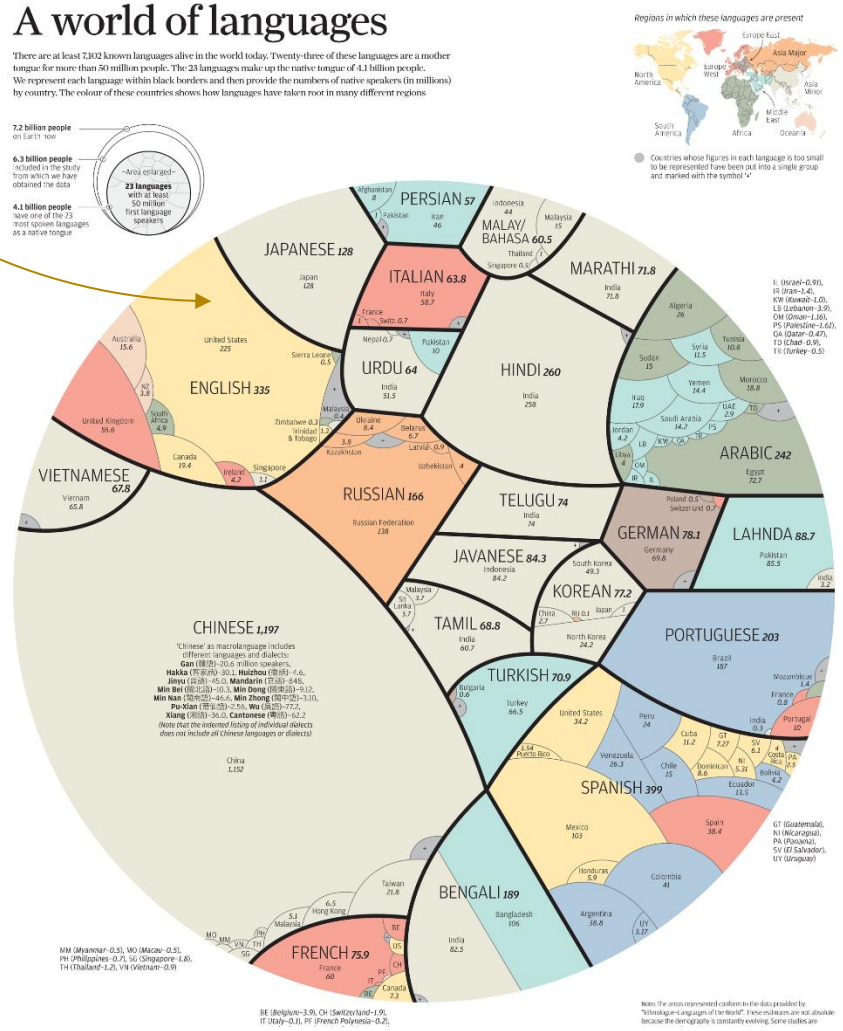
Data Visualization

Introduction

M126 | Maria Roussou

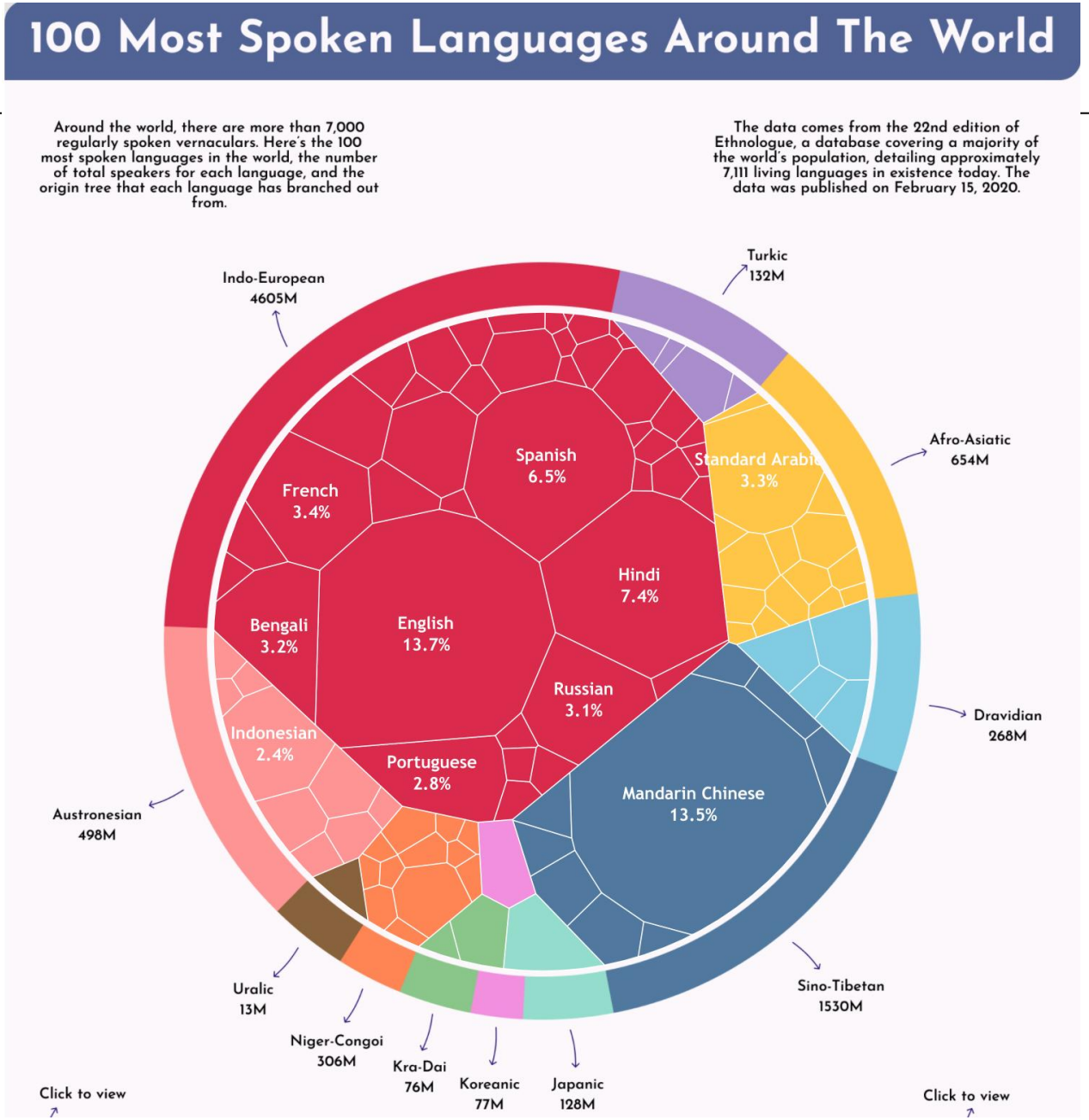
Some practicalities

We use the English language in all written material



Some practicalities

Our spoken language will be defined according to necessity and preference



We use the English language

Some practicalities

- E-mail: mroussou@di.uoa.gr

- Class day, time
  - every Wednesday, 18:00 – 21:00

- Presence sheet*

(*) attendance is important, but not mandatory. Part of your grade will be based on your in-class / e-class participation

Round-the-room introductions

- 2-minute introduction about you:
  - studies/background
  - goals and expectations from this course

Course structure

13 weeks of:

- Lectures

- Individual assignments

  ~3-4 on a variety of tools and methods

- Group project (in groups of 2-3)

  to create an interactive visualization of a dataset (of your choice), present it live, and document it on video

Course assessment

- Individual effort ~**40%**
  - In-class and e-class participation: ~**10%**
    Your contributions to in-class and online discussions will be a significant portion of your class participation grade.
  - Individual exercises & assignments: ~**30%**

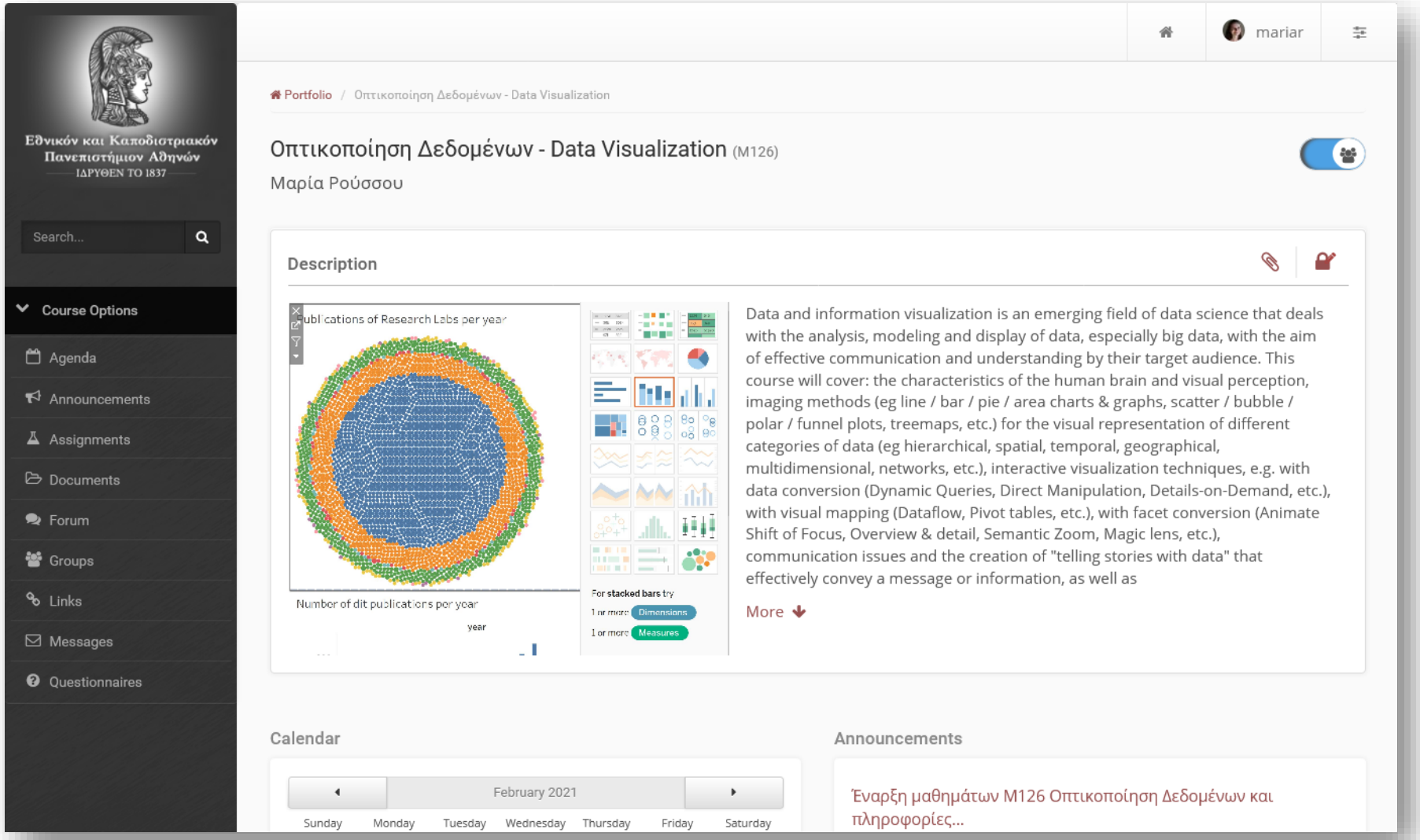
- Group Project ~**60%**
  - Design & implementation: ~**50%**
  - Final Presentation & documentation: ~**10%**

