



Data Visualization

Introduction

We use the English language in all written material



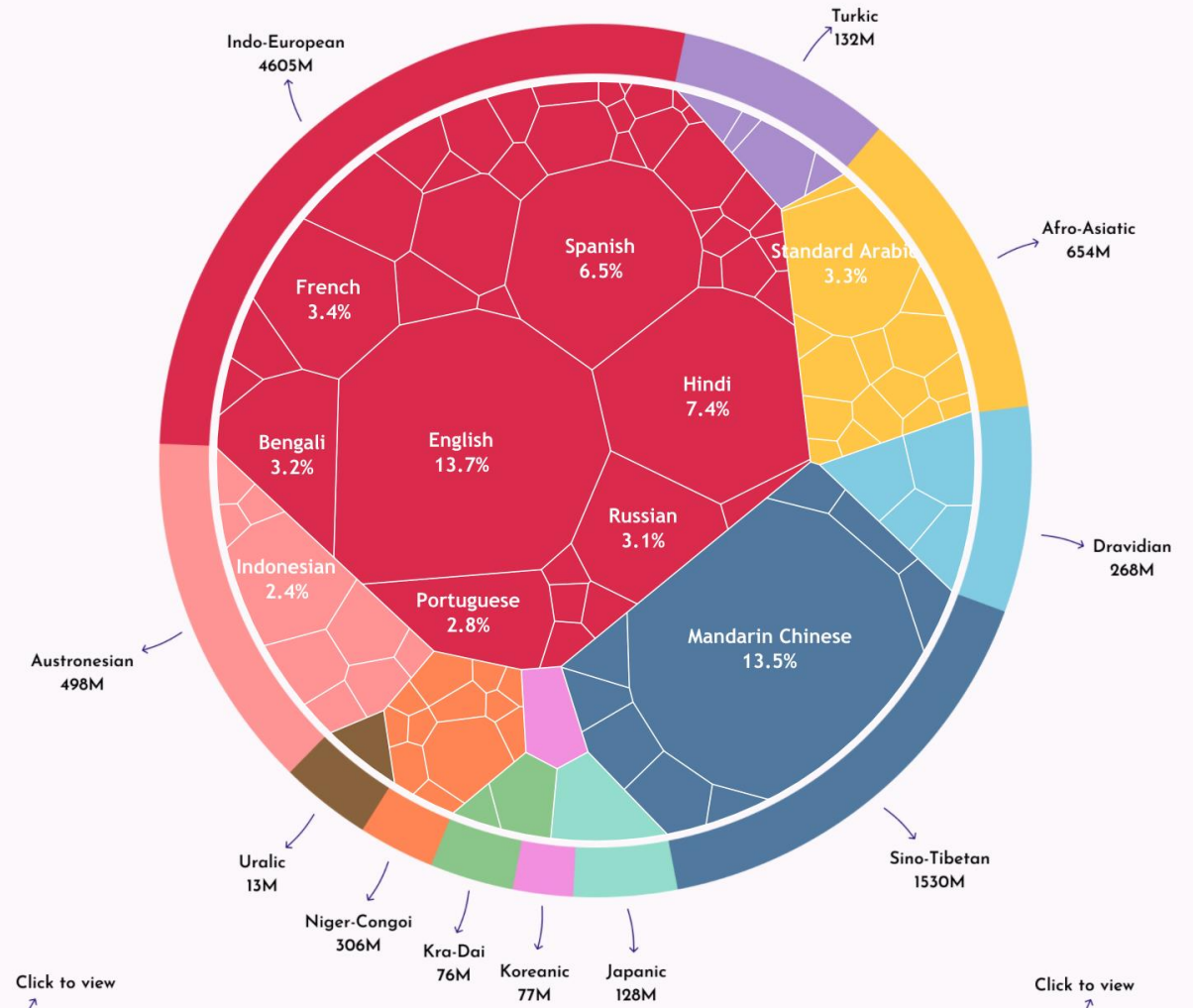
Some practicalities

Our spoken language will be defined according to necessity and preference

100 Most Spoken Languages Around The World

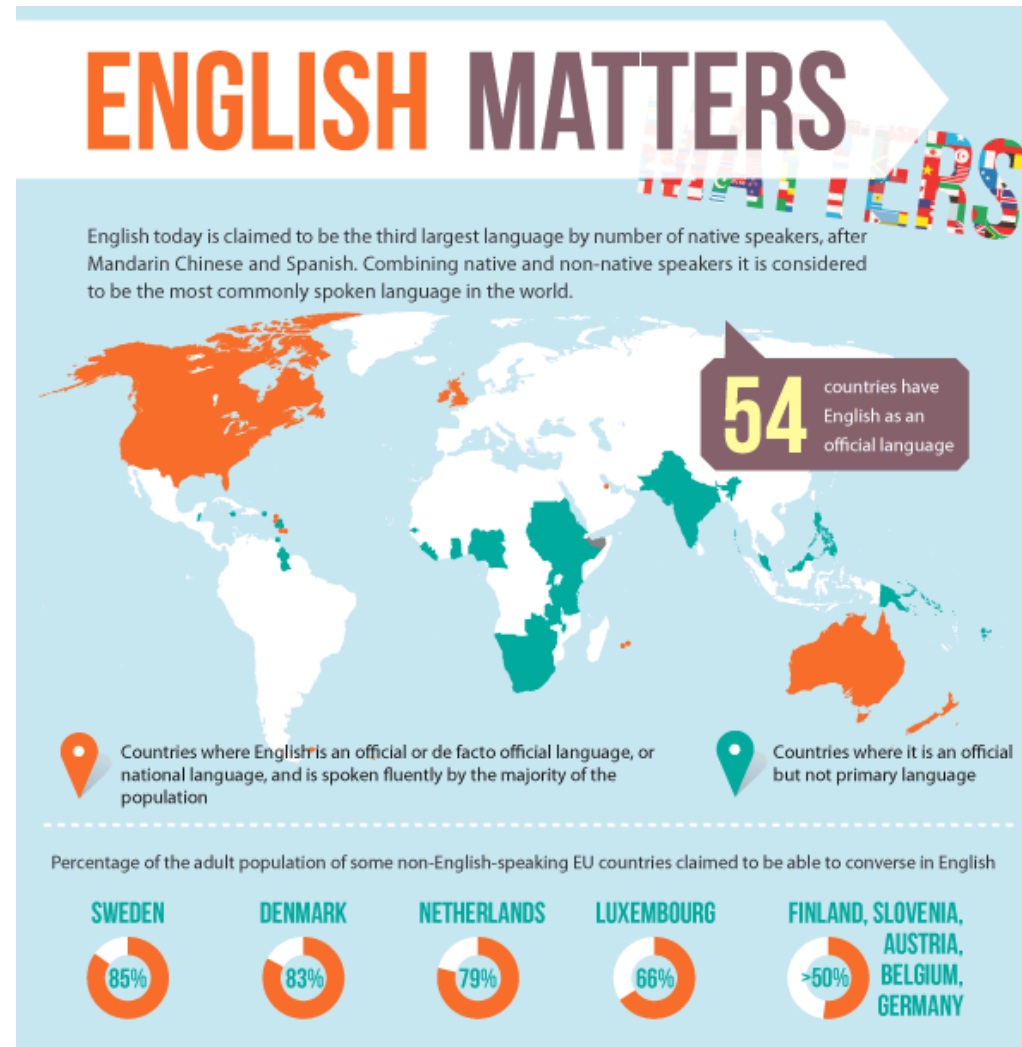
Around the world, there are more than 7,000 regularly spoken vernaculars. Here's the 100 most spoken languages in the world, the number of total speakers for each language, and the origin tree that each language has branched out from.

