

Multidimensional Data Visualization

Gina Lucia Muñoz Salas



Universidad Católica
San Pablo



**Centro de Investigación
e Innovación en
Ciencia Computación**

Multidimensional data

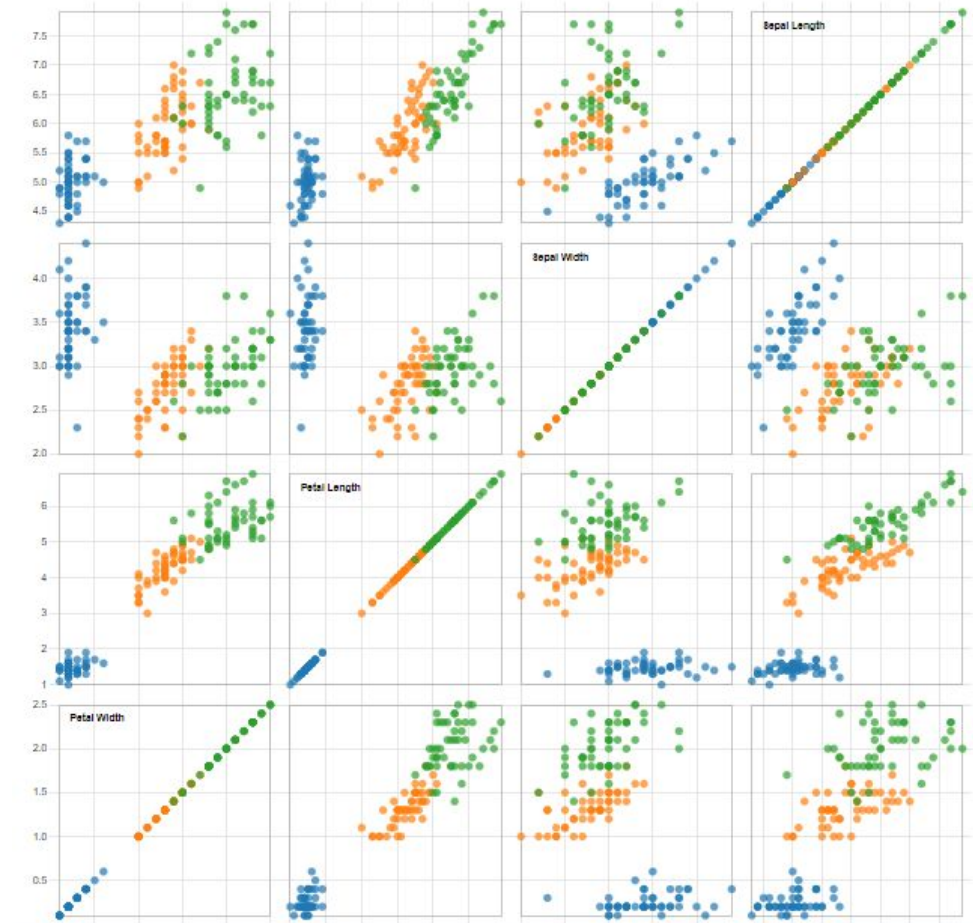
Month	Force	Neighbourhood	Burglary	Robbery	Vehicle crime	Violent crime	Anti-social behaviour	Criminal damage	Shoplifting	Other theft	Drugs	Public disorder	Other crime
2013-05	Cheshire Constabulary	N020	4	0	0	6	12	0	3	2	0	0	0
2013-05	Cheshire Constabulary	N021	22	3	4	19	100	12	20	17	3	2	0
2013-05	Cheshire Constabulary	N022	16	1	8	12	60	7	2	7	3	1	0
2013-05	Cheshire Constabulary	N023	16	0	8	10	56	10	5	5	1	2	1
2013-05	Cheshire Constabulary	N024	3	0	2	31	76	8	33	25	10	20	11
2013-05	Cheshire Constabulary	N025	18	0	15	10	102	15	16	19	1	2	2
2013-05	Cheshire Constabulary	N008	13	0	5	12	41	7	2	15	1	1	0
2013-05	Cheshire Constabulary	N009	5	0	2	10	53	11	5	10	3	1	0
2013-05	Cheshire Constabulary	N006	1	0	1	1	18	0	2	2	0	1	0
2013-05	Cheshire Constabulary	N007	2	0	5	22	73	16	6	12	6	6	1
2013-05	Cheshire Constabulary	N004	26	3	22	79	416	100	70	91	12	12	8
2013-05	Cheshire Constabulary	N005	3	0	4	2	23	2	3	4	0	0	0
2013-05	Cheshire Constabulary	N002	14	1	6	20	90	18	8	21	6	4	1
2013-05	Cheshire Constabulary	N003	2	0	4	11	53	8	6	13	2	3	1
2013-05	Cheshire Constabulary	N001	21	0	16	26	105	23	14	14	5	4	1
2013-05	Cheshire Constabulary	N048	8	1	11	3	30	11	3	16	1	0	0
2013-05	Cheshire Constabulary	N049	24	1	21	56	261	60	57	45	7	7	7