Course style

- **Interactive & participatory**: active participation is a must!
- **By example**: real-world case studies
- **Up-to-date**: constantly abreast of new developments
- **Critique**: other work and our own
- **Research**: be prepared to spend significant amounts of time researching examples and reading papers

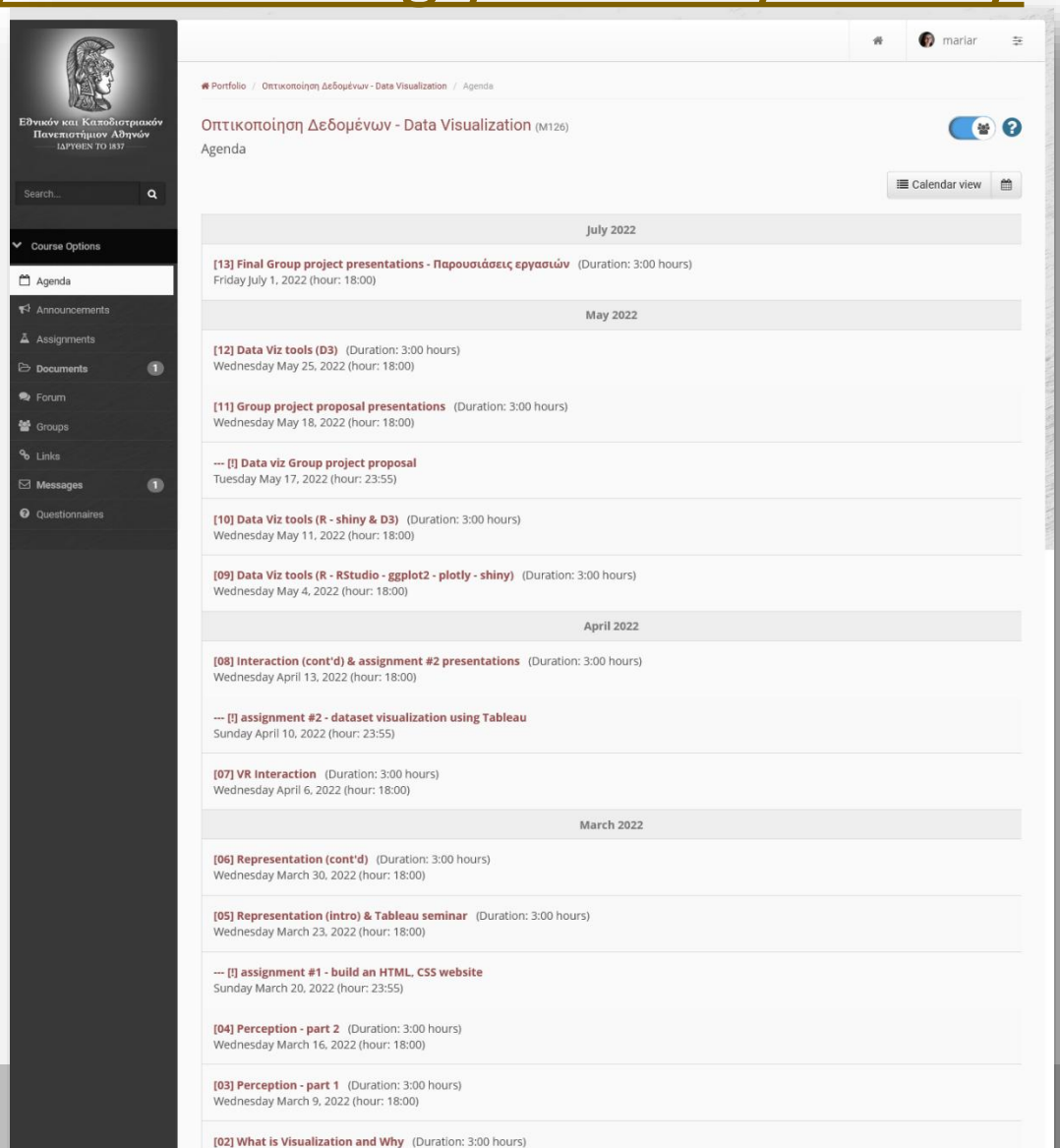
Course announcements, material, assignments

- e-class - https://eclass.uoa.gr/courses/DI453/



Course agenda

- e-class - https://eclass.uoa.gr/courses/DI453/ > **Agenda**

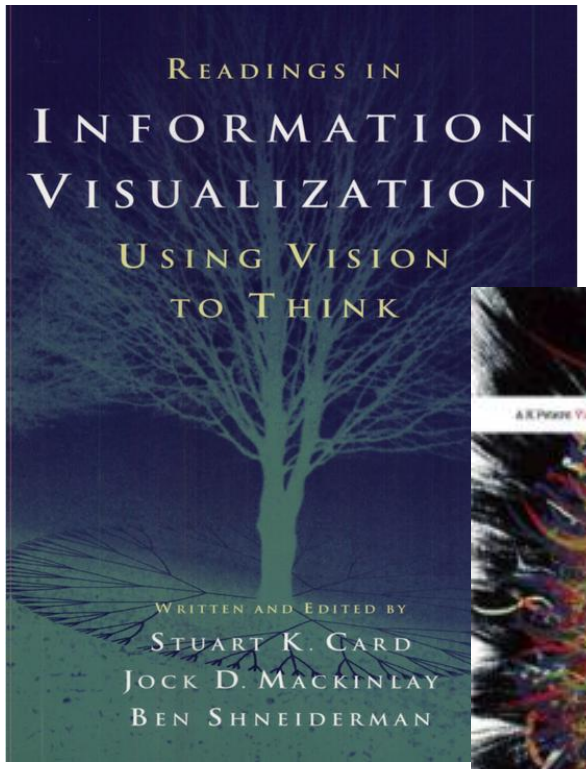


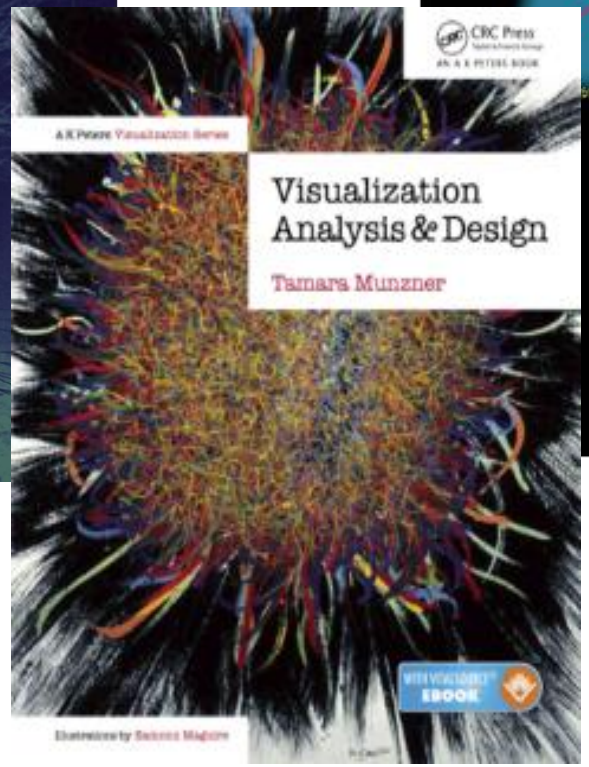
Communication

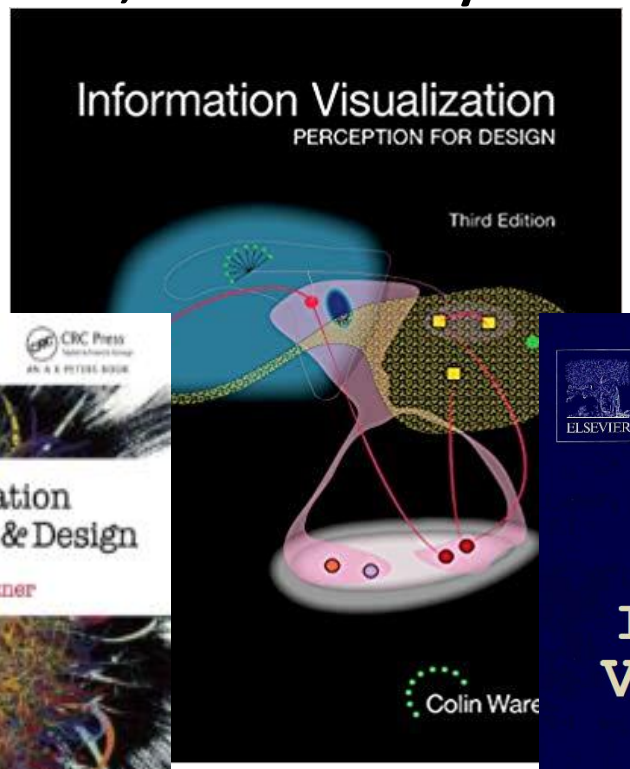
- Discord: https://tinyurl.com/m126-discord-2026

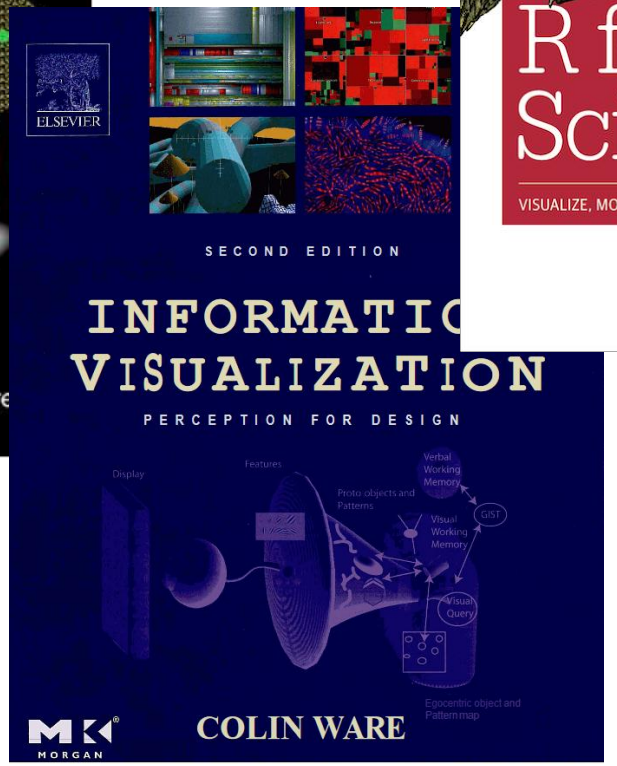
Course references

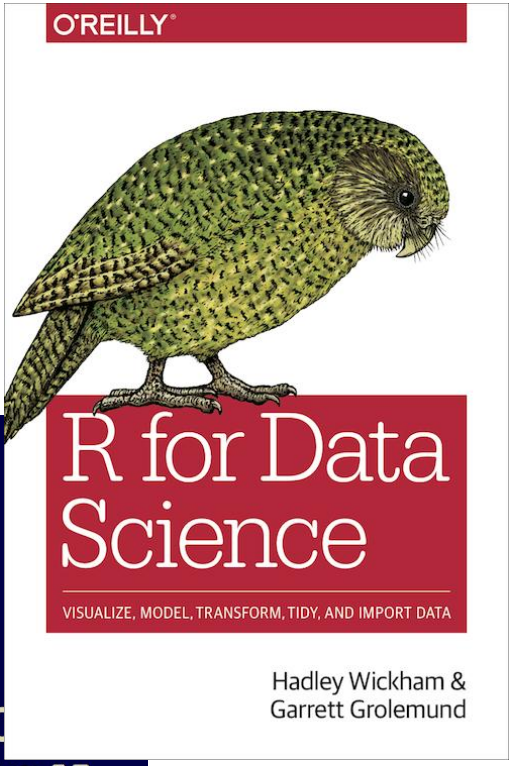
- No obligatory course book, but many to draw from