The data comes from the 22nd edition of Ethnologue, a database covering a majority of the world's population, detailing approximately 7,111 living languages in existence today. The data was published on February 15, 2020.



Some practicalities

We use the English language



Some practicalities

- E-mail: mrroussou@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/>

The screenshot shows the Eclass interface for the course 'Optikopoíηση Δεδομένων - Data Visualization' (M126) by Maria Roussou. The left sidebar contains the University of Athens logo and a search bar, followed by a 'Course Options' menu with links to Agenda, Announcements, Assignments, Documents, Forum, Groups, Links, Messages, and Questionnaires. The main content area features a 'Portfolio' header, the course title, and a 'Description' section. The description includes a circular visualization of research lab publications and a grid of various chart types. Below the description is a 'Calendar' for February 2021 and an 'Announcements' section with a message about the course.

Εθνικόν και Καποδιστριακόν
Πανεπιστήμιον Ἀθηνῶν
— ΙΔΡΥΘΕΝ ΤΟ 1837 —

Search...

▼ Course Options

- Agenda
- Announcements
- Assignments
- Documents
- Forum
- Groups
- Links
- Messages
- Questionnaires

Portfolio / Οπτικοποίηση Δεδομένων - Data Visualization

Οπτικοποίηση Δεδομένων - Data Visualization (M126)

Μαρία Ρούσσου

Description

Publications of Research Labs per year

Number of dit publications per year

year

For stacked bars try
1 or more: Dimensions
1 or more: Measures

Data and information visualization is an emerging field of data science that deals with the analysis, modeling and display of data, especially big data, with the aim of effective communication and understanding by their target audience. This course will cover: the characteristics of the human brain and visual perception, imaging methods (eg line / bar / pie / area charts & graphs, scatter / bubble / polar / funnel plots, treemaps, etc.) for the visual representation of different categories of data (eg hierarchical, spatial, temporal, geographical, multidimensional, networks, etc.), interactive visualization techniques, e.g. with data conversion (Dynamic Queries, Direct Manipulation, Details-on-Demand, etc.), with visual mapping (Dataflow, Pivot tables, etc.), with facet conversion (Animate Shift of Focus, Overview & detail, Semantic Zoom, Magic lens, etc.), communication issues and the creation of "telling stories with data" that effectively convey a message or information, as well as

More ↓

Calendar

February 2021

Sunday Monday Tuesday Wednesday Thursday Friday Saturday

Announcements

Έναρξη μαθημάτων M126 Οπτικοποίηση Δεδομένων και πληροφορίες...

Course agenda

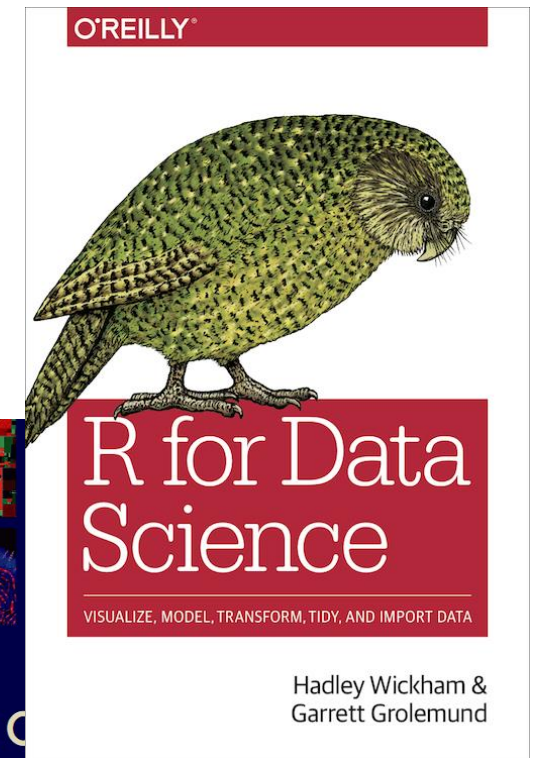
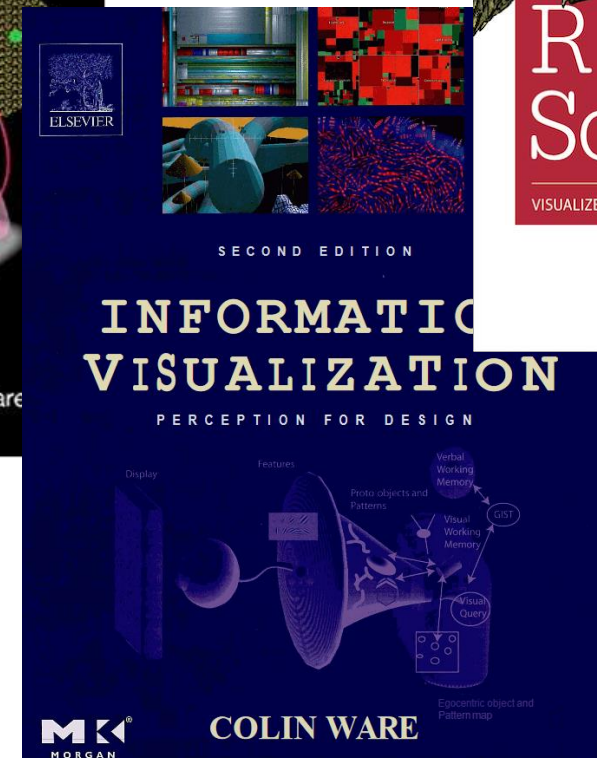
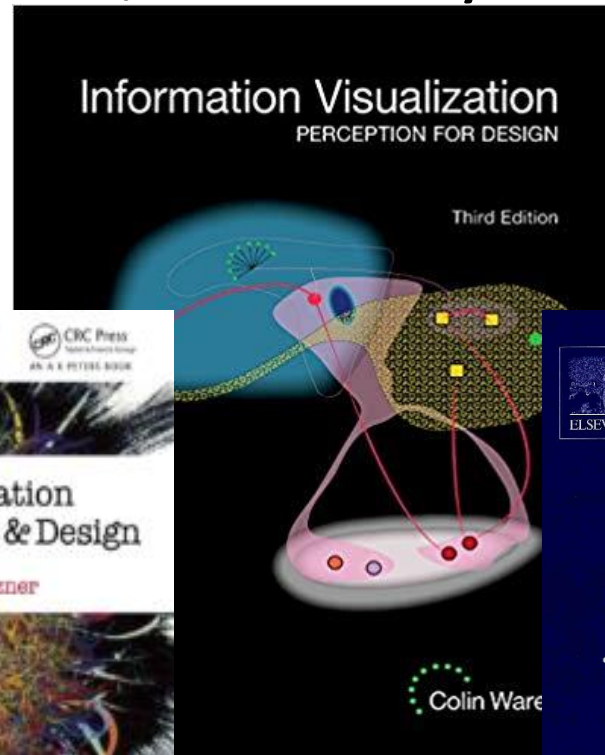
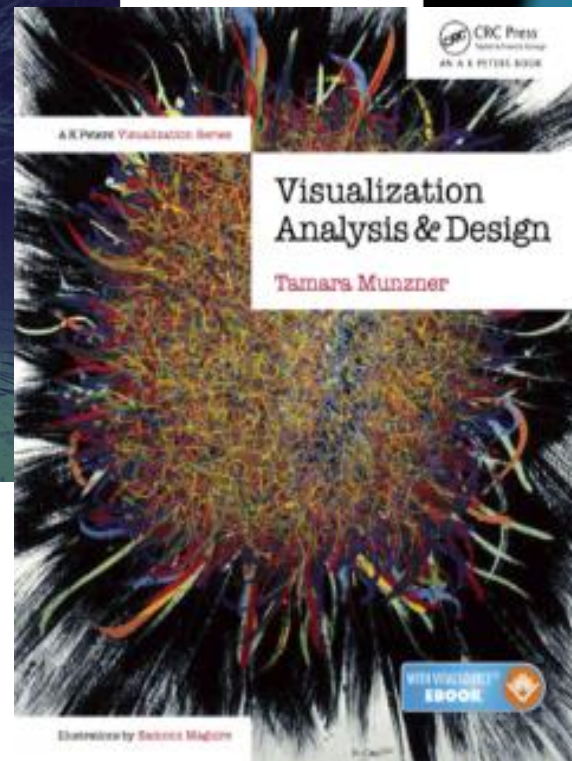
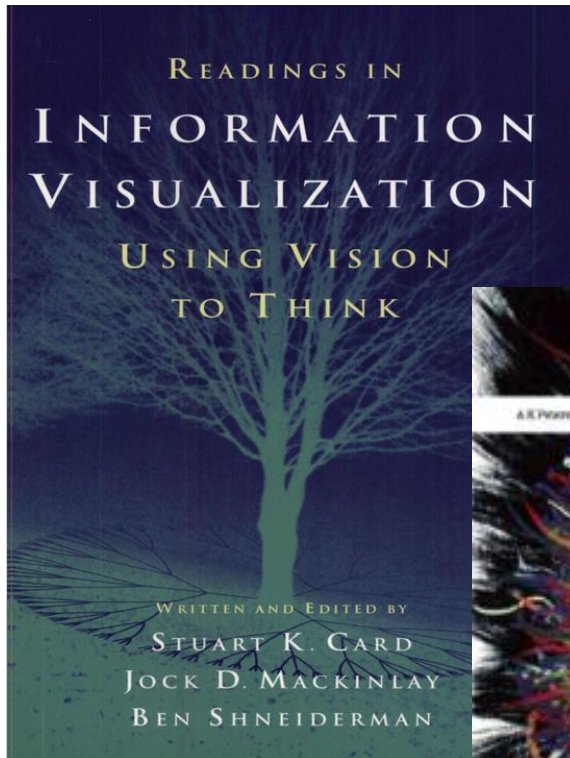
- e-class - <https://eclass.uoa.gr/courses/DI453/> > Agenda

