Explorable Explainers

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Agenda

- Core principles
- Examples
- Tools overview
- Tool reviews
- Our verdict

Core Principles of Explorable Explainers

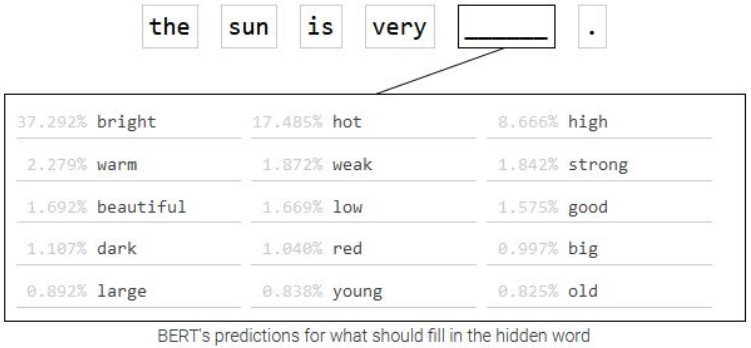
- Should encourage truly active reading
  - Reactive documents
  - Explorable examples
  - Contextual information
- Informative media with some form of interactive simulation and user guidance.

http://worrydream.com/ExplorableExplanations/
https://en.wikipedia.org/wiki/Explorable_explanation

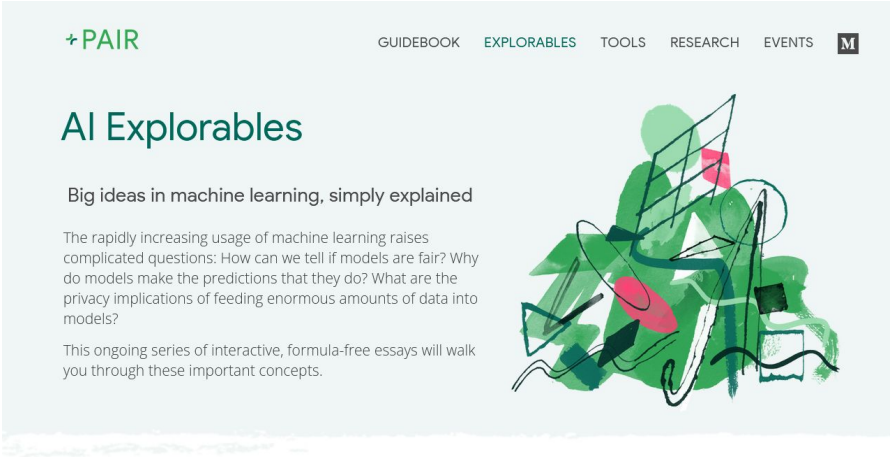
Examples of Explorable Explainers

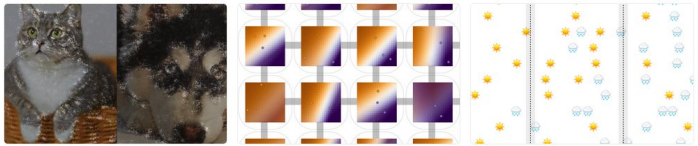
Pair (Collection of explorables in the field of AI)