2013-05	Cheshire Constabulary	N042	12	0	7	43	254	20	71	39	16	10	0
2013-05	Cheshire Constabulary	N043	14	0	8	17	78	18	2	7	9	6	0
2013-05	Cheshire Constabulary	N040	29	0	55	21	73	15	13	8	2	1	1
2013-05	Cheshire Constabulary	N041	9	0	4	18	40	10	2	8	1	0	0
2013-05	Cheshire Constabulary	N046	12	0	3	9	45	13	3	9	7	3	1
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2013-05	Cheshire Constabulary	N044	9	0	23	19	78	24	17	40	8	5	0
2013-05	Cheshire Constabulary	N045	6	0	9	7	44	14	6	18	3	3	1
2013-05	Cheshire Constabulary	N033	8	0	5	8	36	8	12	10	1	0	1
2013-05	Cheshire Constabulary	N026	11	0	8	4	51	9	1	11	1	1	3
2013-05	Cheshire Constabulary	N050	9	0	6	5	80	11	4	6	2	3	1
2013-05	Cheshire Constabulary	N027	10	0	13	16	81	19	15	19	5	4	1
2013-05	Cheshire Constabulary	N028	2	1	4	7	26	7	4	12	3	0	0
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2013-05	Cheshire Constabulary	N039	10	0	5	2	37	2	9	4	6	2	2
2013-05	Cheshire Constabulary	N032	12	1	14	11	47	13	12	6	2	3	0
2013-05	Cheshire Constabulary	N019	6	0	4	8	61	5	12	15	4	3	0
2013-05	Cheshire Constabulary	N018	7	0	5	14	39	5	8	17	1	1	1
2013-05	Cheshire Constabulary	N031	5	1	6	7	16	2	0	5	0	0	0
2013-05	Cheshire Constabulary	N030	1	0	7	5	18	2	0	3	1	2	2
2013-05	Cheshire Constabulary	N037	17	0	9	32	182	41	34	25	8	11	2
2013-05	Cheshire Constabulary	N036	11	0	5	23	84	22	17	6	1	2	1
2013-05	Cheshire Constabulary	N035	4	0	5	2	11	1	0	2	1	0	0
2013-05	Cheshire Constabulary	N034	11	0	13	14	74	16	9	17	0	6	2
2013-05	Cheshire Constabulary	N011	8	0	2	3	22	6	5	5	0	0	0