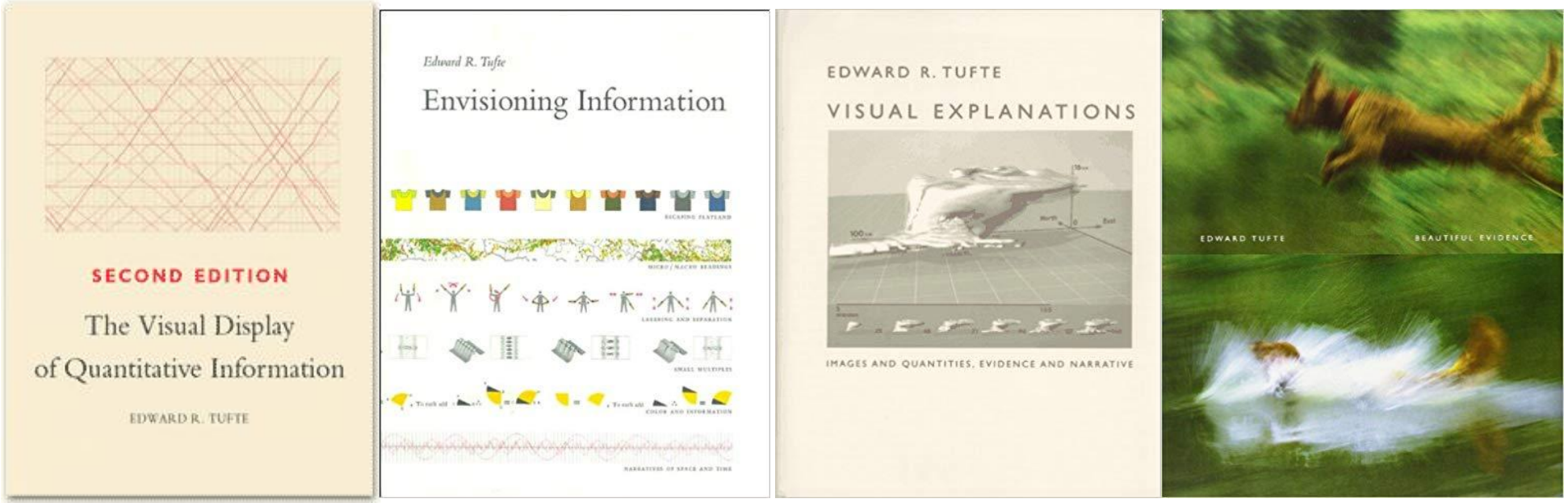


References (books)

- Bederson, B. B., & Shneiderman, B. (2003). *The Craft of Information Visualization: Readings and Reflections*. Morgan Kaufmann Publishers.
- Card, S. K., Mackinlay, J., & Shneiderman, B. (1999). *Readings in Information Visualization: Using Vision to Think*. (S. K. Card, J. Mackinlay, & B. Shneiderman, Eds.). Morgan Kaufmann.
- Munzner, T. (2014). *Visualization Analysis and Design*. CRC Press, A. K. Peters Visualization Series. Ch.1: What's Vis, and Why Do It?
- Murray, S. (2017). *Interactive Data Visualization for the Web* (2nd ed.). O'Reilly Media. https://alignedleft.com/tutorials/d3/
- Spence, R. (2014). *Information Visualization: An Introduction* (3rd Editio). Springer International Publishing Switzerland.
- Ware, C. (2013). Information Visualization: *Perception for Design* (3rd Edition). Morgan Kaufmann.
- Grolemund, G., & Wickham, H. (2017). *R for Data Science*. O'Reilly Media. Retrieved from https://r4ds.had.co.nz/

References (books)

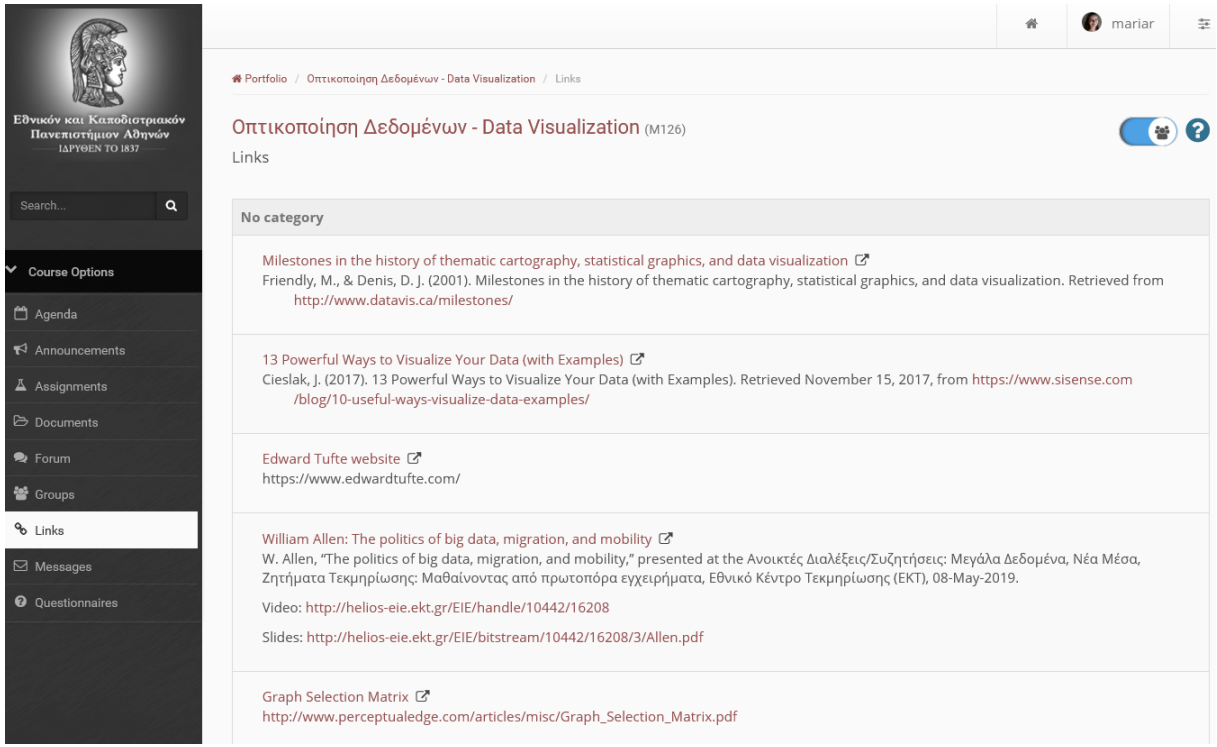
- Tufte, E. R. (2001). *The Visual Display of Quantitative Information* (2nd ed.). Graphics Press.
- Tufte, E. R. (1990). *Envisioning Information* (4th ed.). Graphics Press.
- Tufte, E. R. (1997). *Visual Explanations: Images and Quantities, Evidence and Narrative*. Graphics Press.
- Tufte, E. R. (2006). *Beautiful Evidence* (1st ed.). Graphics Press.