- For example a language model explorable



BERT's predictions for what should fill in the hidden word

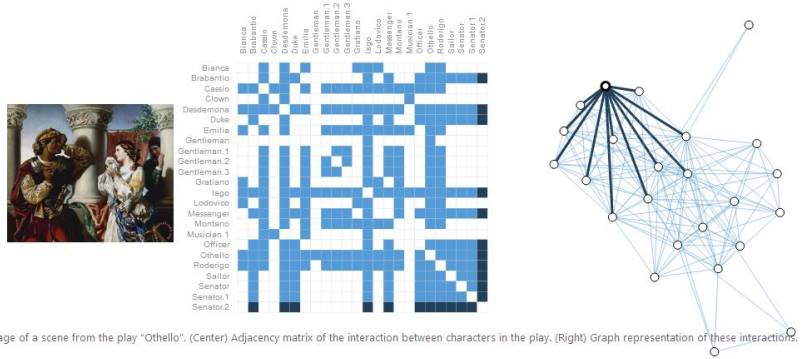




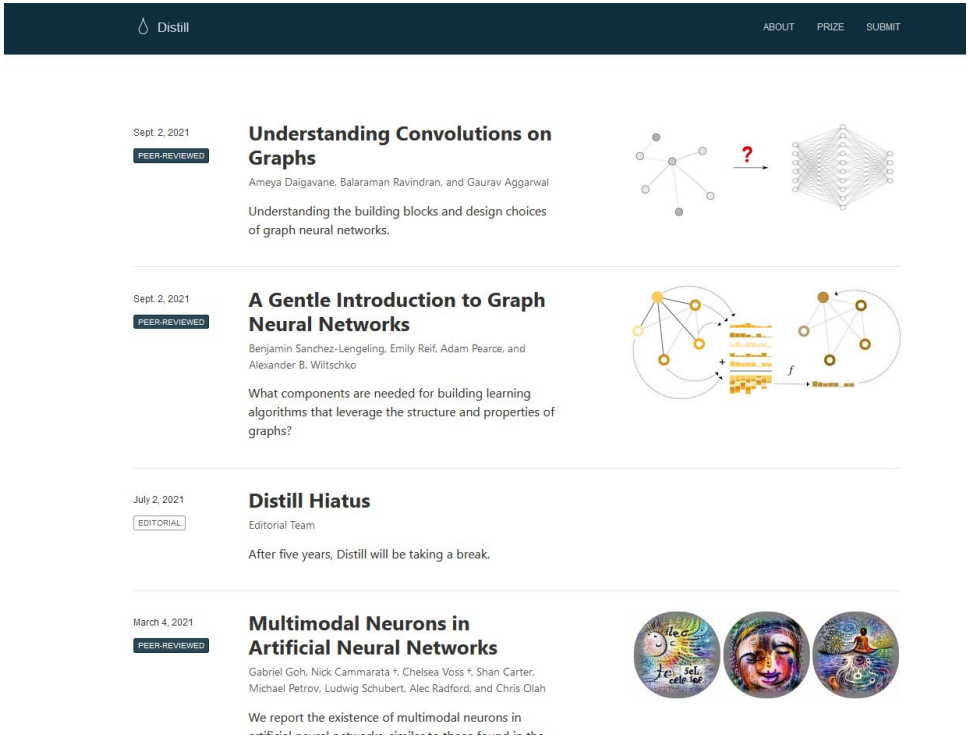
https://pair.withgoogle.com/explorables/

Distill

- New way to read scientific papers.
- Explore scientific papers by interacting.
- A Gentle Introduction to Graph Neural Networks.



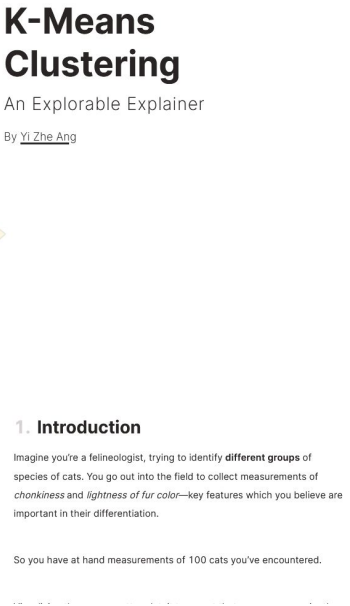
(Left) Image of a scene from the play "Othello". (Center) Adjacency matrix of the interaction between characters in the play. (Right) Graph representation of these interactions.



https://distill.pub/
https://distill.pub/journal/
https://distill.pub/2021/gnn-intro/

K-Means Clustering

- Breaks down a very complex topic into small digestible junks and makes it available for a wider audience.



https://k-means-explorable.vercel.app/ by Yi Zhe Ang

Tools

Tools

Python

- **Jupyter**
  - Web-based interactive computing platform
  - https://jupyter.org/
- Bokeh
  - Library
  - https://bokeh.org/
- Vega-Altair
  - Library
  - https://altair-viz.github.io/

R

- **Shiny**
  - Package (library)
  - https://shiny.rstudio.com/

Javascript

- **Observable**
  - Web-based interactive computing platform
  - https://observablehq.com/
- **D3**
  - Library
  - https://d3js.org/
- Tangle
  - Library
  - http://worrydream.com/Tangle/
- Joy.js
  - UI framework
  - https://ncase.me/joy/
- Idyll
  - Open-source markup language and toolkit
  - https://idyll-lang.org
- Highcharts
  - Library
  - https://www.highcharts.com/