Visualization techniques

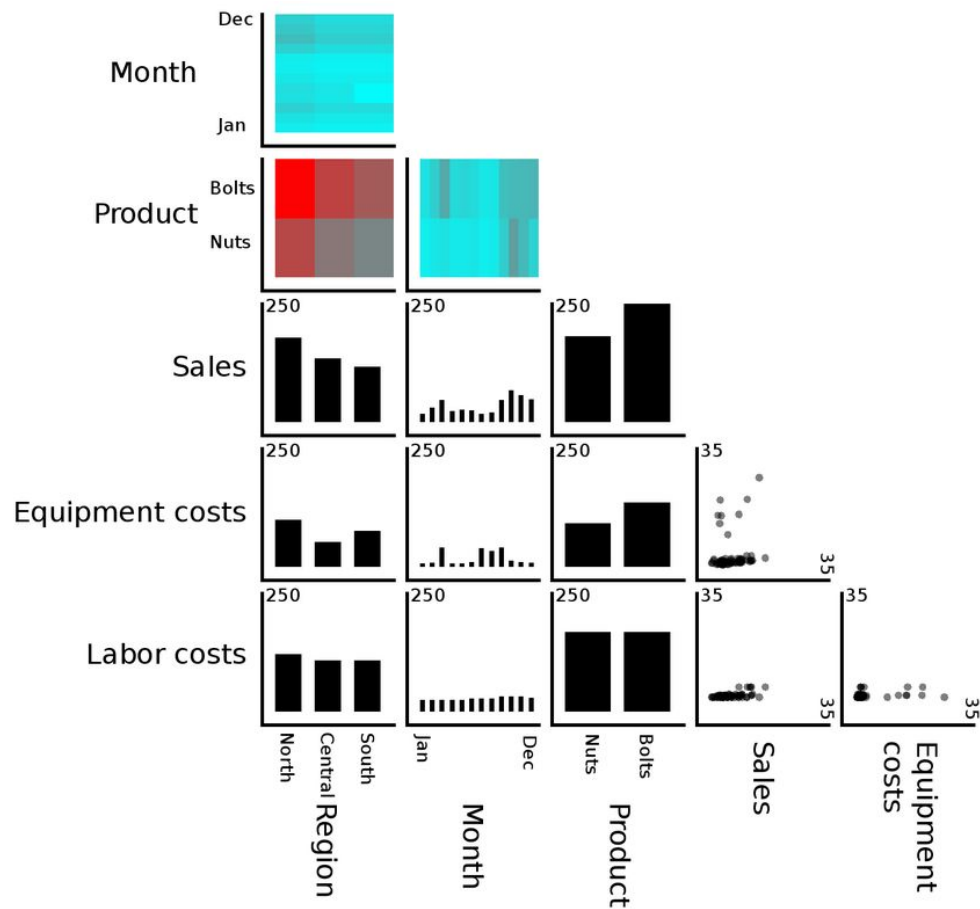
- Point- Based
 - Scatterplots
 - Multidimensional Projections
 - Other techniques
- Line-Based
- Region-Based

Point based

Scatterplot matrix



GPlom



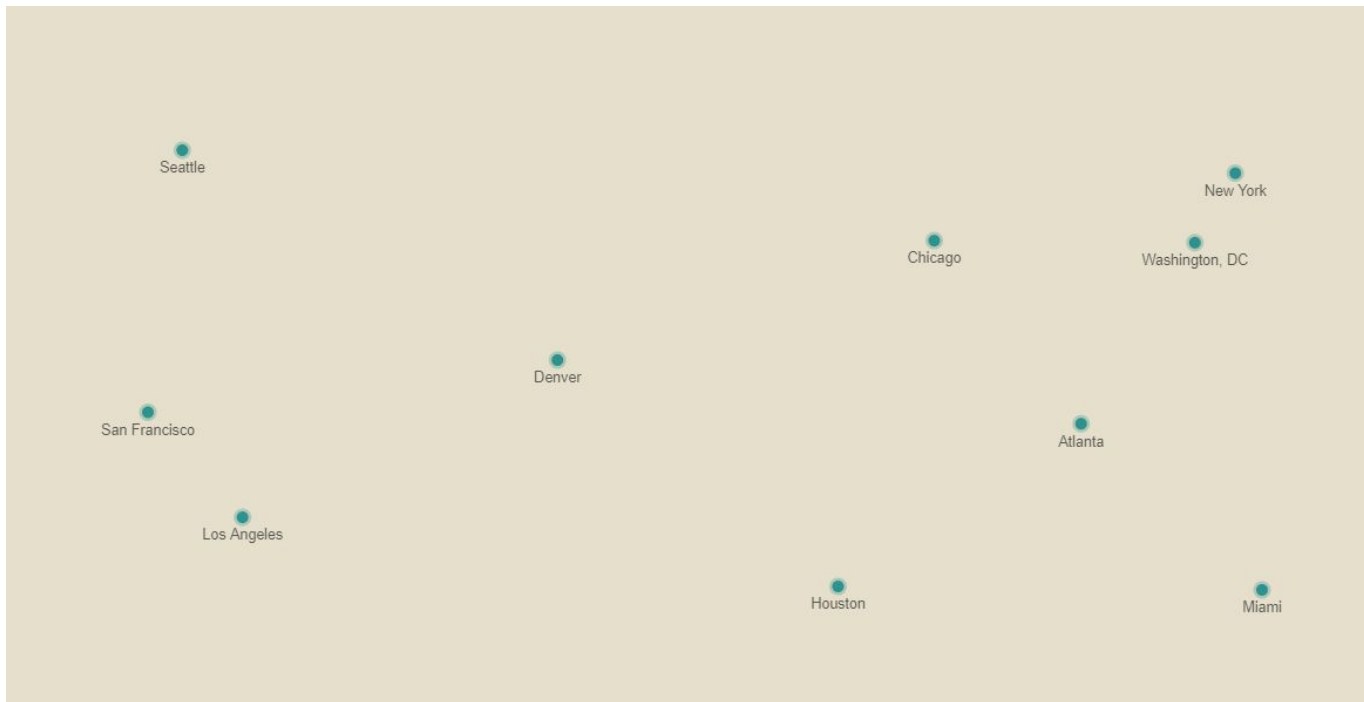
Im, J. F., McGuffin, M. J., et al. (2013). Gplom: The generalized plot matrix for visualizing multidimensional multivariate data. IEEE transactions on visualization and computer graphics, 19(12):2606–2614.