http://www.edwardtufte.com/tufte/

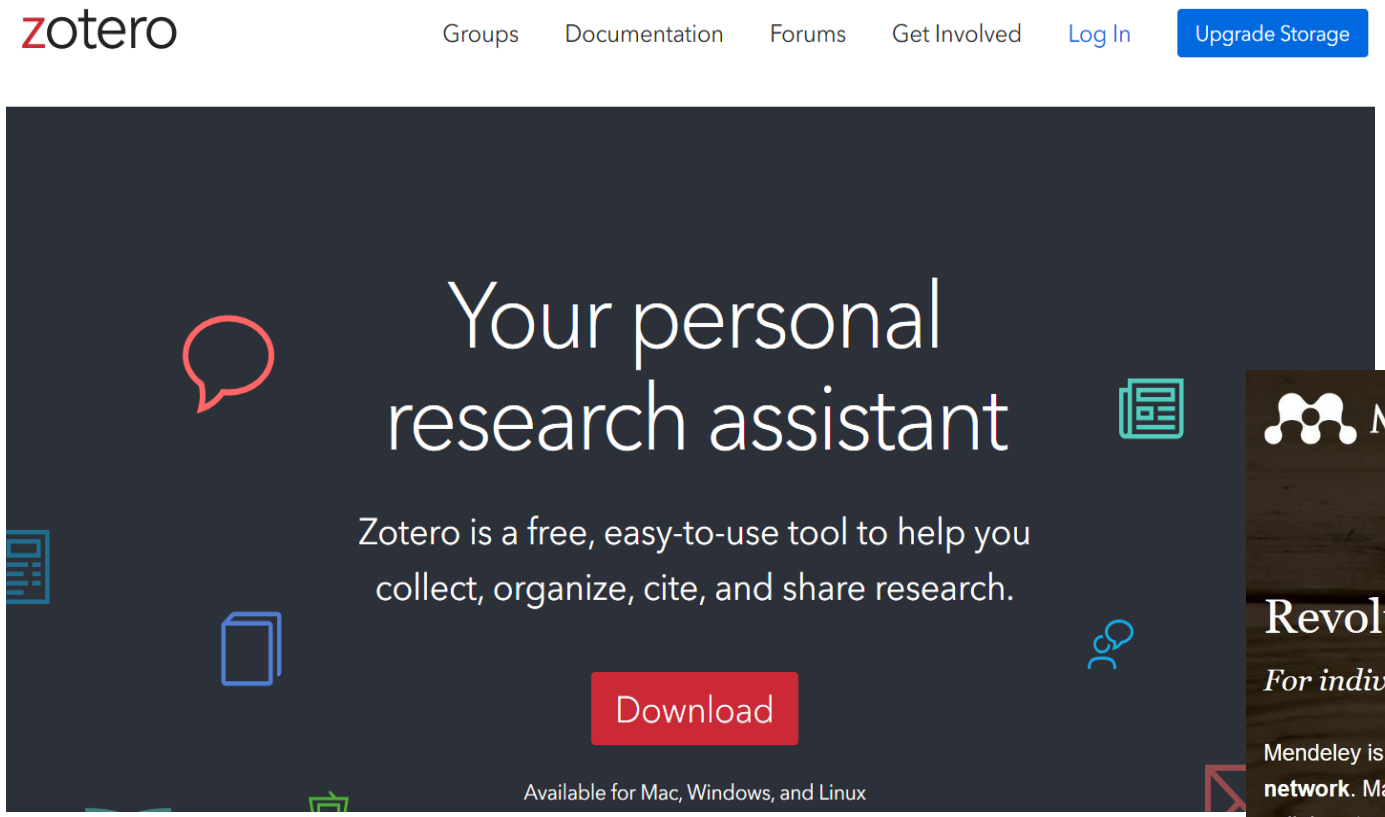
Other resources

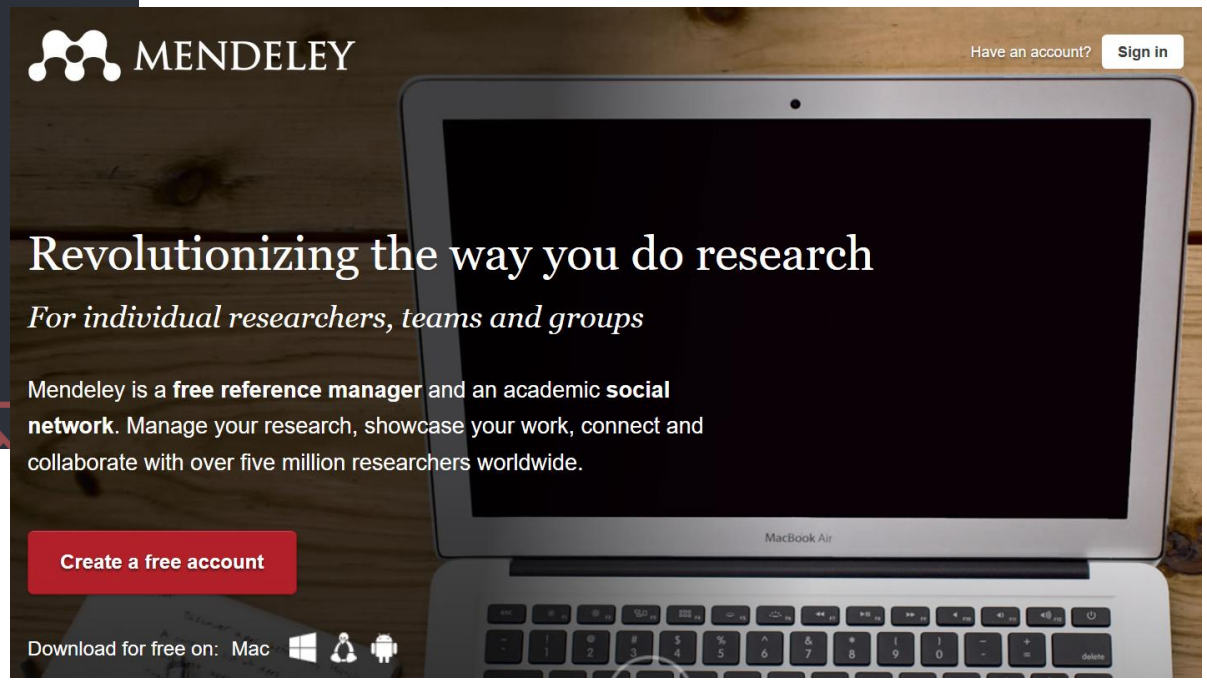
- Websites with examples (e.g., Flowing Data)
- Data / datasets (e.g., Kaggle)
- Videos (e.g., Hans Rosling's talks)
- Conferences (e.g., IEEE Vis)
- Tools (e.g., Tableau)



Course material - Get organized

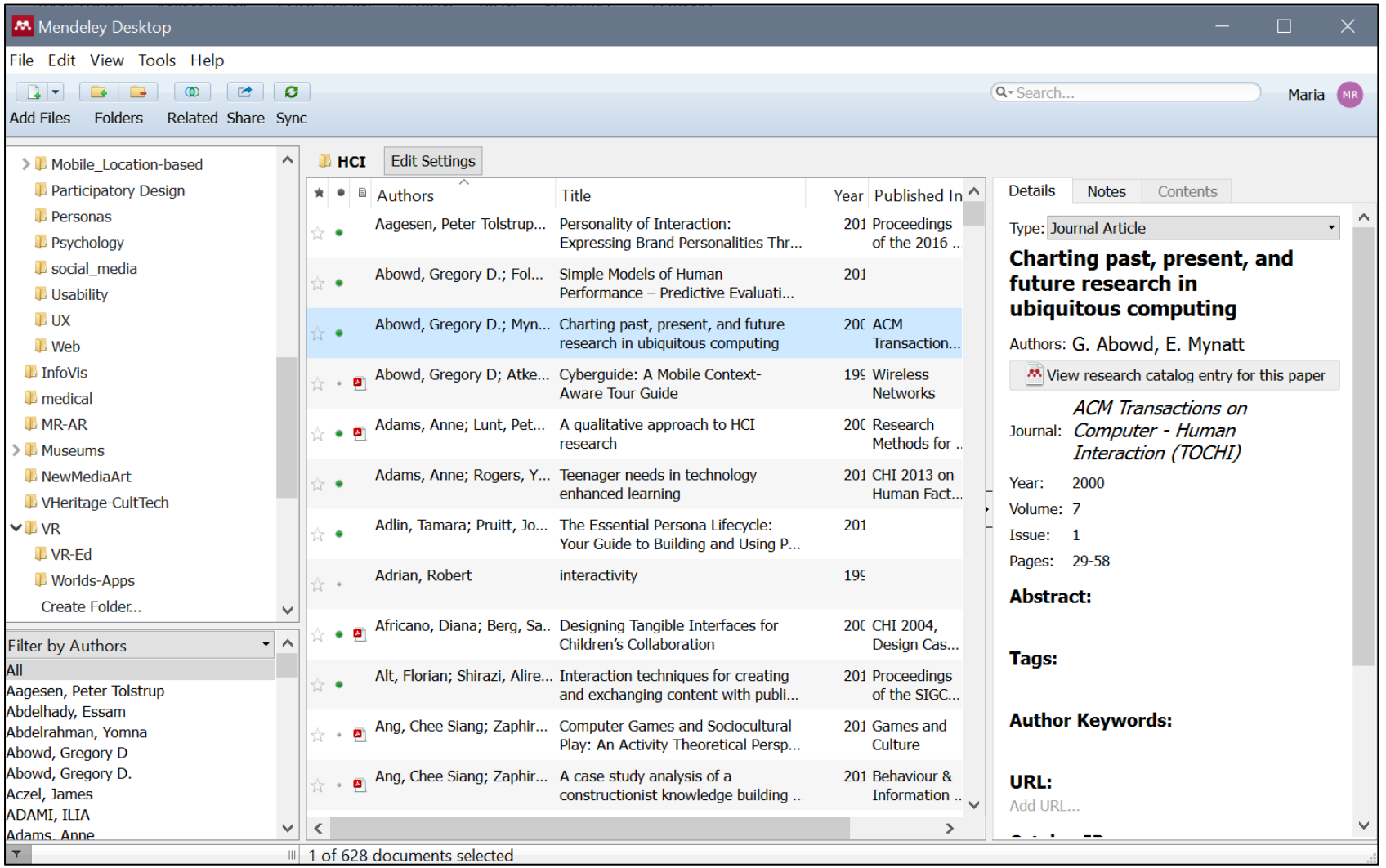
- https://www.zotero.org/, https://www.mendeley.com/





Course material - Get organized

- Get organized: example Mendeley Desktop



Course content

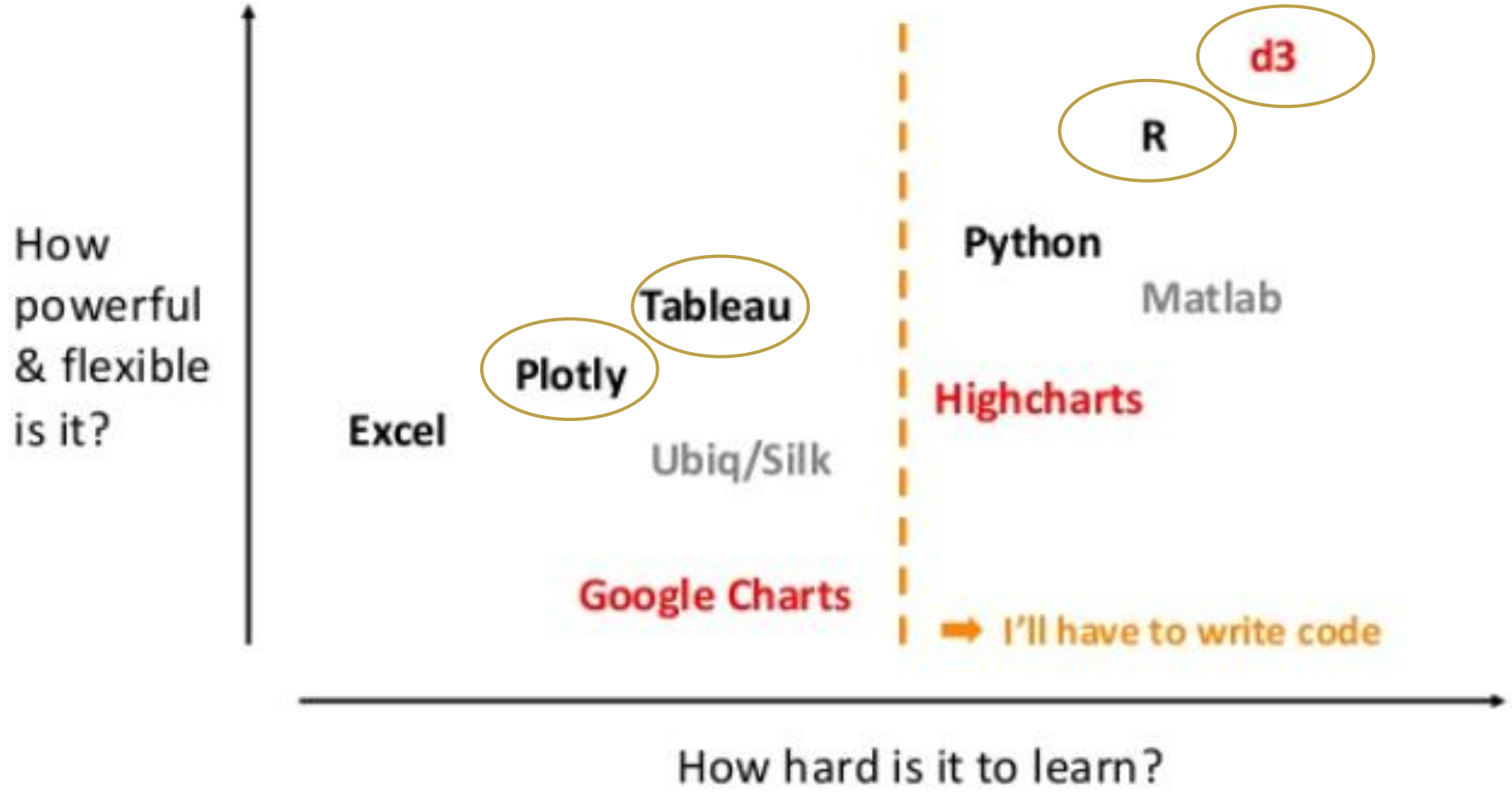
- Introduction & definitions
  - Getting-to-know-us and practicalities
  - What is DataViz and why do it
  - Examples
- Perception
  - visual channel characteristics, color, size, shape, spatial layouts, etc., how human perception relates to creating effective data visualizations
- DataViz Principles – Representation
  - Raw data & data types, representation techniques (charts, lines, etc.)
- Presentation
  - Scrolling, flipping, context and detail, focus, zooming, etc.
- Interaction
  - Dynamic queries, Direct walk, Details-on-demand, Brushing, etc.