The screenshot displays the Eclass course page for 'Οπτικοποίηση Δεδομένων - Data Visualization' (M126). The sidebar on the left includes the university logo, a search bar, and a 'Course Options' menu with links to Agenda, Announcements, Assignments, Documents, Forum, Groups, Links, Messages, and Questionnaires. The main content area shows the course title and a 'Calendar view' button. The agenda is organized by month, with entries for July, May, April, and March 2022. Each entry includes a course activity name, its duration, and the scheduled date and time.

Month	Activity	Duration	Date & Time
July 2022	[13] Final Group project presentations - Παρουσιάσεις εργασιών	3:00 hours	Friday July 1, 2022 (hour: 18:00)
May 2022	[12] Data Viz tools (D3)	3:00 hours	Wednesday May 25, 2022 (hour: 18:00)
	[11] Group project proposal presentations	3:00 hours	Wednesday May 18, 2022 (hour: 18:00)
	--- [1] Data viz Group project proposal		Tuesday May 17, 2022 (hour: 23:55)
	[10] Data Viz tools (R - shiny & D3)	3:00 hours	Wednesday May 11, 2022 (hour: 18:00)
	[09] Data Viz tools (R - RStudio - ggplot2 - plotly - shiny)	3:00 hours	Wednesday May 4, 2022 (hour: 18:00)
April 2022	[08] Interaction (cont'd) & assignment #2 presentations	3:00 hours	Wednesday April 13, 2022 (hour: 18:00)
	--- [1] assignment #2 - dataset visualization using Tableau		Sunday April 10, 2022 (hour: 23:55)
	[07] VR Interaction	3:00 hours	Wednesday April 6, 2022 (hour: 18:00)
March 2022	[06] Representation (cont'd)	3:00 hours	Wednesday March 30, 2022 (hour: 18:00)
	[05] Representation (intro) & Tableau seminar	3:00 hours	Wednesday March 23, 2022 (hour: 18:00)
	--- [1] assignment #1 - build an HTML, CSS website		Sunday March 20, 2022 (hour: 23:55)
	[04] Perception - part 2	3:00 hours	Wednesday March 16, 2022 (hour: 18:00)
	[03] Perception - part 1	3:00 hours	Wednesday March 9, 2022 (hour: 18:00)
	[02] What is Visualization and Why	3:00 hours	

Course references

- No obligatory course book, but many to draw from

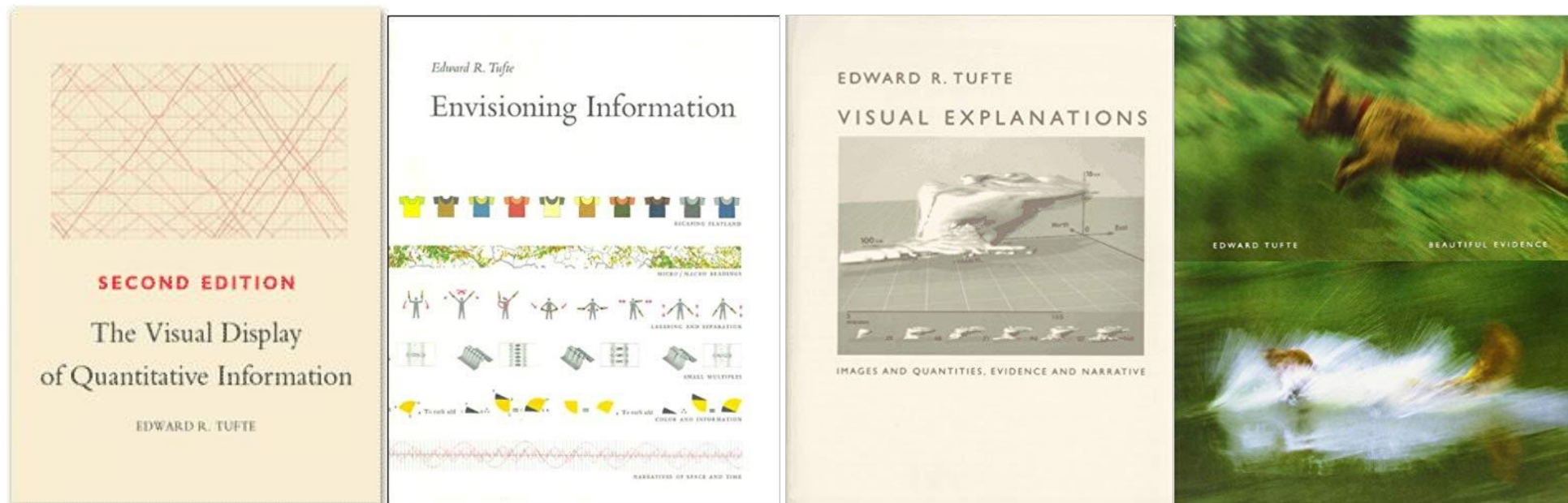


References (books)

- 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)