Multidimensional Projections

["Atlanta", "Chicago", "Denver", "Houston", "Los Angeles", "Miami", "New York", "San Francisco", "Seattle", "Washington, DC"]

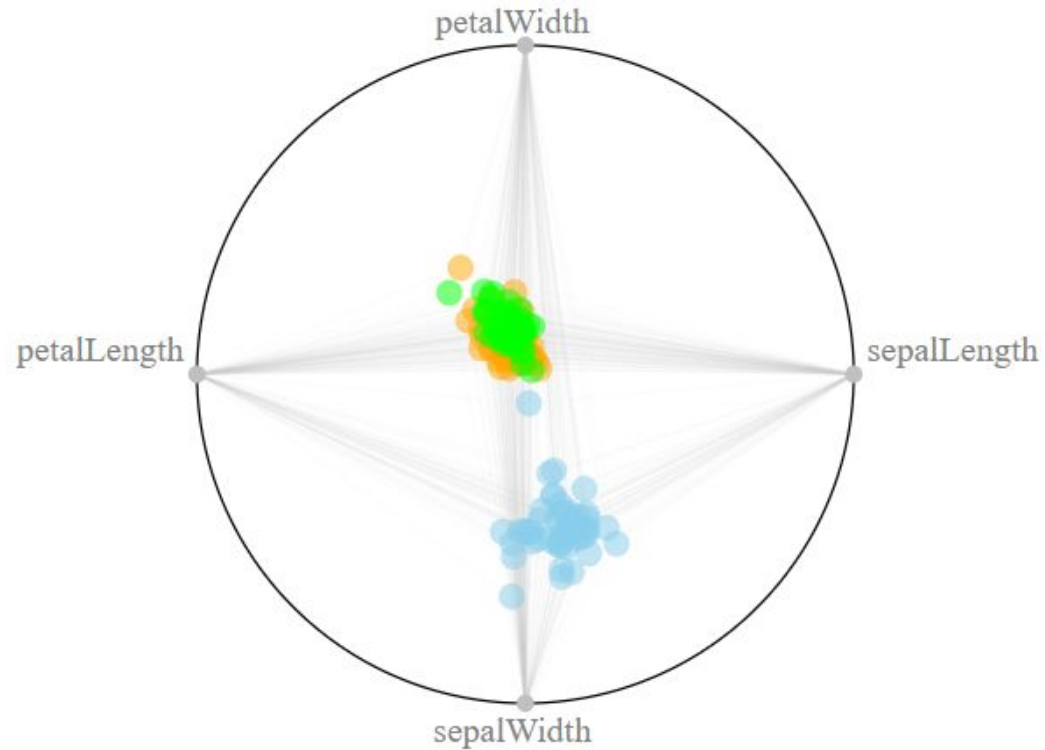
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Multidimensional Projections