Course content

- Visualization Tools
  - (~~Excel~~)
  - Tableau
  - R (using tidyverse which incudes ggplot, Shiny…)
  - D3 (via Observable)
  - (~~Python~~)

Course content

- Visualization Tools



Course content

- What is data visualization?
- What are the main purposes of data visualization?
- What are the major advantages of data visualization?
- What are the criteria of good visualizations?
- What kind of strengths of human visual system we should exploit for data visualization?
- What kind of weaknesses of human visual system we should avoid for data visualization?

What this course is NOT about

- It is not a graphic design course
- It is not a course to learn tools

but

- Exposure to a number of visual design concepts & tools
- Support by experts

Assignments

- ~Week **3**: individual assignment (Html5, CSS,…)
- ~Week **7**: individual assignment (Tableau)
- ~Week **9**: individual assignment (*tbd*, R)
- ~Week **11**: individual assignment (*tbd*, D3)

- ~Week **13**: Final Project Presentation
- ~Week **16**: Project documentation

(see eClass agenda for due dates)

Group Project

- To visualize effectively a dataset

- Main phases of work:
  - Conceptualization - design
  - Implementation
  - Presentation (& documentation)

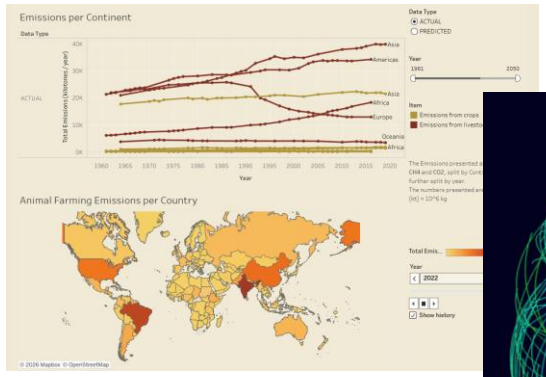
  - All previous group projects:

https://tinyurl.com/m126-projects

Final Group Projects 2023-2024

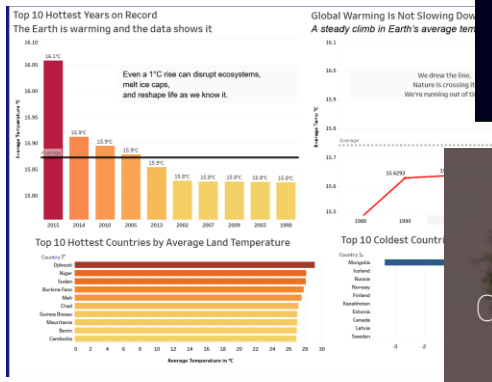
- 2024-2025 Group projects https://tinyurl.com/m126-2025

1. **Visualizing Quantitative Country Clusters**
   https://geoleven.github.io/datavizwinteam/alt/



2. **The true cost of Factory Farming**
   https://vis.sftportal.eu/

3. **Global Cybersecurity Threats**
   https://panagiotagyft.github.io/cyber-threats/



4. **Climate Change**
   https://dataviz540.wixsite.com/climate-change

5. **Exploring HPV and Cervical Cancer Trends Worldwide and in the EU**
   https://sites.google.com/view/hpvandcervicalcancer/home

Final Group Projects 2023-2024

- 2023-2024 Group projects https://t.ly/4b3G3

1. **Visualizing Spotify Music Streaming Trends**
   https://spotifyviz.vercel.app/

2. **MobiliCity**
   https://eirkyr.github.io/MobiliCity/

3. **«Are we done with Airbnb yet? Alternative: Rents VS Airbnb, FIGHT!»**
   https://m126-visualizations-project.000webhostapp.com/M126-Template/

4. **Visualizing the Environmental Impact of Electric Vehicles**
   https://wheelygoodair.ovh/

5. **Visualizing Economic Indicators for Global Education (Connecting Education & Finance)**
   https://evankos.netlify.app/

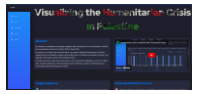
6. **Visualizing Athens Airbnb Trends Insights for Hosts and Travelers**
   https://sophiaross26.github.io/Airbnb-project/

7. **Visualising Greece's Demographic Downturn**
   https://kostantinostheo.github.io/vizginius/

8. **Αμβλώσεις: Οπτικοποίηση της έρευνας και των στατιστικών στοιχείων για τις αμβλώσεις**
   https://nikpnevmatikos.github.io/Data-Visualization-Abortion-Laws/

9. **Wanna EU Relocate?**
   https://nikoletos-k.github.io/Wanna-EU-Relocate-DataViz-2024/

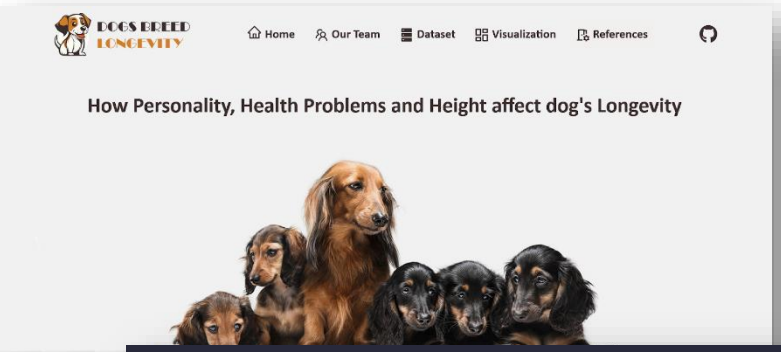
10. **Visualizing the Humanitarian Crisis in Palestine**
    https://zazos.github.io/DataViz-website

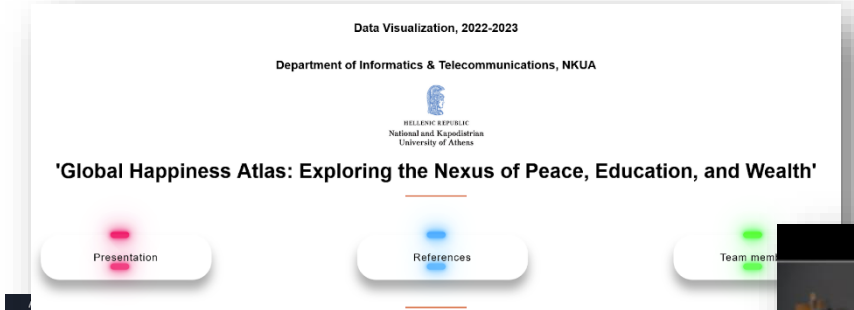


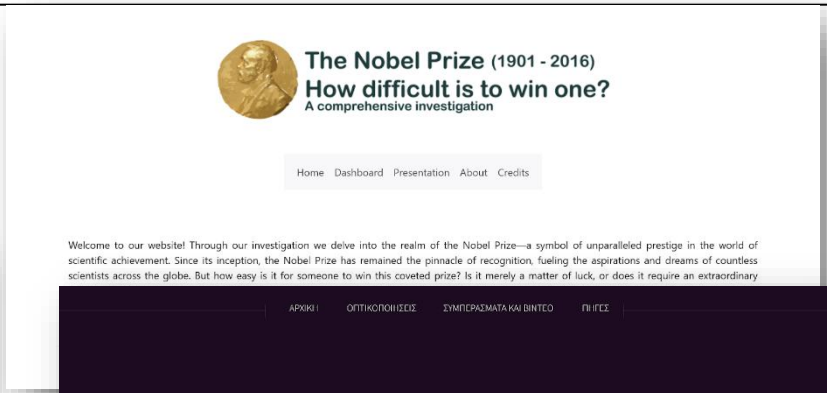
11. **Talk is cheap; show me the code**
    https://jimtsiob.github.io/data-viz-comp-prog/

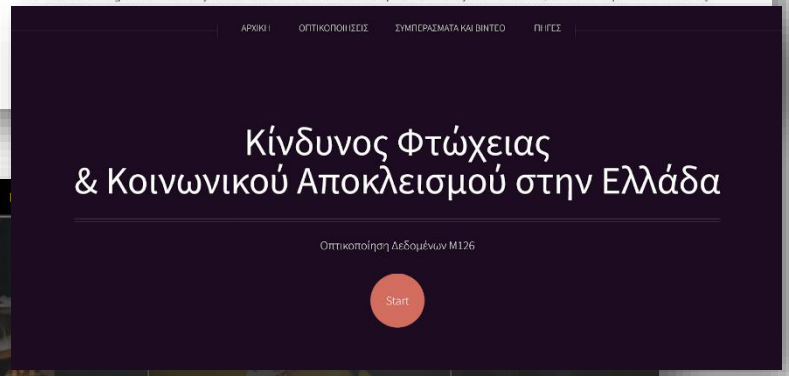
Final Group Projects 2022-2023

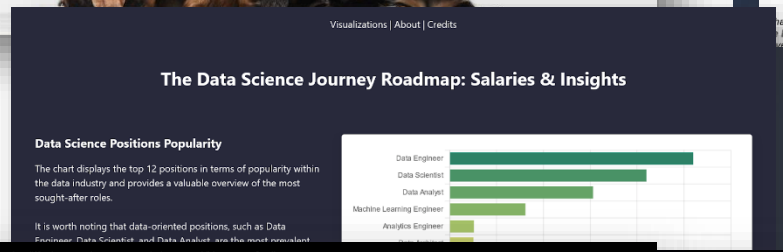
- 2022-2023 Group projects
  https://tinyurl.com/m126-2023