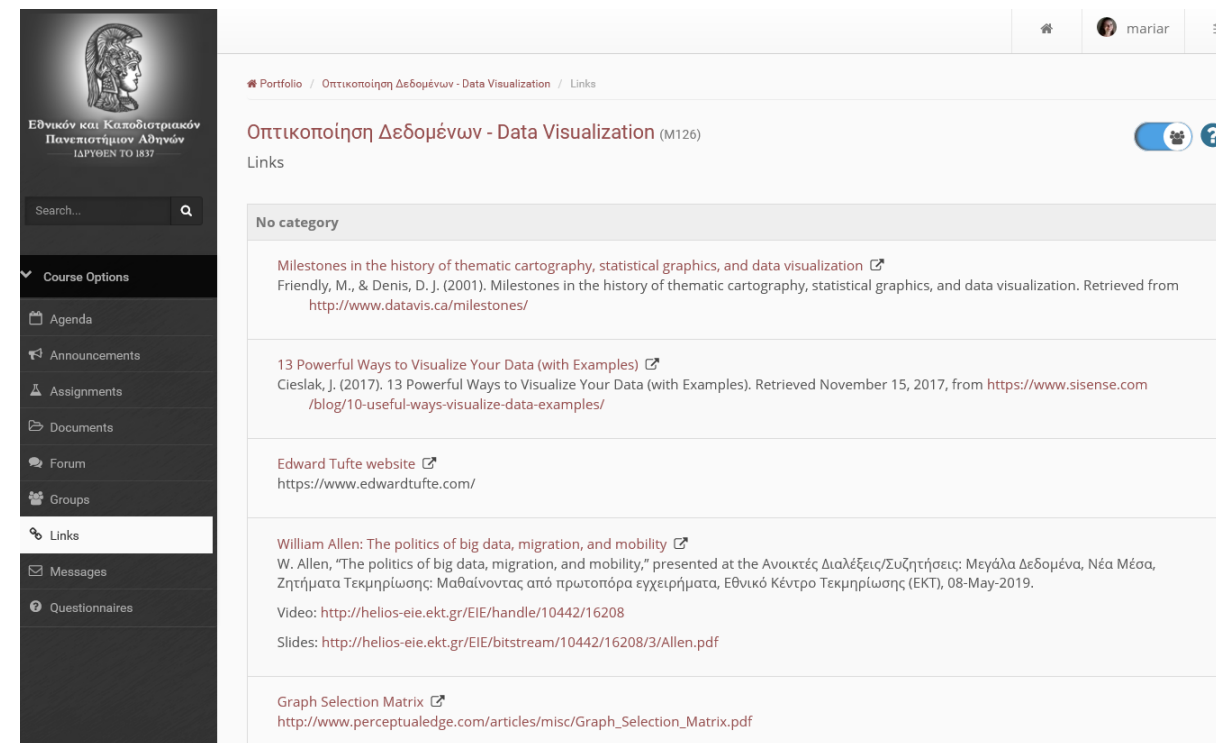
- Tufte, E. R. (2001). *The Visual Display of Quantitative Information* (2nd ed.). Graphics Press.
- Tufte, E. R. (1990). *Envisioning Information* (4th ed.). Graphics Press.
- Tufte, E. R. (1997). *Visual Explanations: Images and Quantities, Evidence and Narrative*. Graphics Press.
- Tufte, E. R. (2006).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



The screenshot shows a course website interface. On the left is a dark sidebar menu with the logo of the National and Kapodistrian University of Athens (Εθνικόν και Καποδιστριακόν Πανεπιστήμιον Ἀθηνῶν) and the text 'ΙΔΡΥΘΕΝ ΤΟ 1837'. The menu items include: Search..., Course Options, Agenda, Announcements, Assignments, Documents, Forum, Groups, Links (highlighted), Messages, and Questionnaires. The main content area is titled 'Portfolio / Οπτικοποίηση Δεδομένων - Data Visualization / Links'. Below the title is a section 'Οπτικοποίηση Δεδομένων - Data Visualization (M126)' with a toggle switch and a help icon. Underneath is a 'Links' section with the heading 'No category'. The links listed are: 'Milestones in the history of thematic cartography, statistical graphics, and data visualization' (Friendly, M., & Denis, D. J. (2001). Retrieved from http://www.datavis.ca/milestones/), '13 Powerful Ways to Visualize Your Data (with Examples)' (Cieslak, J. (2017). Retrieved November 15, 2017, from https://www.sisense.com/blog/10-useful-ways-visualize-data-examples/), 'Edward Tufte website' (https://www.edwardtufte.com/), 'William Allen: The politics of big data, migration, and mobility' (W. Allen, "The politics of big data, migration, and mobility," presented at the Ανοικτές Διαλέξεις/Συζητήσεις: Μεγάλα Δεδομένα, Νέα Μέσα, Ζητήματα Τεκμηρίωσης: Μαθαίνοντας από πρωτοπόρα εγχειρήματα, Εθνικό Κέντρο Τεκμηρίωσης (ΕΚΤ), 08-May-2019. Video: http://helios-eie.ekt.gr/EIE/handle/10442/16208. Slides: http://helios-eie.ekt.gr/EIE/bitstream/10442/16208/3/Allen.pdf), and 'Graph Selection Matrix' (http://www.perceptualedge.com/articles/misc/Graph_Selection_Matrix.pdf).

Course material - Get organized

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

zotero

Groups

Documentation

Forums

Get Involved

Log In

Upgrade Storage

Your personal research assistant

Zotero is a free, easy-to-use tool to help you collect, organize, cite, and share research.

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Available for Mac, Windows, and Linux

MENDELEY

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For individual researchers, teams and groups

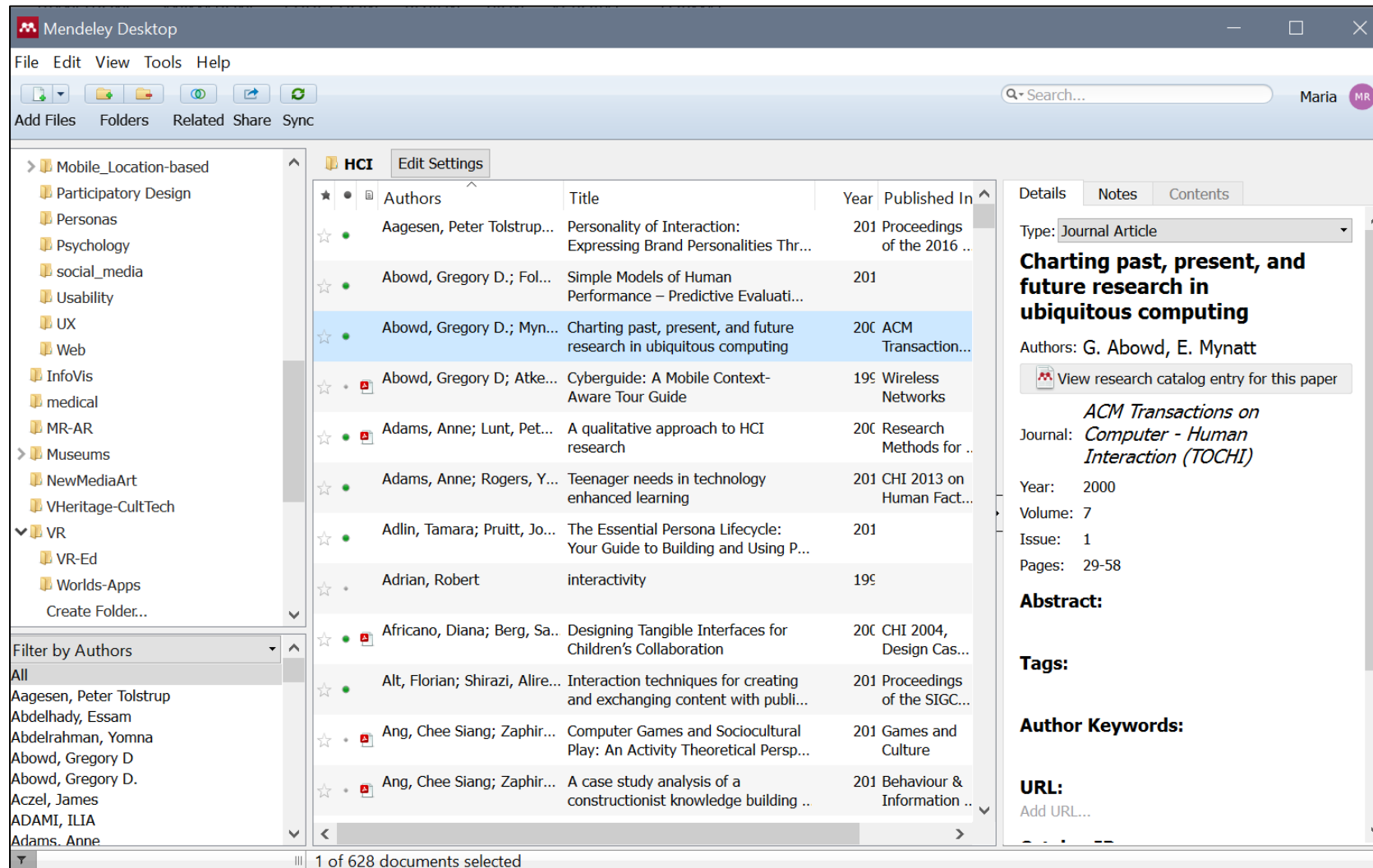
Mendeley is a **free reference manager** and an academic **social network**. Manage your research, showcase your work, connect and collaborate with over five million researchers worldwide.

