations at the exam
- Be prepared to answer questions about your visualization choices

More details later on

Schedule

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Nov 16	Nov 17	Nov 18	Nov 19	Nov 20	Nov 21	Nov 22
				Lecture 1 Assignment 1		
Nov 23	Nov 24	Nov 25	Nov 26	Nov 27	Nov 28	Nov 29
Lecture 2 Assignment 2				Lecture 3		
Nov 30	Dec 1	Dec 2	Dec 3	Dec 4	Dec 5	Dec 6
Lecture 4				Lecture 5		
Dec 7	Dec 8	Dec 9	Dec 10	Dec 11	Dec 12	Dec 13
Lecture 6				Lecture 7		
Dec 14	Dec 15	Dec 16	Dec 17	Dec 18	Dec 19	Dec 20
Lecture 8				Lecture 9 Assignment 3		
Dec 21	Dec 22	Dec 23	Dec 24	Dec 25	Dec 26	Dec 27
Lecture 10						
Dec 28	Dec 29	Dec 30	Dec 31	Jan 1	Jan 2	Jan 3
Jan 4	Jan 5	Jan 6	Jan 7	Jan 8	Jan 9	Jan 10
				Lecture 11		
Jan 11	Jan 12	Jan 13	Jan 14	Jan 15	Jan 16	Jan 17
Lecture 12						

Schedule variants

Dec 21 + Jan 8 + Jan 11

Dec 21	Dec 22	Dec 23	Dec 24	Dec 25
Lecture 10				
Dec 28	Dec 29	Dec 30	Dec 31	Jan 1
Jan 4	Jan 5	Jan 6	Jan 7	Jan 8
				Lecture 11
Jan 11	Jan 12	Jan 13	Jan 14	Jan 15
Lecture 12				

Dec 21 + Jan 11 + Jan 15

Dec 21	Dec 22	Dec 23	Dec 24	Dec 25
Lecture 10				
Dec 28	Dec 29	Dec 30	Dec 31	Jan 1
Jan 4	Jan 5	Jan 6	Jan 7	Jan 8
Jan 11	Jan 12	Jan 13	Jan 14	Jan 15
Lecture 11				Lecture 12

Jan 8 + Jan 11 + Jan 15

Dec 21	Dec 22	Dec 23	Dec 24	Dec 25
Dec 28	Dec 29	Dec 30	Dec 31	Jan 1
Jan 4	Jan 5	Jan 6	Jan 7	Jan 8
				Lecture 10
Jan 11	Jan 12	Jan 13	Jan 14	Jan 15
Lecture 11				Lecture 12

Which schedule?

Start at 9:00 or 9:15?

Have a break or not?

You decide:

<https://freeonlinesurveys.com/s/51Js3gZh>

Course materials

Available on Moodle

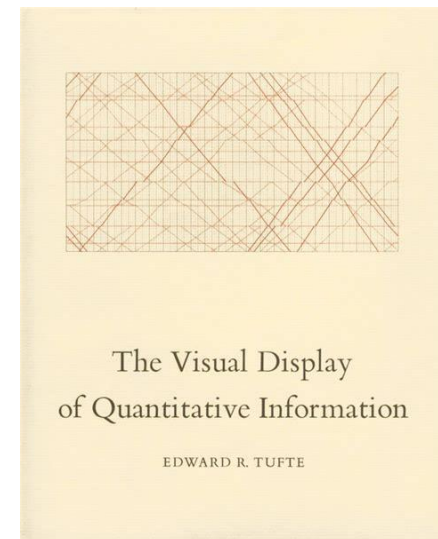
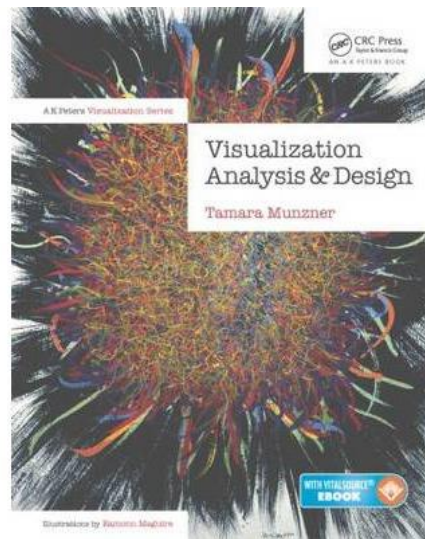
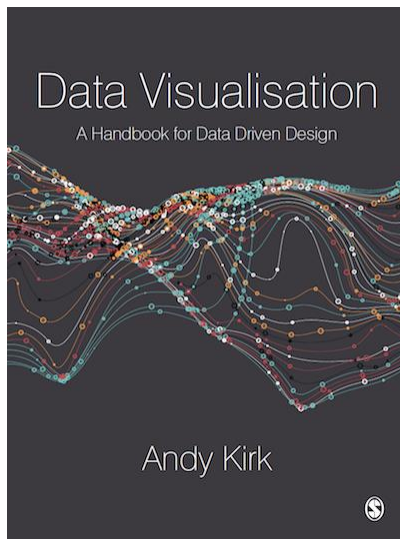
- Links to numerous sources of data (already available)
- Slides with lots of links (after lectures)
- Python code and data (when relevant)