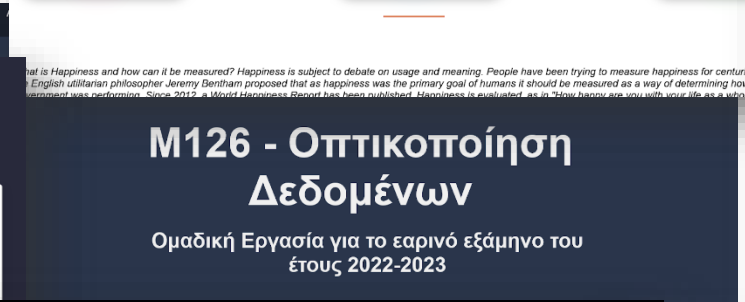


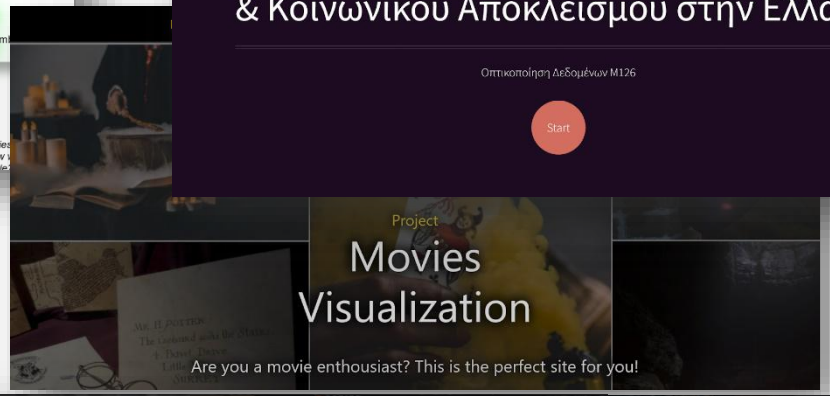


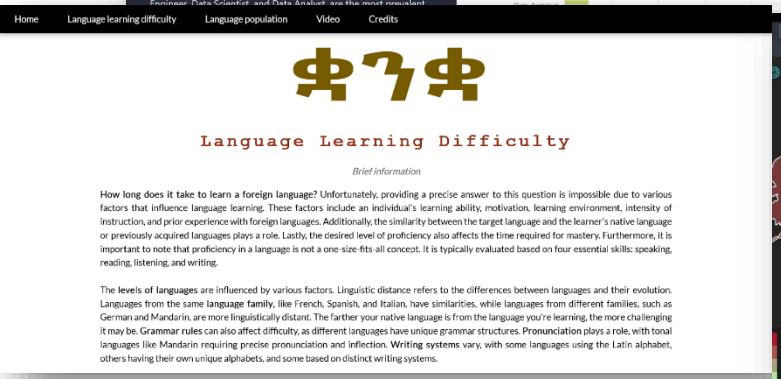


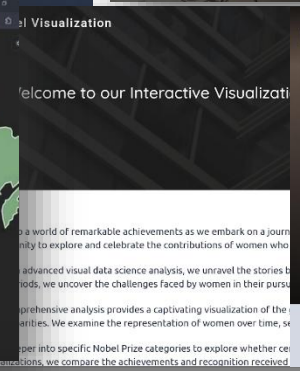


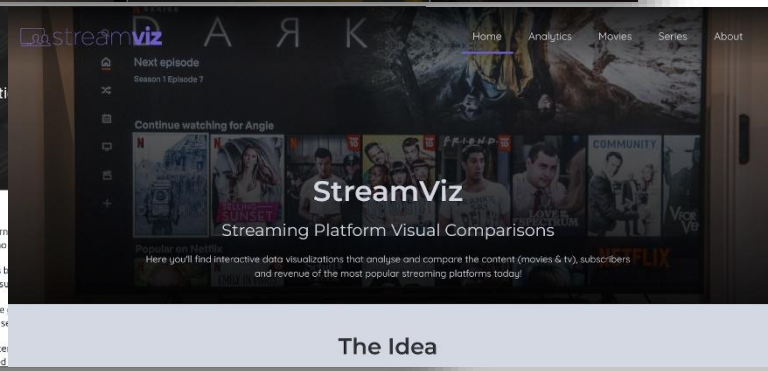






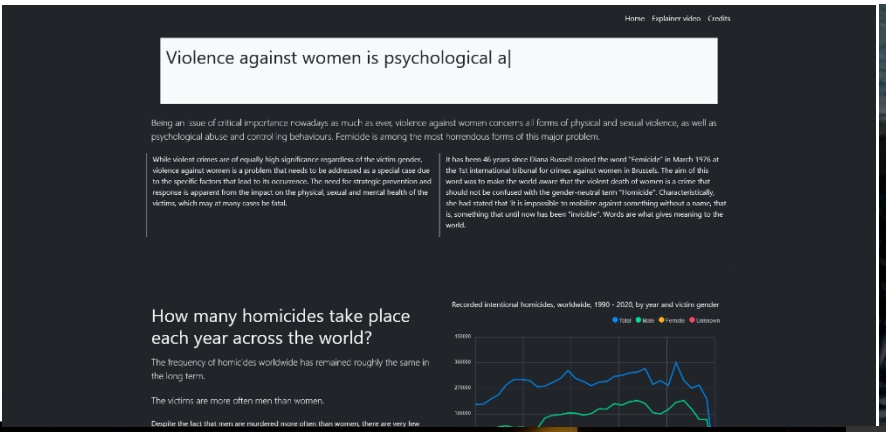


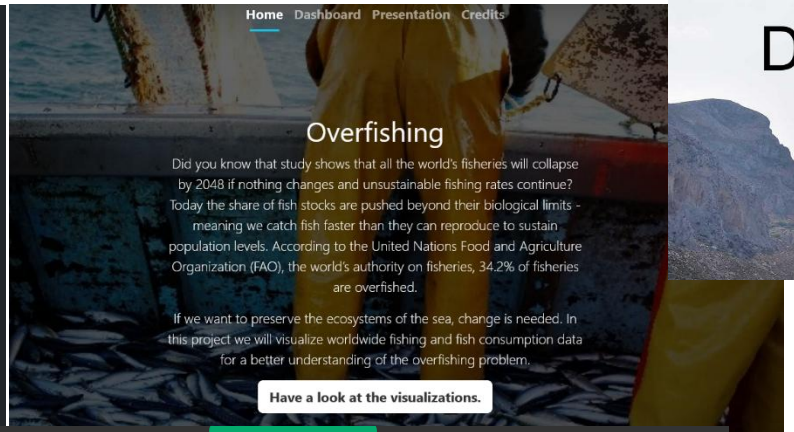


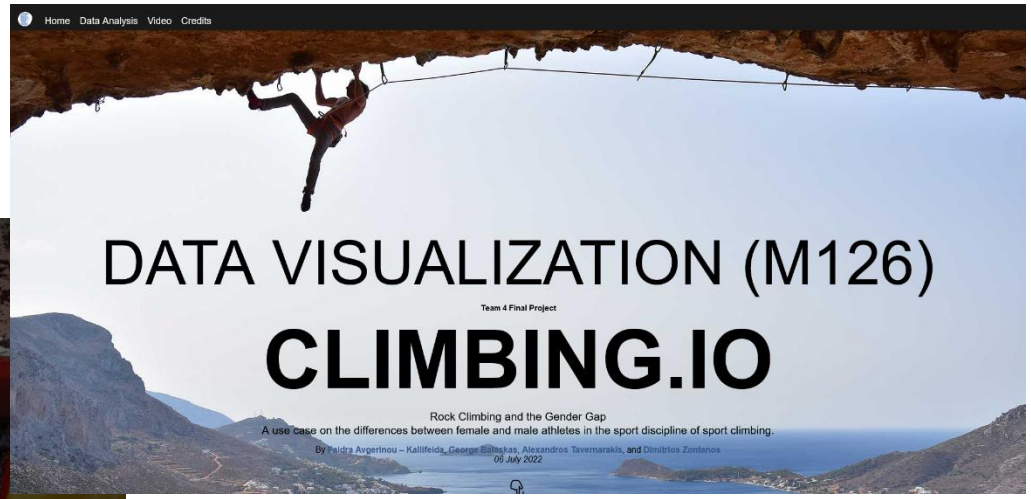


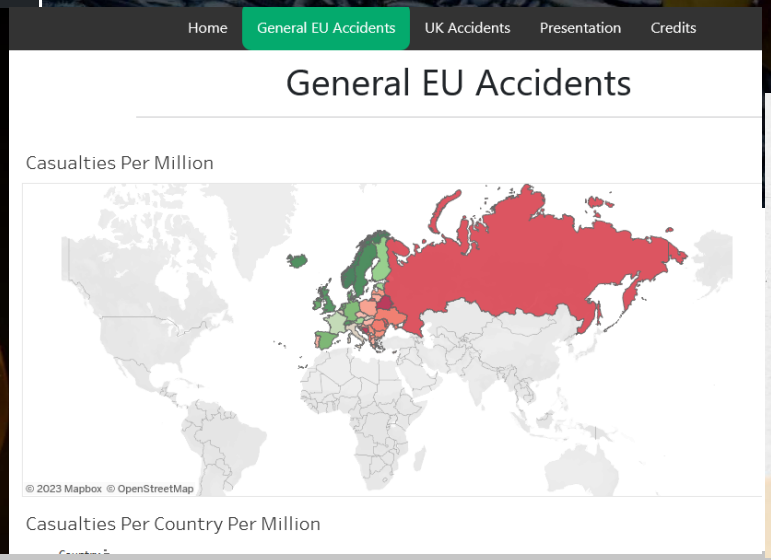
Final Group Projects 2022-2023

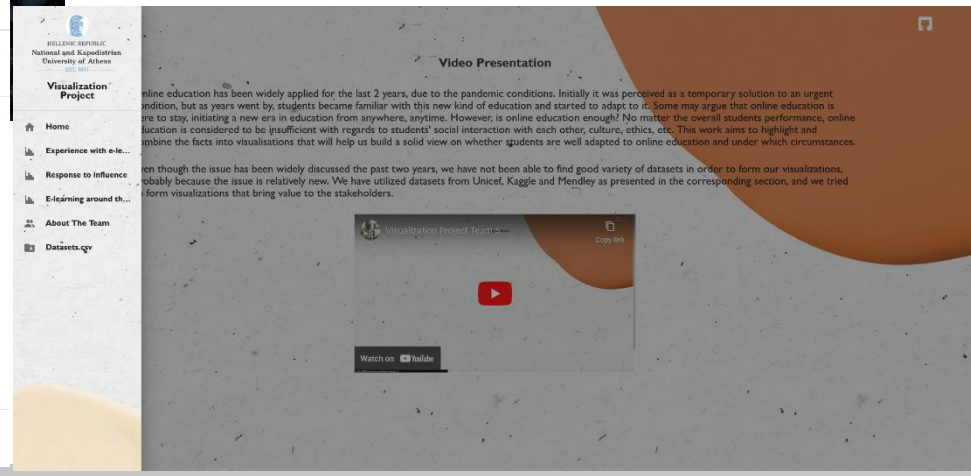
- 2021-2022 Group projects
  https://tinyurl.com/328sxwe7