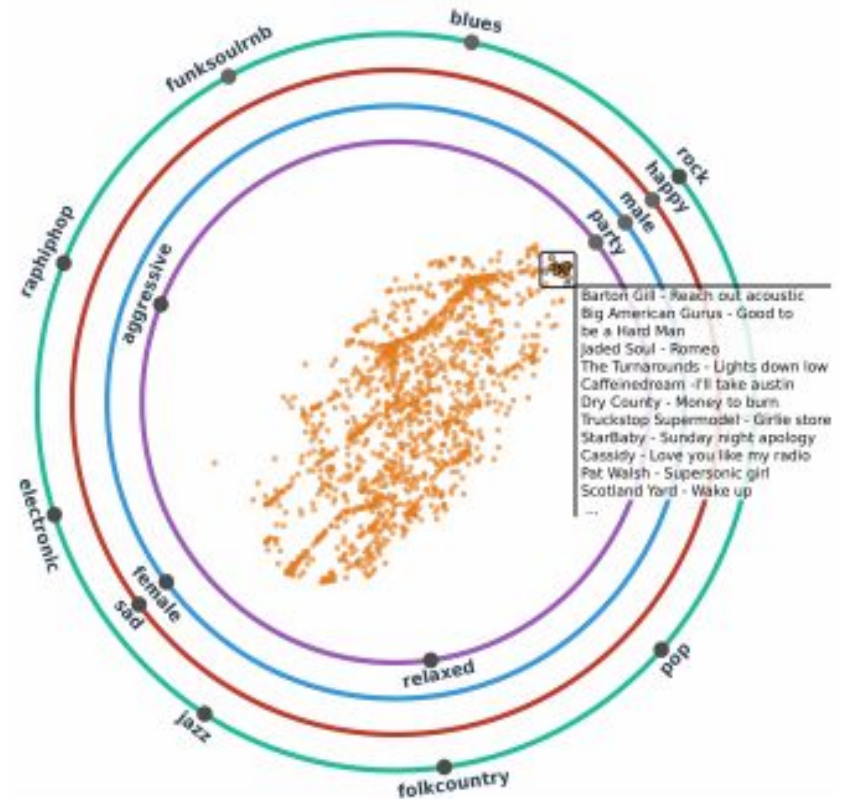
<http://bl.ocks.org/nitaku/raw/83f0df83b4de89eb2848/>