Example Implementation of a Parallel Coordinates Explorable

Dataset

- Contains artificially crafted data about student marks
  - Used to illustrate correlations using parallel coordinates
- Subjects are assigned 0 to 100 points

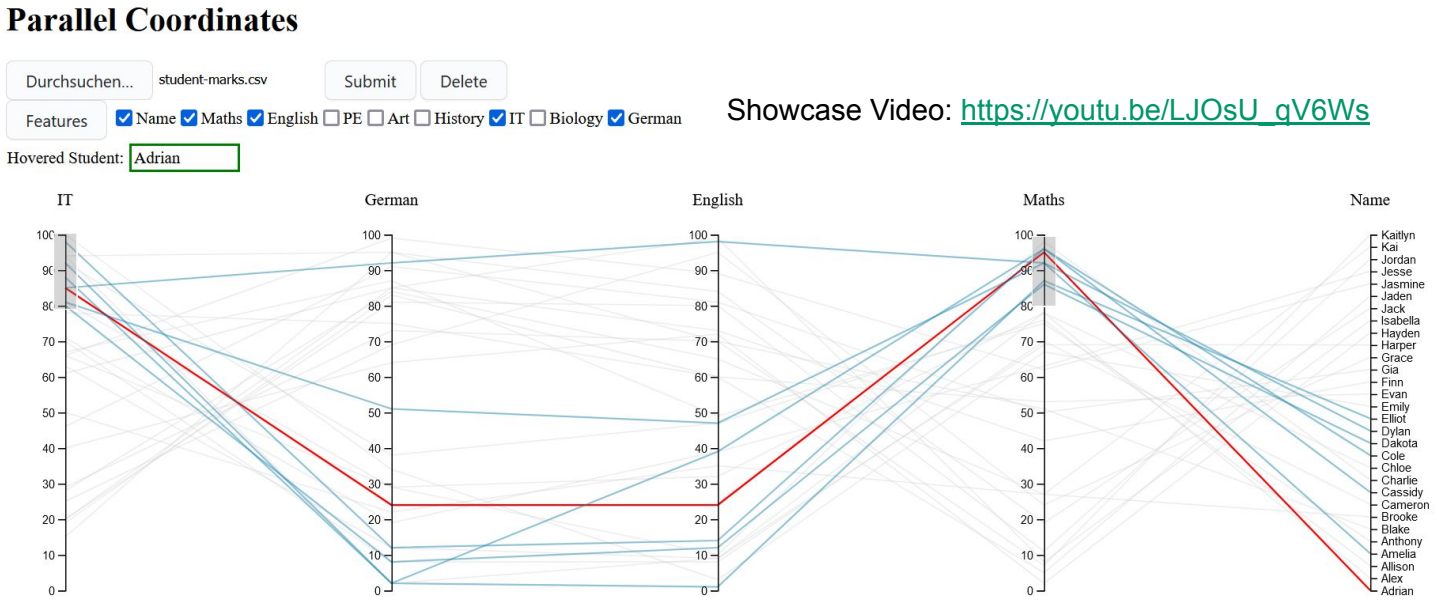
id	Name	Maths	English	PE	Art	History	IT	Biology	German
0	Adrian	95	24	82	49	58	85	21	24
1	Alex	78	32	98	55	56	81	46	29
2	Allison	76	47	99	34	48	92	30	38
3	Amelia	92	98	60	45	82	85	78	92
4	Anthony	75	49	98	55	68	67	91	87
5	Blake	51	70	87	40	97	94	60	95
6	Brooke	27	35	84	45	23	50	15	22
7	Cameron	70	8	84	64	26	70	12	8
8	Cassidy	96	14	62	35	56	98	5	12

Narrative

- Explorable explainer using parallel coordinates
- Show correlations between grades
- Steps
  - Premise
  - Correlations using traditional tables
  - Application of parallel coordinates