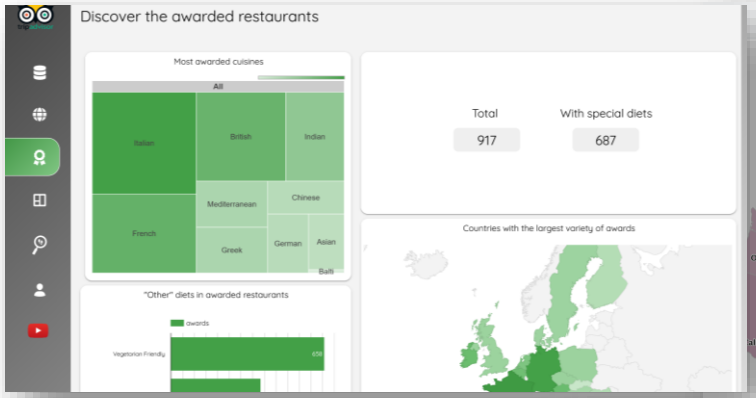


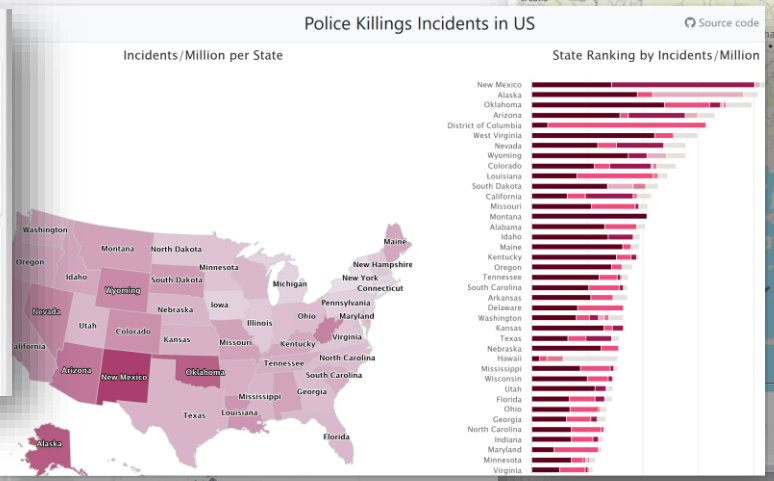


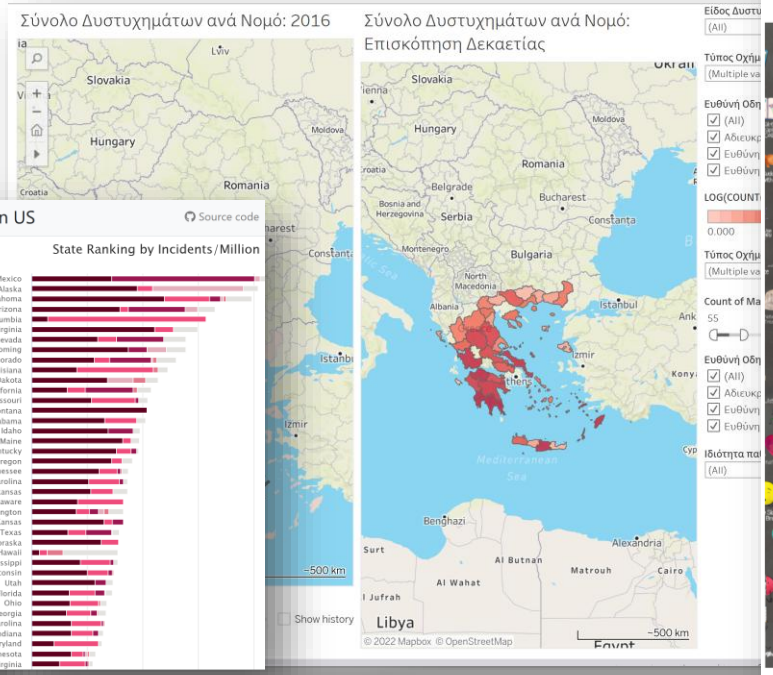


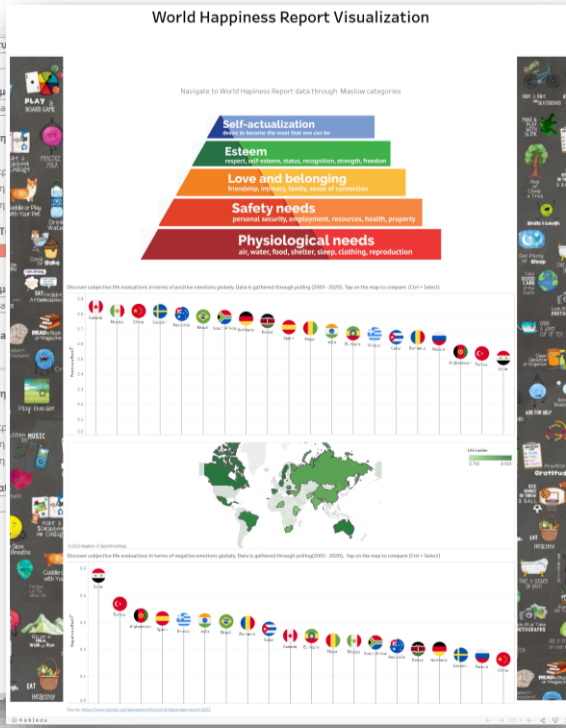
Final Group Projects 2020-2021

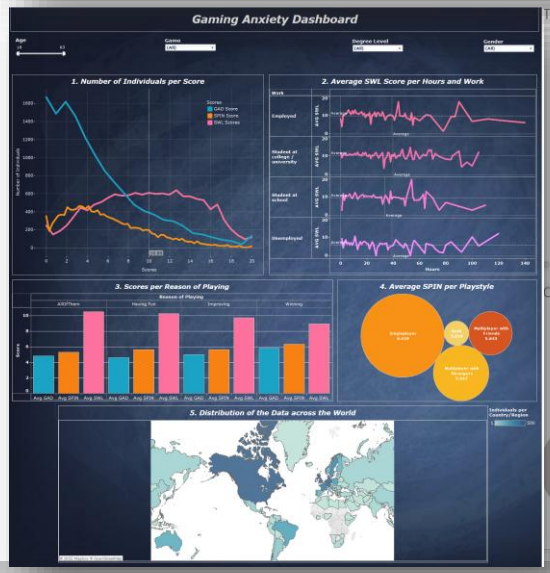
- 2020-2021 Group projects
  https://tinyurl.com/8tr3xms5

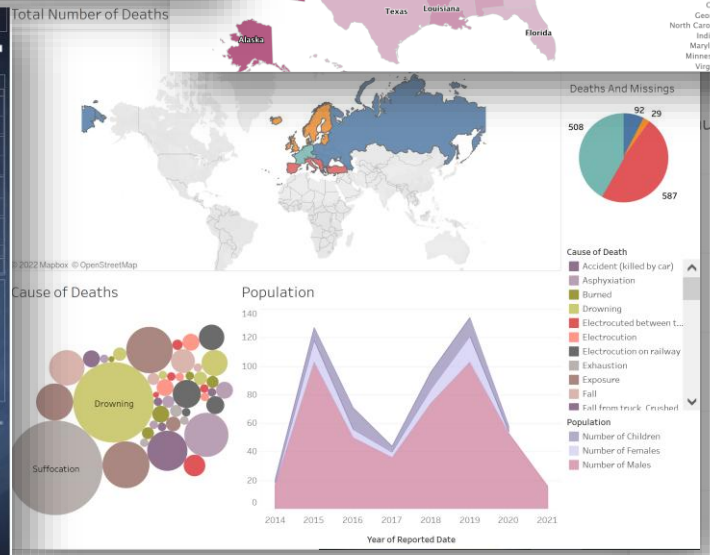


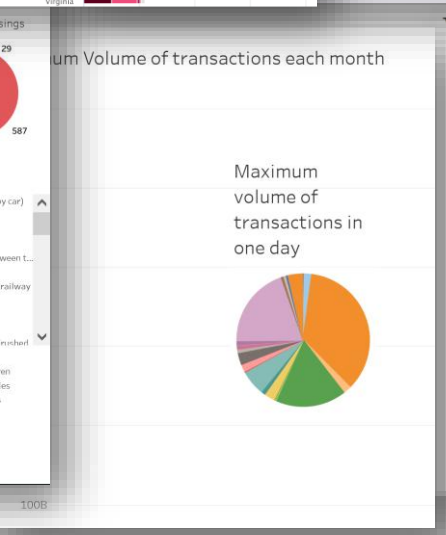


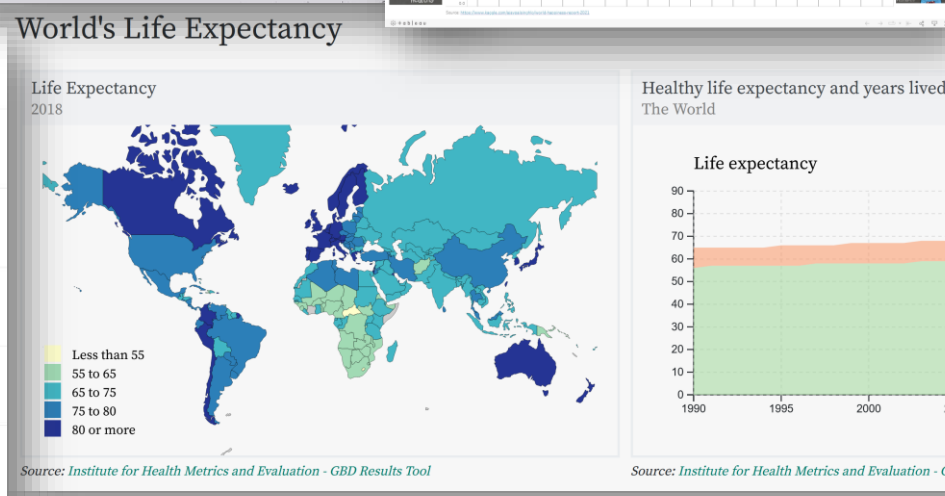












Final Group Projects 2020-2021

1. Restaurants in Europe: A Visualization Analysis
Site: https://datastudio.google.com/u/0/reporting/d9941ae3-5460-43d1-ae10-4db6416db2a3/page/3nn6B
Video: https://youtu.be/PtcYpt6As1Y

2. **Cryptocurrencies**
Site: https://datavisualisation2021.github.io/Cryptocurrency/
Video: https://datavisualisation2021.github.io/Cryptocurrency/credits.html

3. **Εξαφάνιση Προσφυγικών Ροών 2014-2021**
Site: https://elenapashali.github.io/DataProjectGroup3/
Video: https://youtu.be/uJANgP5s41o

4. **Οδική Ασφάλεια**
Site**:** http://users.uoa.gr/~ic1200016/m126/index.html

Final Group Projects 2020-2021

5. **World Happiness Report Visualization**
Site**:** https://ippokratoys.github.io/world-life-happiness-visualization/
Video: https://youtu.be/Mizq_obRqvY

6. **GamingAnxiety**
Site**:** https://mikemitsios.github.io/Gaming_Anxiety/index.html
Video: https://www.youtube.com/watch?v=taYprdbYI0E

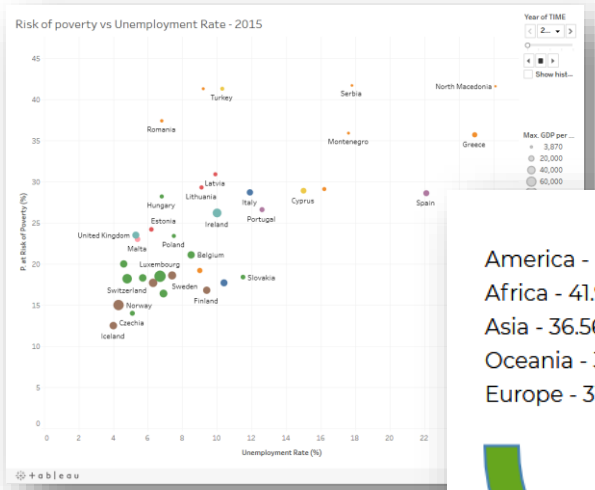
7. **World's Life Expectancy**
Site: https://lefkothea-bianca.github.io/Data-Visualization-Project.github.io/
Video: https://youtu.be/QKzmGfvBxus