Create a free account

Download for free on: Mac

Course material - Get organized

■ Get organized: example Mendeley Desktop



Course content

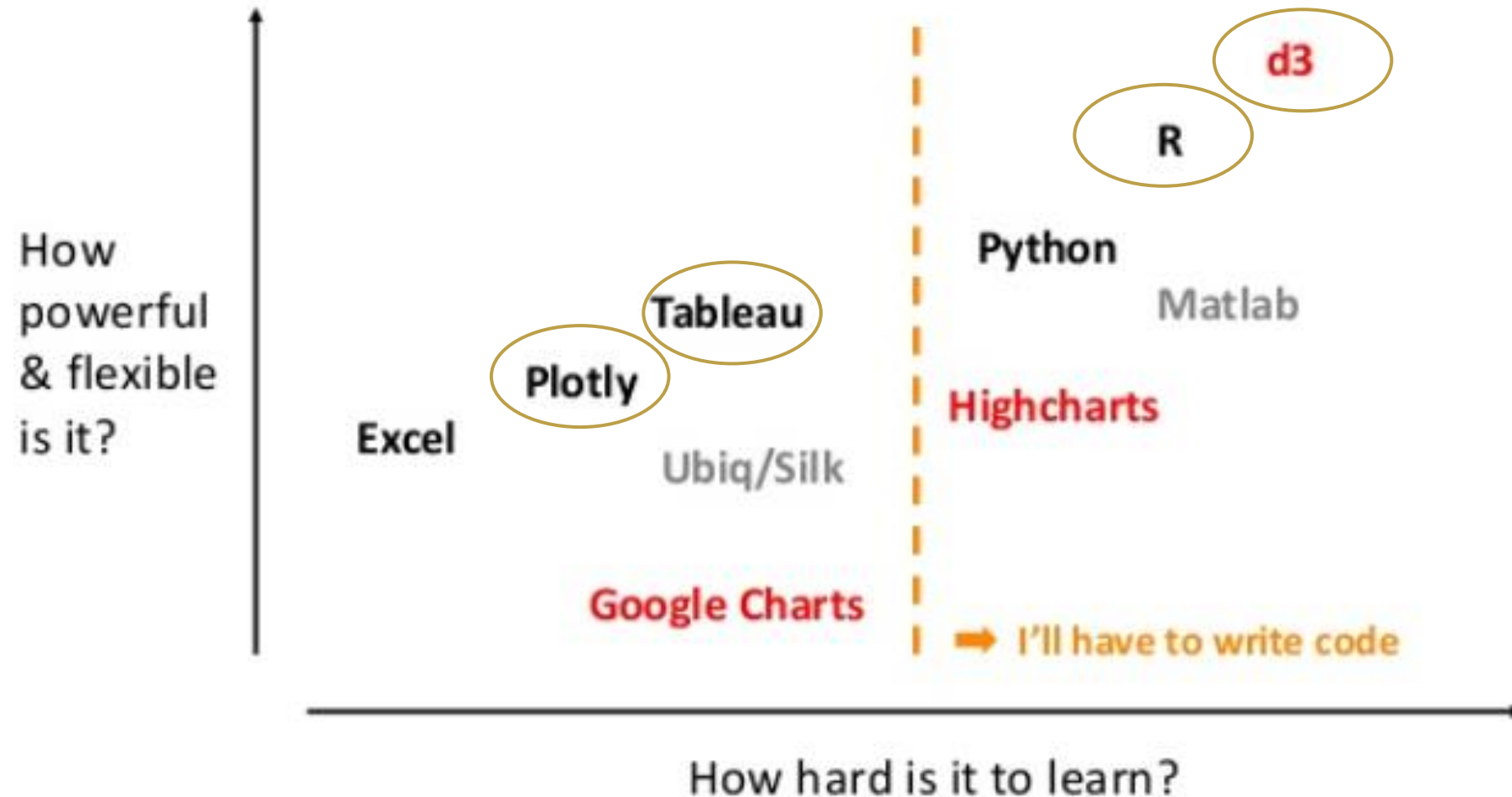
- Introduction & definitions
 - Getting-to-know-us and practicalities
 - What is DataViz and why do it
 - Examples
- Perception
 - visual channel characteristics, color, size, shape, spatial layouts, etc., how human perception relates to creating effective data visualizations
- DataViz Principles – Representation
 - 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 includes 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)

<https://tinyurl.com/m126-projects>

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/vizginus/>

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>



Home Our Team Dataset Visualization References

How Personality, Health Problems and Height affect dog's Longevity



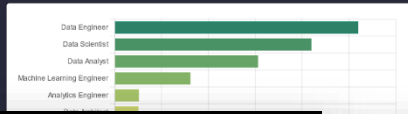
Visualizations | About | Credits

The Data Science Journey Roadmap: Salaries & Insights

Data Science Positions Popularity

The chart displays the top 12 positions in terms of popularity within the data industry and provides a valuable overview of the most sought-after roles.

It is worth noting that data-oriented positions, such as Data Engineer, Data Scientist, and Data Analyst, are the most prevalent.



Language Learning Difficulty

Brief Information

How long does it take to learn a foreign language? Unfortunately, providing a precise answer to this question is impossible due to various factors that influence language learning. These factors include an individual's learning ability, motivation, learning environment, intensity of instruction, and prior experience with foreign languages. Additionally, the similarity between the target language and the learner's native language or previously acquired languages plays a role. Lastly, the desired level of proficiency also affects the time required for mastery. Furthermore, it is important to note that proficiency in a language is not a one-size-fits-all concept. It is typically evaluated based on four essential skills: speaking, reading, listening, and writing.