Available on Teams

- Lecture recordings (after lectures)

Books

- Andy Kirk. Data Visualization: A Handbook for Data Driven Design. SAGE Publications, London, 2016.
- Tamara Munzner. Visualization Analysis & Design. A K Peters Visualization Series, CRC Press, Boca Raton, 2014.
- Edward R. Tufte. The Visual Display of Quantitative Information. Graphics Press, Cheshire, 2015.



Online resources

Blogs with tips and tutorials (in alphabetical order)

- Chartable: <https://blog.datawrapper.de>
- Eager eyes: <https://eagereyes.org>
- FlowingData: <https://flowingdata.com>
- Information is beautiful: <https://informationisbeautiful.net>
- PolicyViz: <https://policyviz.com>
- Randal S. Olson: <http://www.randalolson.com/blog/>
- Storytelling with data: <https://www.storytellingwithdata.com/>
- The functional art: <http://www.thefunctionalart.com>
- Telling stories with data: <http://www.chadskelton.com>
- Vis4.net: <https://www.vis4.net/blog/>
- Visualizing data: <http://www.visualisingdata.com>
- Vizdata (in Italian): <https://www.vizdata.it>

Podcasts



<http://datastori.es>

By Enrico Bertini and
Moritz Stefaner
Since February 2012
162 episodes
~45 min / episode



<https://www.storytellingwithdata.com/podcast/>

By Cole Nussbaumer
Knaflic
Since November 2017
35 episodes
~45 min / episode

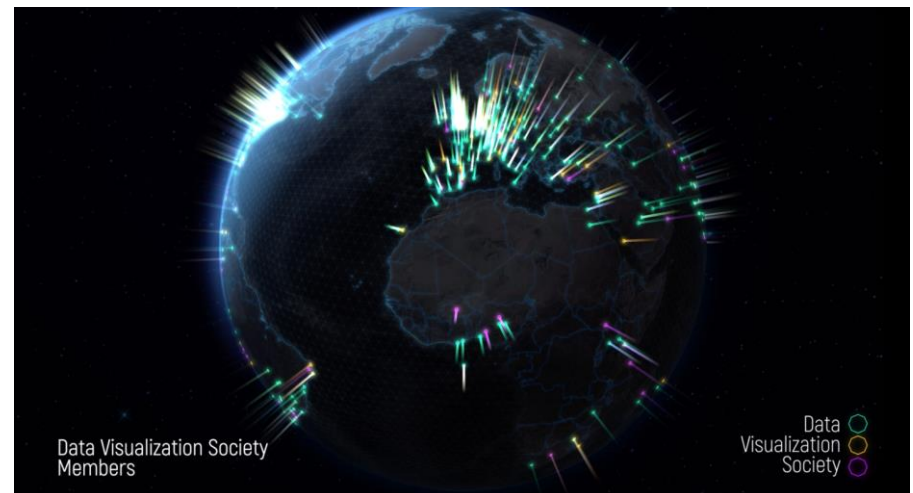


<https://policyviz.com/podcast/>

By Jonathan Schwabish
Since April 2015
184 episodes
~30 min / episode

Data Visualization Society

- More than 11,000 members
- Website: <https://www.datavisualizationsociety.com>
- Newsletter, Slack channel, challenges, resources, jobs, ...
- Medium journal Nightingale: <https://medium.com/nightingale>



Challenges

#MakeoverMonday

- Weekly challenge
- Create better visualization for the given data
- <http://www.makeovermonday.co.uk/>

#SWDchallenge (SWD = Storytelling with data)

- Monthly challenge
- Practice and apply data visualization and storytelling skills
- <https://www.storytellingwithdata.com/swdchallenge/>

Many other challenges

- <https://www.datavisualizationsociety.com/challenges-1>

Disclaimer

Most examples are US- and UK-centric