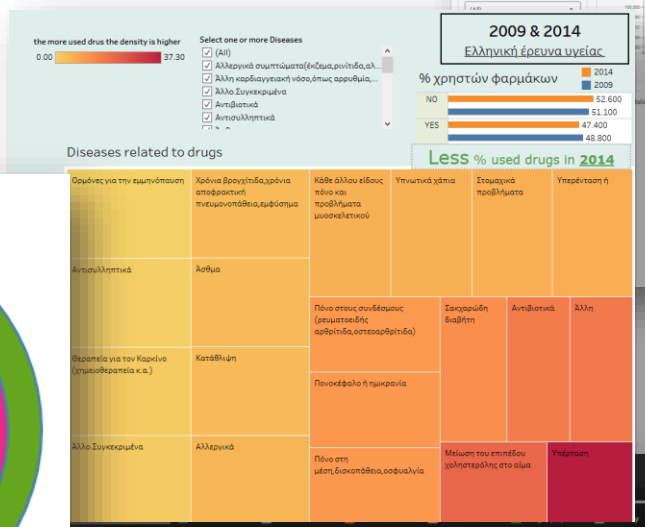
8. **Police Killings Incidents in US**
Site**:** https://jbalasis.github.io/dataVisualization/dashboard
Video: https://jbalasis.github.io/dataVisualization/video

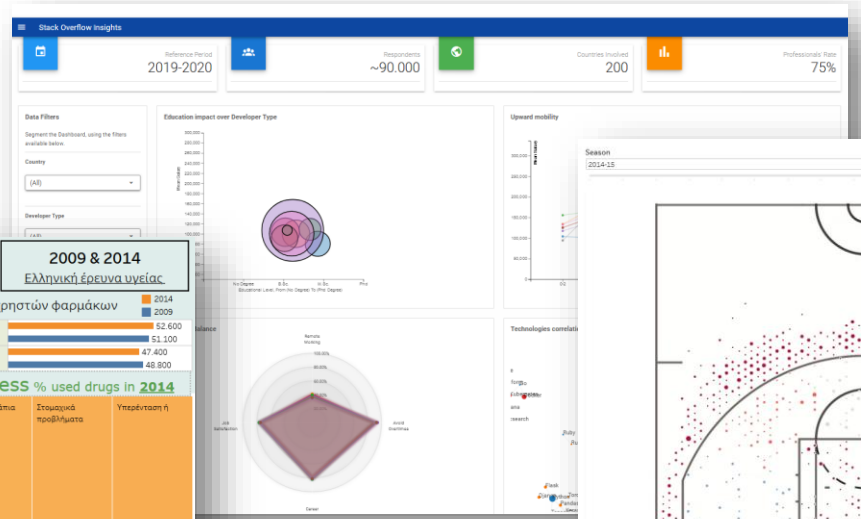
9. **Students' Performance**
Site: https://app.powerbi.com/groups/me/apps/cc52c2b9-b854-42b1-99cf-f873e3d6c20c/reports/34c779d7-9c5b-42a2-b0b8-847e33c6fc03/ReportSection
Video: https://drive.google.com/file/d/13RX7_iuDjaj9Ek0DpQ2CzOJb_PytmSTP/view

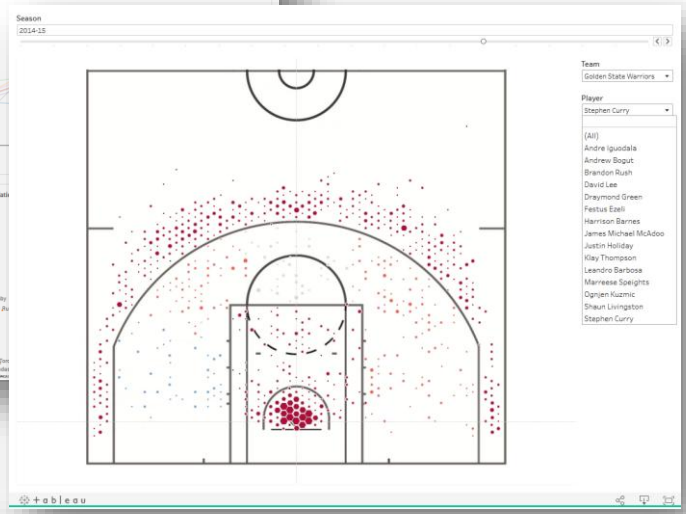
Final Group Projects 2019-2020

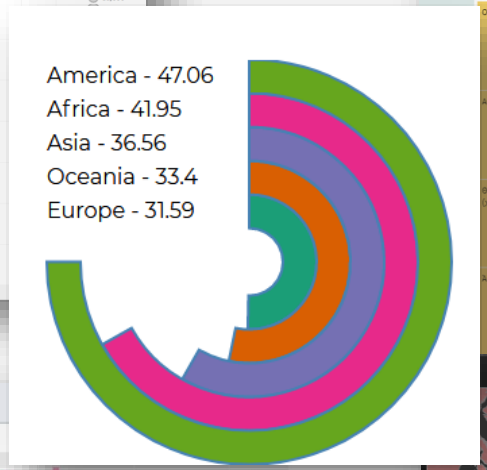
- 2019-2020 Group projects
  https://tinyurl.com/y76394h2

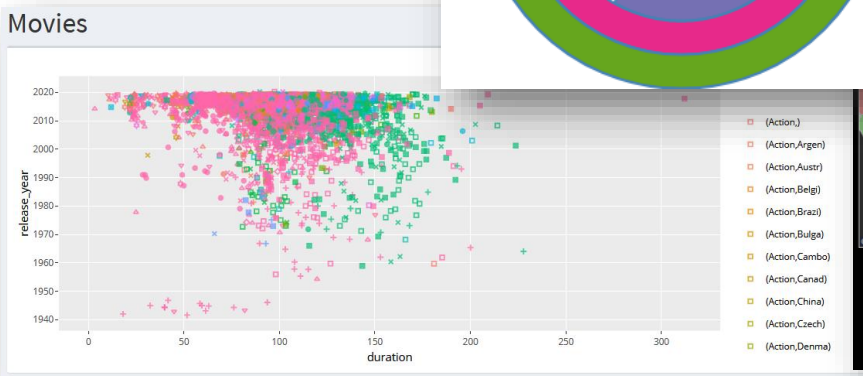


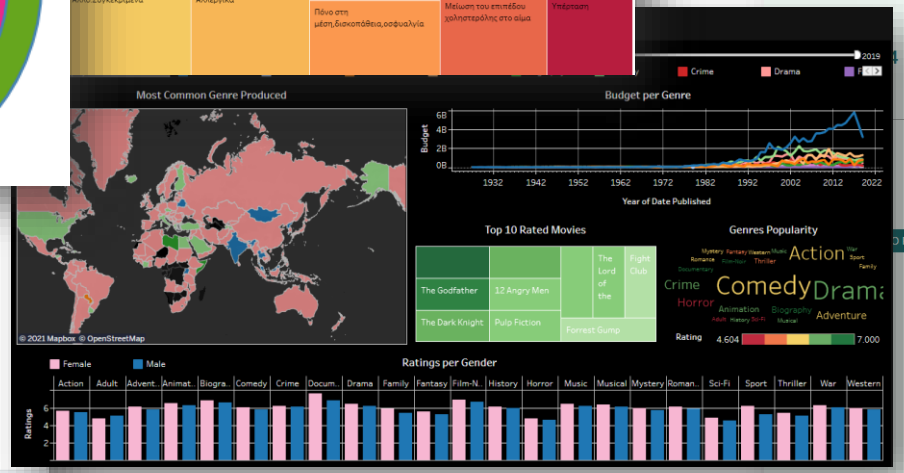


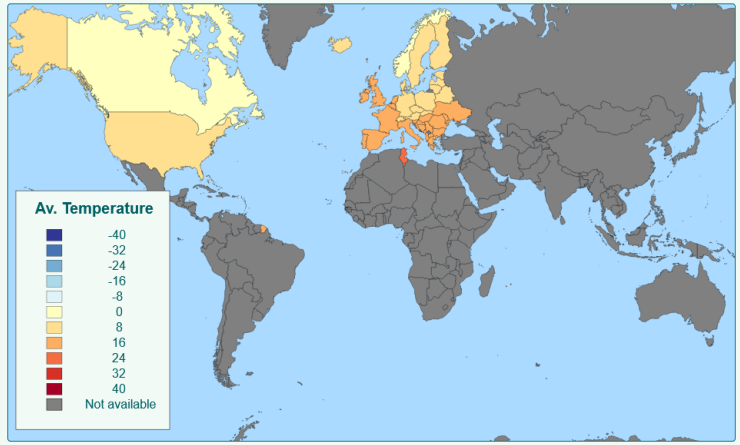












Final Group Projects 2019-2020 (1/2)

1. Health data visualizations in Greece

Site: https://vnansi.github.io/dashboardabouthealth

Video: https://youtu.be/_qVkE7krq5I

2. Netflix Data Visualisation

Site: https://kleanthi7.shinyapps.io/NetflixDataVisualisation

Video: https://www.kapwing.com/videos/5f0b66a3dce446001502e5c8

3. The Big Screen Visualization

Site: https://xkitsios.github.io/DataVizProject/

Video: https://youtu.be/7j08kc5-c6E

Final Group Projects 2019-2020 (1/2)

4. NBA Shot Evolution

Site: https://in7ictus.github.io/m126/

Video: https://github.com/in7ictus/m126/blob/master/assets/presentation.mp4

5. Stack Overflow Insights

Site: https://stackoverflow-viz-app.github.io/stackoverflow-developers-insights/

Video: https://youtu.be/wSOmzuOE2eA

6. World Income inequality

Site: https://income-inequality-dv.herokuapp.com/dashboard

Video: https://income-inequality-dv.herokuapp.com/video

Final Group Projects 2019-2020 (2/2)

7. Social Inequalities between EU students

Site: https://jvardas.github.io/group-7-dataviz/

Video: https://vimeo.com/437672319

8. Movie Data Visualization

Site: http://83.212.107.231/#main_dashboard_graphs

Video: https://www.dropbox.com/s/kp6ia864v0yydbp/2020-07-12%2018-49-15.mkv?dl=0

9. Global Warming

Site: https://kostis30fyllou.github.io/climate-change/

Video: https://www.youtube.com/watch?v=OwR-5u2MhfI&feature=youtu.be

- See
  “The Role of Big Data Visualization in an Era of Pandemics”
  Open Conference, November 2020
  https://youtu.be/xP257qHKcME

Data Visualization: What and why?

Individual

Assignment #1

Thank you!

mroussou@di.uoa.gr

https://eclass.uoa.gr/courses/DI453/

Discord: https://tinyurl.com/m126-discord-26