The levels of languages are influenced by various factors. Linguistic distance refers to the differences between languages and their evolution. Languages from the same language family, like French, Spanish, and Italian, have similarities, while languages from different families, such as German and Mandarin, are more linguistically distant. The farther your native language is from the language you're learning, the more challenging it may be. Grammar rules can also affect difficulty, as different languages have unique grammar structures. Pronunciation plays a role, with tonal languages like Mandarin requiring precise pronunciation and inflection. Writing systems vary, with some languages using the Latin alphabet, others having their own unique alphabets, and some based on distinct writing systems.

Data Visualization, 2022-2023

Department of Informatics & Telecommunications, NKUA



'Global Happiness Atlas: Exploring the Nexus of Peace, Education, and Wealth'

Presentation

References

Team members

What is Happiness and how can it be measured? Happiness is subject to debate on usage and meaning. People have been trying to measure happiness for centuries. The English utilitarian philosopher Jeremy Bentham proposed that as happiness was the primary goal of humans it should be measured as a way of determining how well government was performing. Since 2012, a World Happiness Report has been published. Happiness is evaluated, as in "How happy are you with your life as a whole?"

M126 - Οπτικοποίηση Δεδομένων

Ομαδική Εργασία για το εαρινό εξάμηνο του έτους 2022-2023



The Nobel Prize (1901 - 2016) How difficult is to win one? A comprehensive investigation

Home Dashboard Presentation About Credits

Welcome to our website! Through our investigation we delve into the realm of the Nobel Prize—a symbol of unparalleled prestige in the world of scientific achievement. Since its inception, the Nobel Prize has remained the pinnacle of recognition, fueling the aspirations and dreams of countless scientists across the globe. But how easy is it for someone to win this coveted prize? Is it merely a matter of luck, or does it require an extraordinary

ΑΡΧΗ | ΟΠΤΙΚΟΠΟΙΗΣΕΙΣ | ΣΥΜΠΕΡΑΣΜΑΤΑ ΚΑΙ ΒΗΜΕΤΑ | ΠΗΓΕΣ

Κίνδυνος Φτώχειας & Κοινωνικού Αποκλεισμού στην Ελλάδα

Οπτικοποίηση Δεδομένων M126

Start

Project Movies Visualization

Are you a movie enthusiast? This is the perfect site for you!

StreamViz

Analytics

Home

Movies

Series

About

Next episode
Season 1 Episode 7

Continue watching for Angie

StreamViz

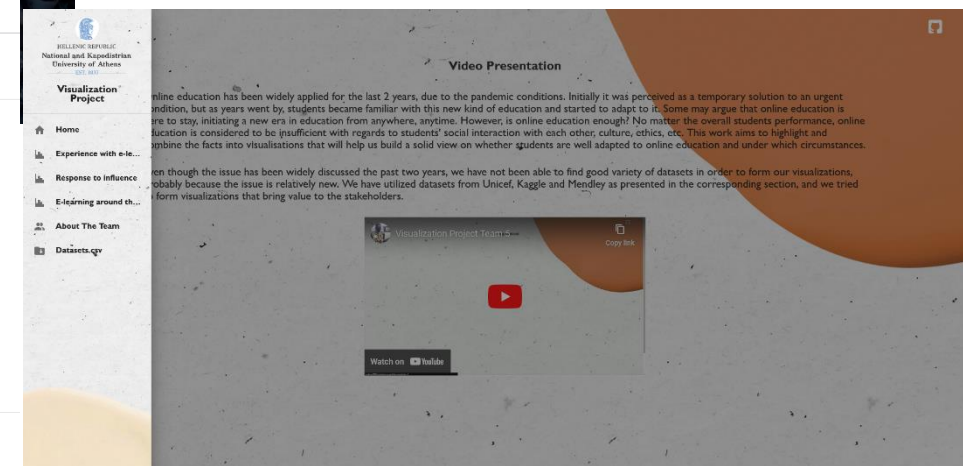
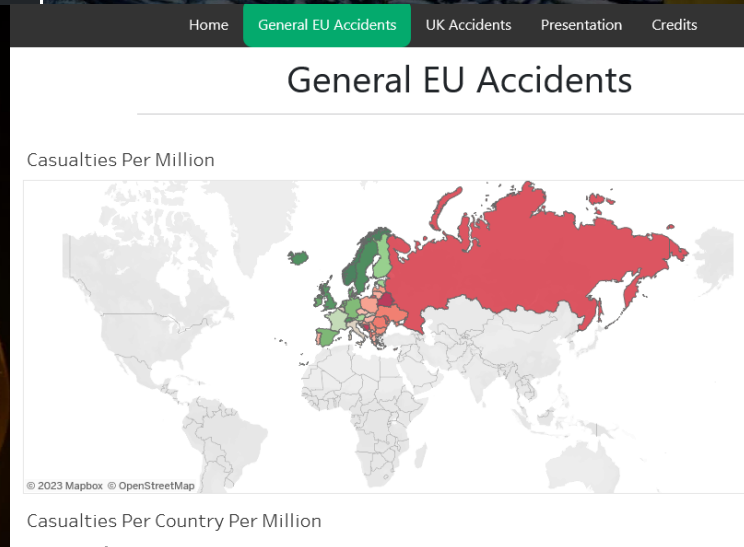
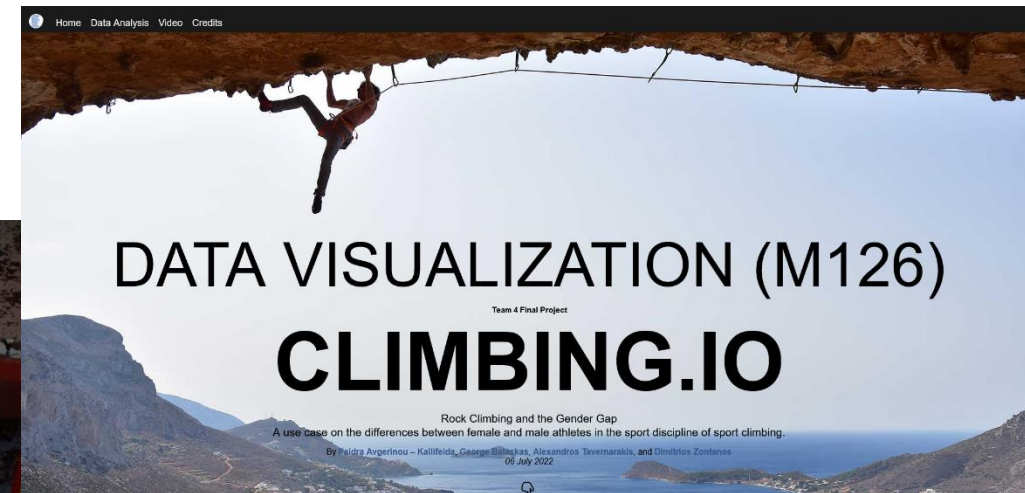
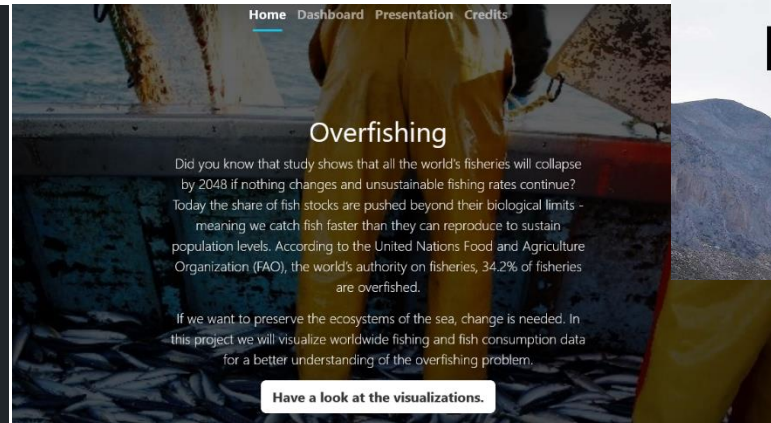
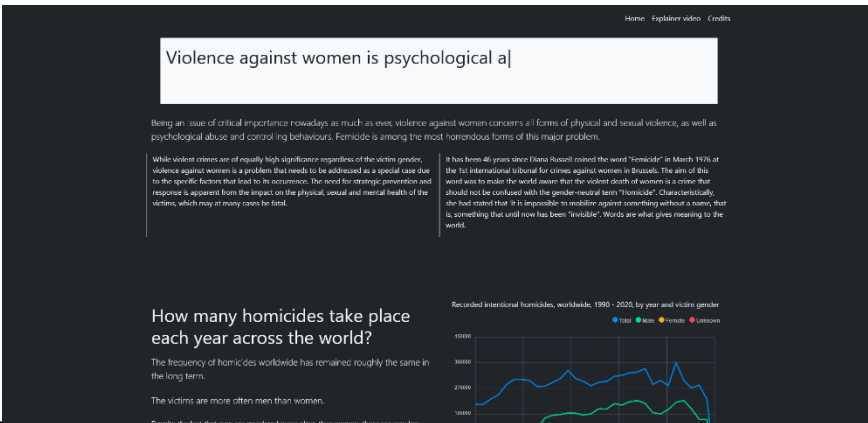
Streaming Platform Visual Comparisons