D3.js Standalone

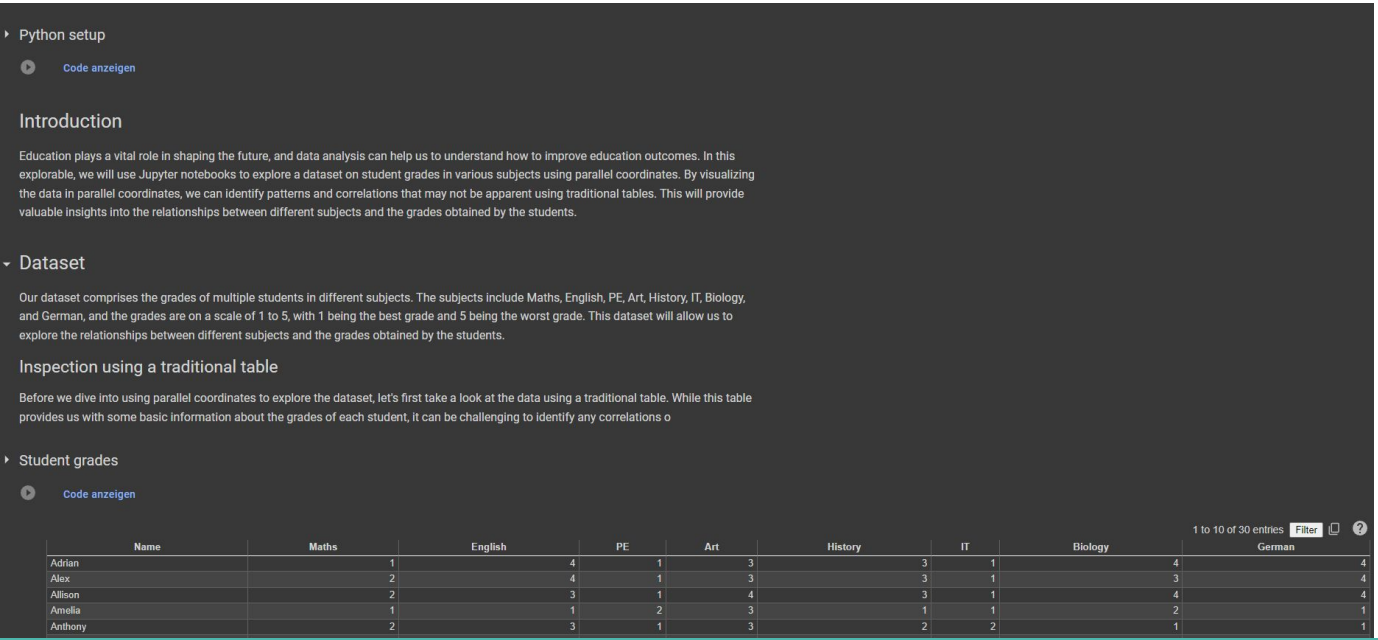
- Technical Details
  - Javascript lib D3.js to create SVG
  - UI written in HTML and CSS
  - Standalone with option to host
- UI Elements
  - Datafile input
  - Feature selection
  - Rearrange features
  - Area selection



Showcase Video: https://youtu.be/LJOsU_qV6Ws

Jupyter Notebooks

- Types of hosting
  - Local execution
  - Hosting services
  - Dedicated server
- Multiple languages supported
- Structure elements
  - Code blocks
  - Widget for user input
  - Data table view
  - Text using Markdown