RadViz



<https://bi.ocks.org/biovisualize/a91f514aaf57eabf8e36>

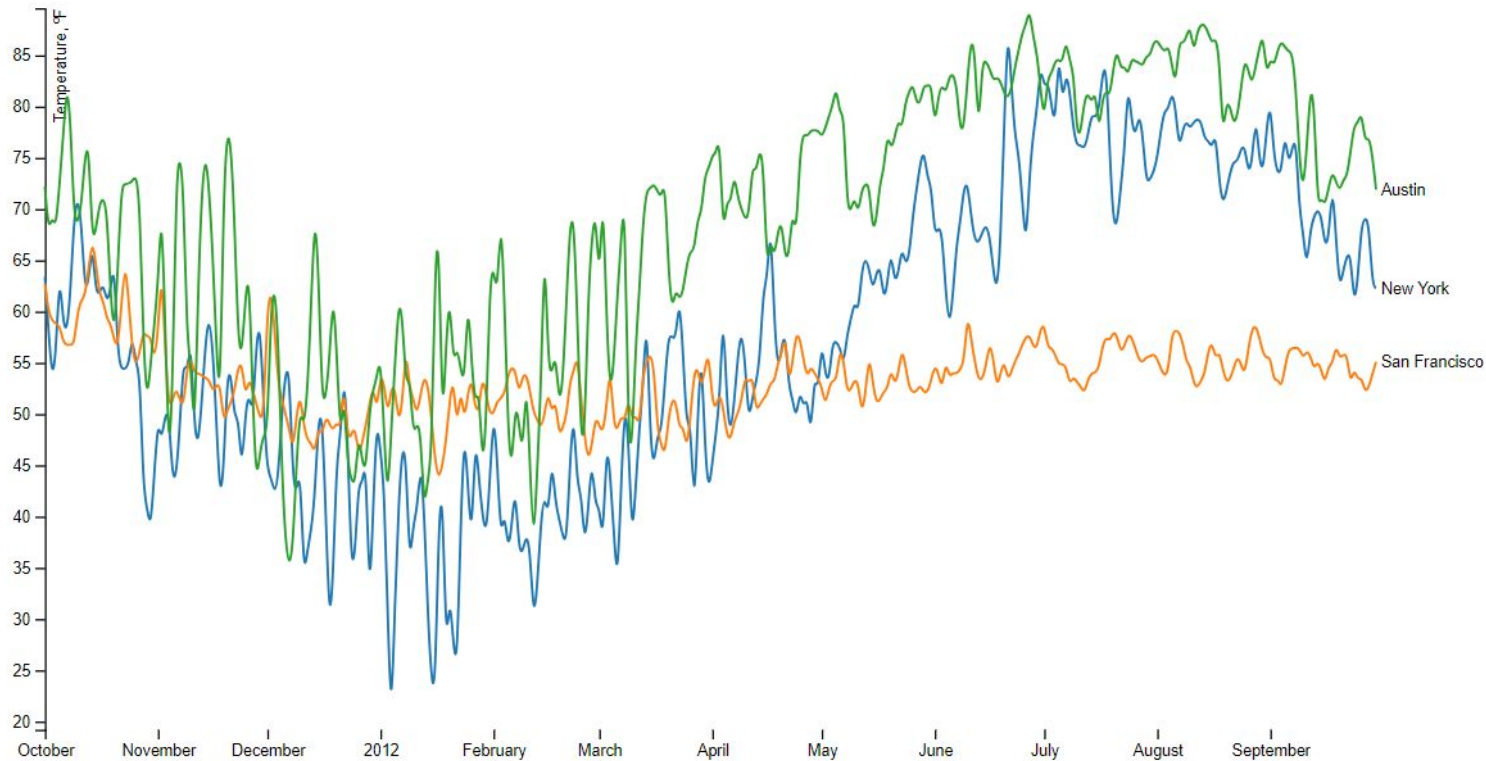
Concentric Radviz

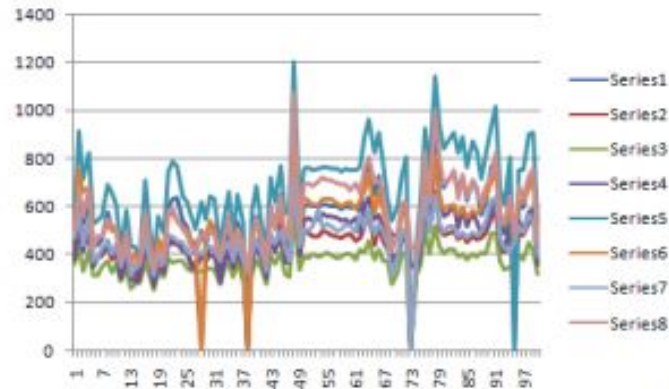


Ono, J. H. P., Sikansi, F., et al. (2015). Concentric radviz: Visual exploration of multi-task classification. In SIBGRAPI Conference on Graphics, Patterns and Images, pages 165–172. IEEE.