Here you'll find interactive data visualizations that analyse and compare the content (movies & tv), subscribers and revenue of the most popular streaming platforms today!

The Idea

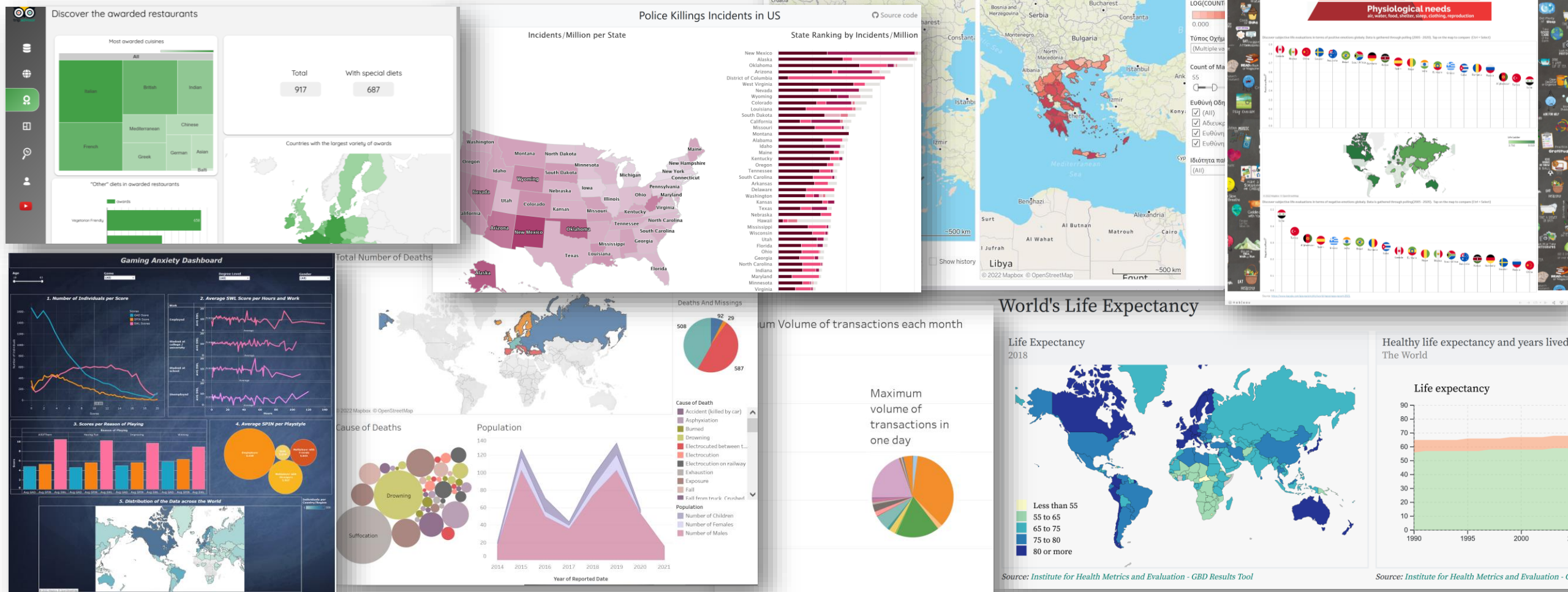
Final Group Projects 2022-2023

- 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=taYprdbYIOE>

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>

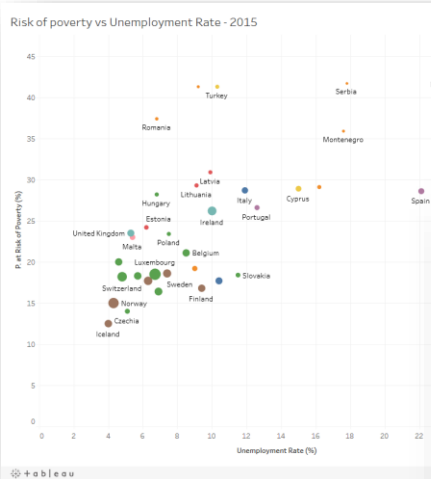
9. Students' Performance

Site: <https://app.powerbi.com/groups/me/apps/cc52c2b9-b854-42b1-99cf-f873e3d6c20c/reports/34c779d7-9c5b-42a2-b0b8-847e33c6fc03/ReportSection>

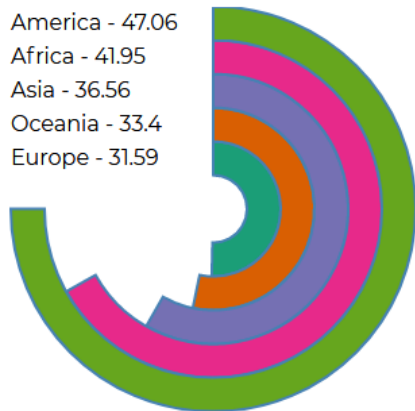
Video: https://drive.google.com/file/d/13RX7_iuDjaj9Ek0DpQ2CzOJb_PytmSTP/view

