

# Data Visualization

## INTRODUCTION

Tea Tušar, Data Science and Scientific Computing, Information retrieval and data visualization

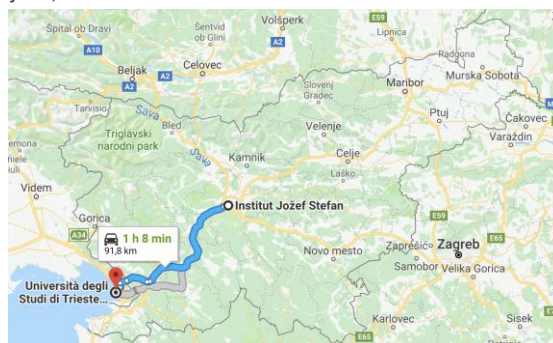
## Lecturer: Tea Tušar



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

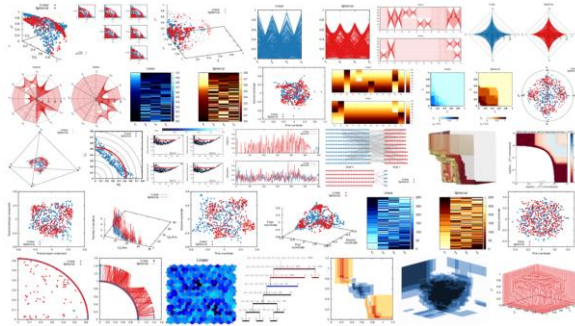
*Assistant Professor* at the Jožef Stefan International Postgraduate School

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

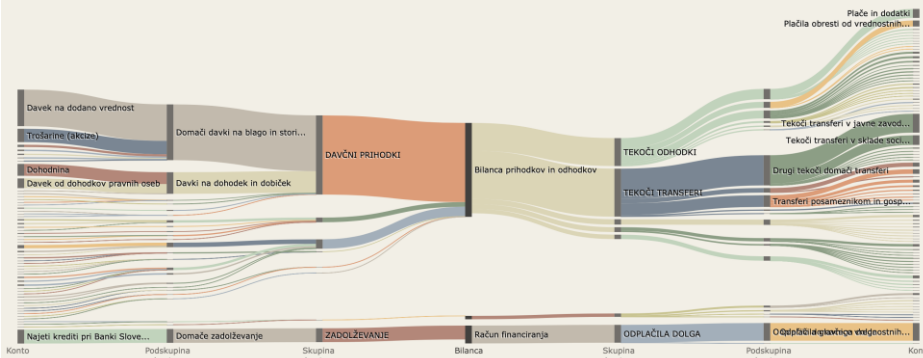


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# State budget

## Spošni del proračuna

Vključuje prihodke in odhodke proračuna izkazane po ekonomski klasifikaciji



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## Contact

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Via Teams (preferred)

By email

- [tea.tusar@ijs.si](mailto:tea.tusar@ijs.si)
- Subject: DataViz2022 ...

During breaks, before or after lessons

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## About the course

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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

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# 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:** attention and 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
- **Creating interactive visualizations in Python**

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# Schedule

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

Afternoon lectures: 14:15 – 15:30 and 15:40 – 16:40 in room 5B

Morning lectures: 9:15 – 10:30 and 10:40 – 11:40 in room 5A

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# Participation

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What is meant by participation

- Attending the lectures (in person)
- Asking questions, answering my questions

Interrupt me  
at any time

Important for you

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

Important for me ⇒ important for you

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

Three assignments

- After lectures 2, 4 and 6 – each due the following Tuesday night
- Not obligatory, but good for you

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# Exam (in project form)

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Groups of 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 (last week)

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## Course materials

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### 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

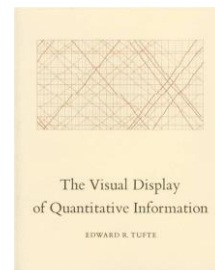
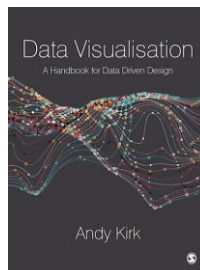
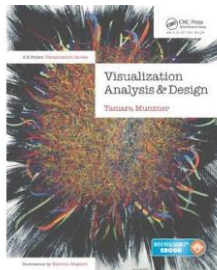
- Lecture recordings (after lectures)

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## Books

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



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## Online resources

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Blogs with tips and tutorials (in alphabetical order)

- Datawrapper: <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: <https://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>

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## Podcasts

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<http://datastori.es>

By Enrico Bertini and Moritz Stefaner  
166 episodes, ~45 min / episode



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

By Cole Nussbaumer Knaflic  
56 episodes, ~45 min / episode



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

By Jonathan Schwabish  
223 episodes, ~30 min / episode



<https://linktr.ee/exploreexplain>

By Andy Kirk  
26 episodes, ~60 min / episode, also videos

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# Data Visualization Society

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- More than 19,000 members
- Website: <https://www.datavisualizationsociety.com>
- Newsletter, Slack channel, challenges, resources, jobs, ...
- Journal Nightingale: <https://nightingaledvs.com/>



<https://www.datavisualizationsociety.com/member-data-challenge/2019/3/28/dvs-global-members>

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# Challenges

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## #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.org/resources>

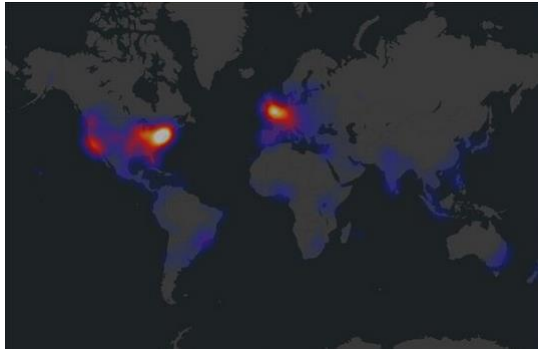
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# Disclaimer

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Most examples are US- and UK-centric



<https://www.datavisualizationsociety.com/one-year-membership-challenge/2020/5/4/dvs-is-global-with-room-to-grow-wzw6x-4gs6m-3bzs2>

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