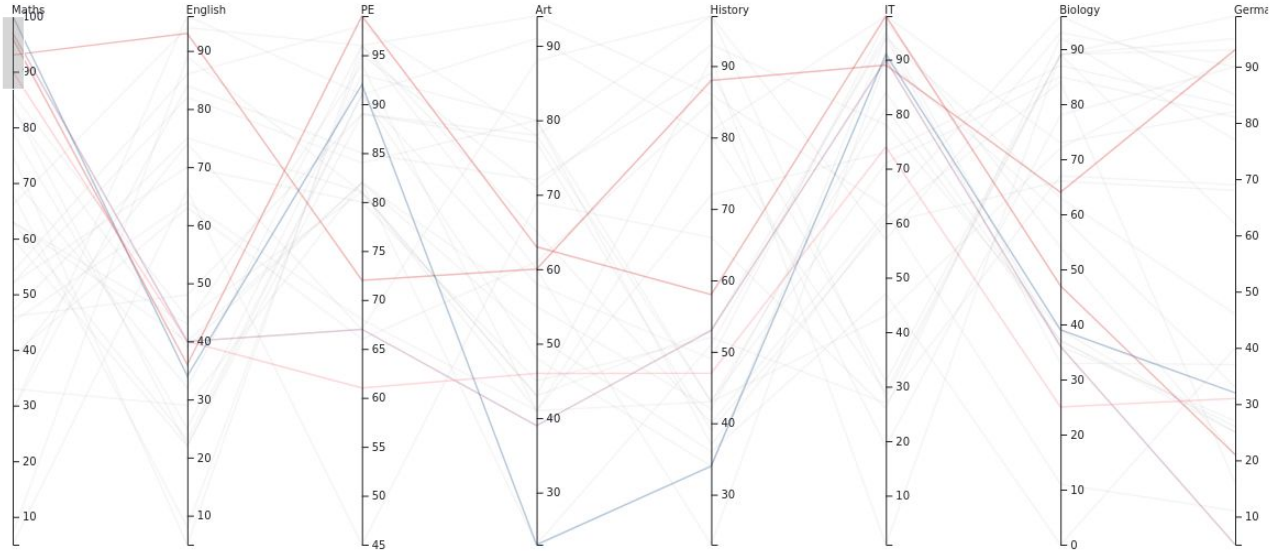


Showcase video:
http://youtu.be/G3GMe9djIrI

Code:
https://colab.research.google.com/drive/1dBUynHp-qUA4g308d0g_gBQmNrVVz1OG

Observable

- Works in web
- Does not allow reordering or inverting features currently



Showcase video:
https://youtu.be/Dnb3JOuBPM8

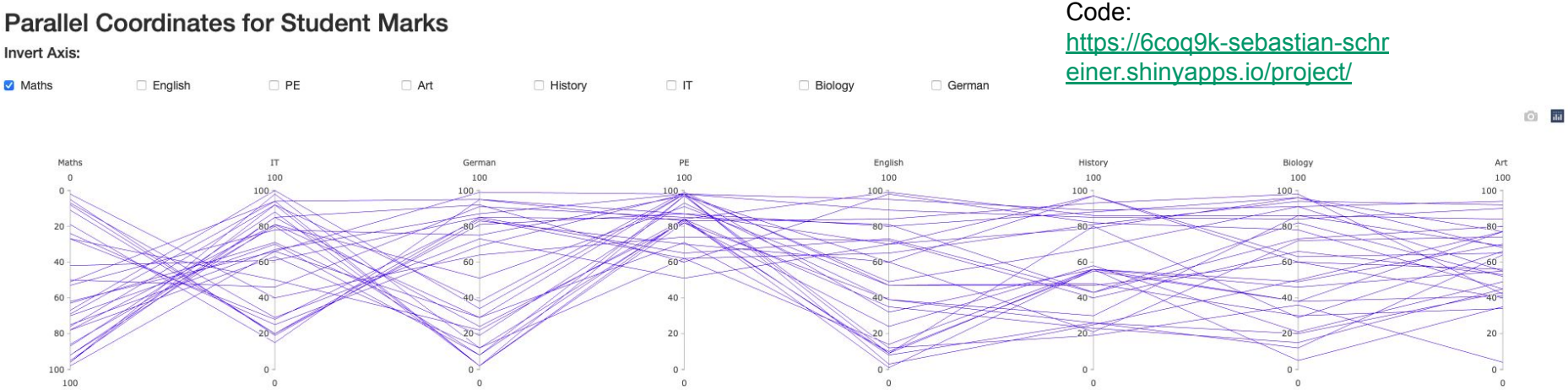
Code:
https://observablehq.com/d/8c75642d36c5d4d8

Shiny

- Package to build interactive and reactive web applications using R
  - also in alpha stage to support python
- No direct parallel coordinates support
  - Plotly, GGally, MASS
- RStudio provides online workspace and hosting
  - *https://posit.cloud*, *https://www.shinyapps.io/*

Showcase video:
https://youtu.be/OtXB9e_MtDY

Code:
https://6coq9k-sebastian-schreiner.shinyapps.io/project/



Results and Verdict

Verdict

	Ease of use	Interactivity	Customizability	Supported Graphs
D3.js Standalone	★★★	★★★★	★★★★★	★★★★★
Jupyter Notebooks	★★★★	★★★	★★★	★★★★★
Observable	★★	★	★★★	★★★★★
Shiny	★	★★★★★	★★★★	★★★

Thank you for your Attention!