Final Group Projects 2019-2020

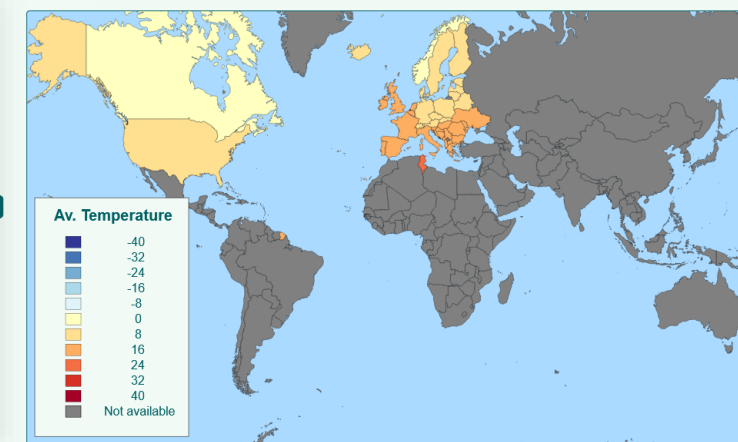
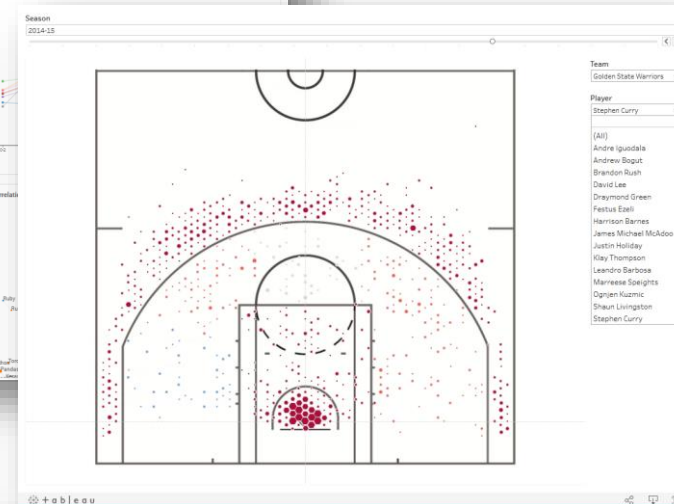
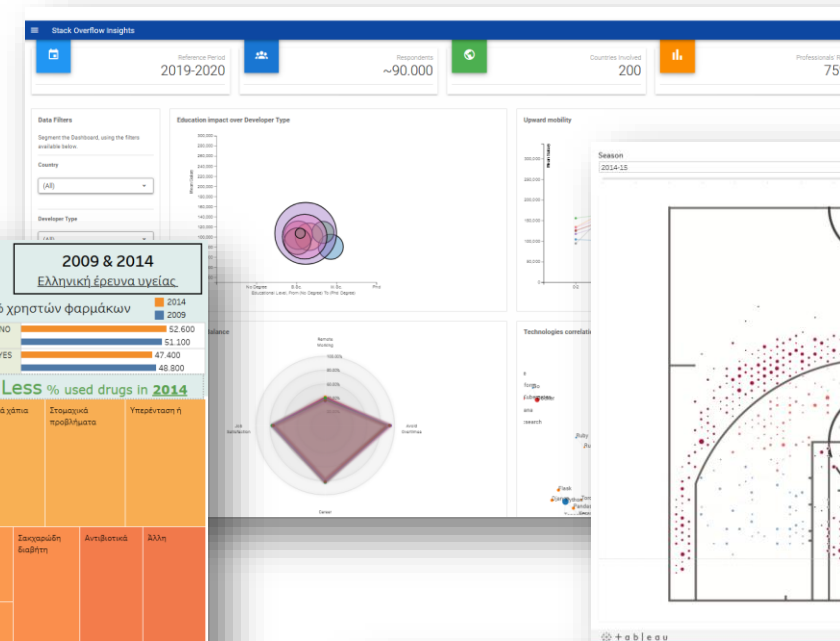
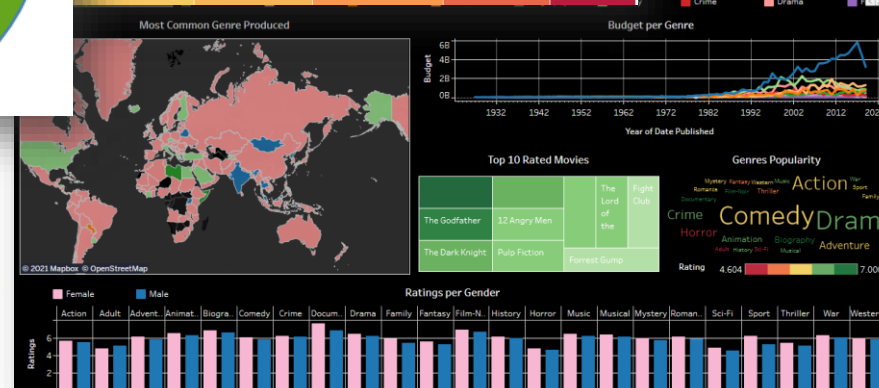
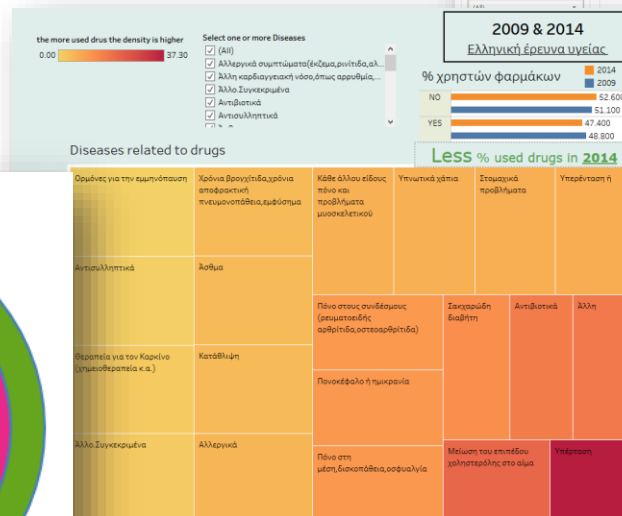
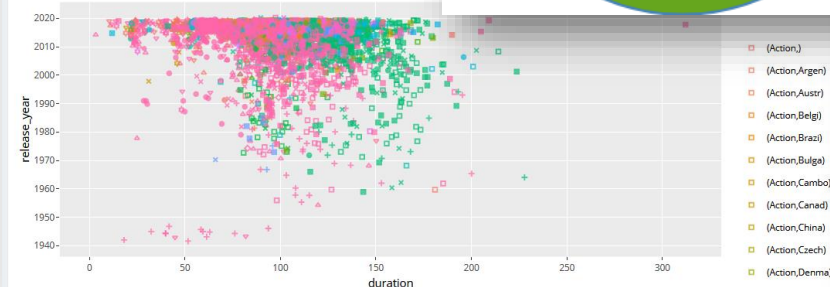
- 2019-2020 Group projects
<https://tinyurl.com/y76394h2>



America - 47.06
Africa - 41.95
Asia - 36.56
Oceania - 33.4
Europe - 31.59



Movies



Final Group Projects 2019-2020 (1/2)

1. Health data visualizations in Greece

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

Video: https://youtu.be/_qVkJE7krq5I

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-5u2Mhfl&feature=youtu.be>

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- 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?

Homework assignment

“Build a basic website about yourself using HTML5, CSS, SVG, Javascript, jQuery”

The website must include at least 3 interlinked webpages containing:

- 1-2 paragraphs about yourself and a picture of yourself
- CSS to style the pages, with specific styles for at least 5 elements
- On one page, a **data-driven visualization image** that you found on the web, with a one paragraph explanation of why you chose it
- On one page give credit to all the sources you have used to build the website (e.g. [jQuery](#) License: [MIT](#) and [jQuery License](#))

Homework assignment

- One of the pages must include an SVG showing at the same time three animated (moving in time) and colored geometric shapes
- Must allow the user to click on the animated shapes and in response perform some action on the shapes (disappear them, freeze/unpause them, etc).

Homework assignment

Start by completing:

- codecademy.com [HTML](#) and [CSS](#) tutorials
- codecademy.com [JavaScript](#) and [jQuery](#) tutorials
- [W3schools SVG tutorial](#)

Alternatively,

- [W3schools HTML](#)
- [Dive Into HTML5 – Homepage](#)
- [Dive Into HTML5 - Canvas](#)
- Links for visualization examples, feel free to browse through bloomberg.com, nytimes.com, nasa.gov, ... (see eClass **Resources**)

Thank you!

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

Discord: <https://tinyurl.com/m126-discord-25>