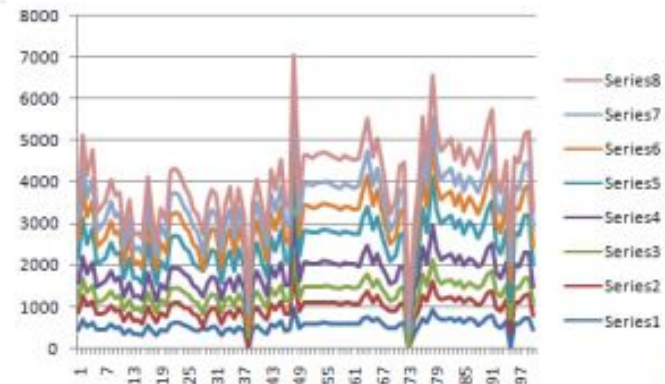
Line- Based

Line charts





(a)



(b)

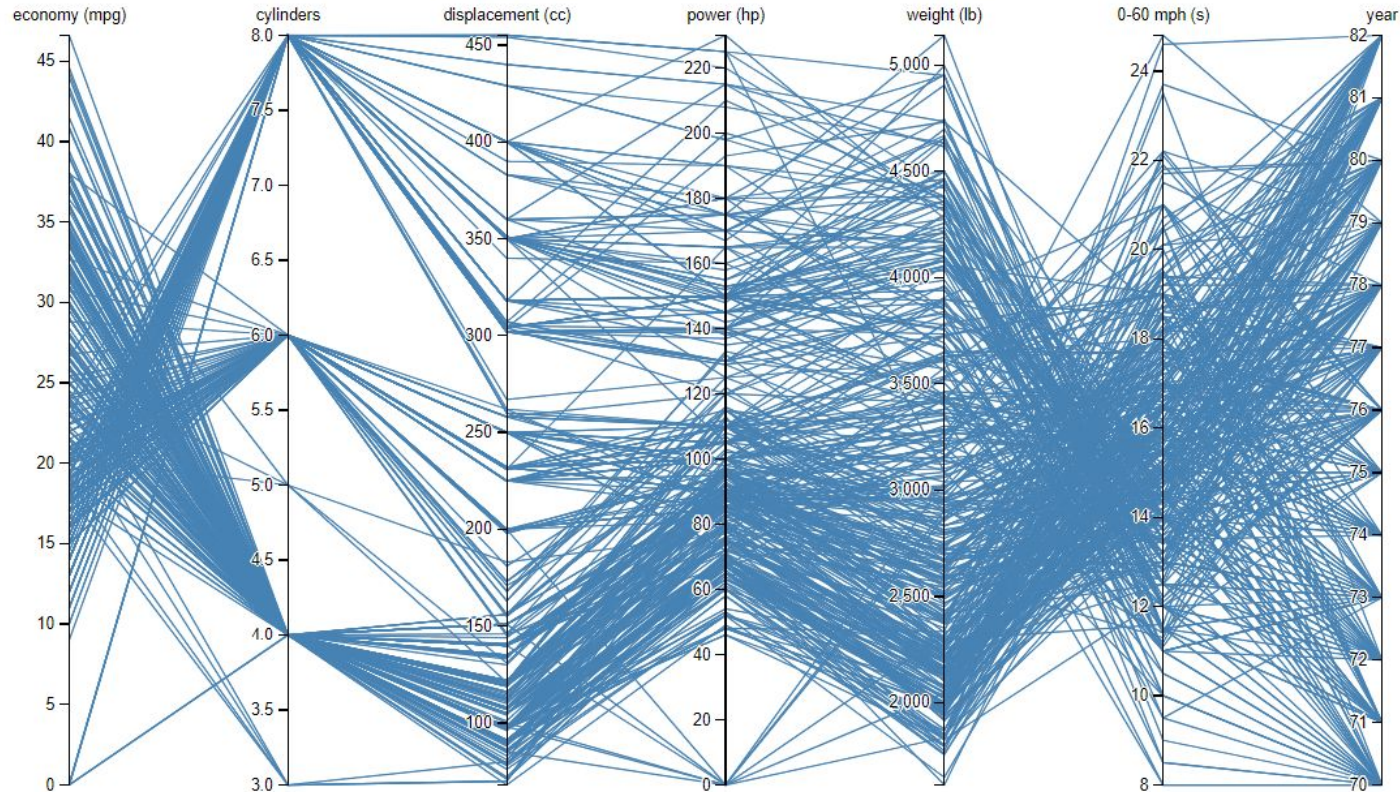


(c)

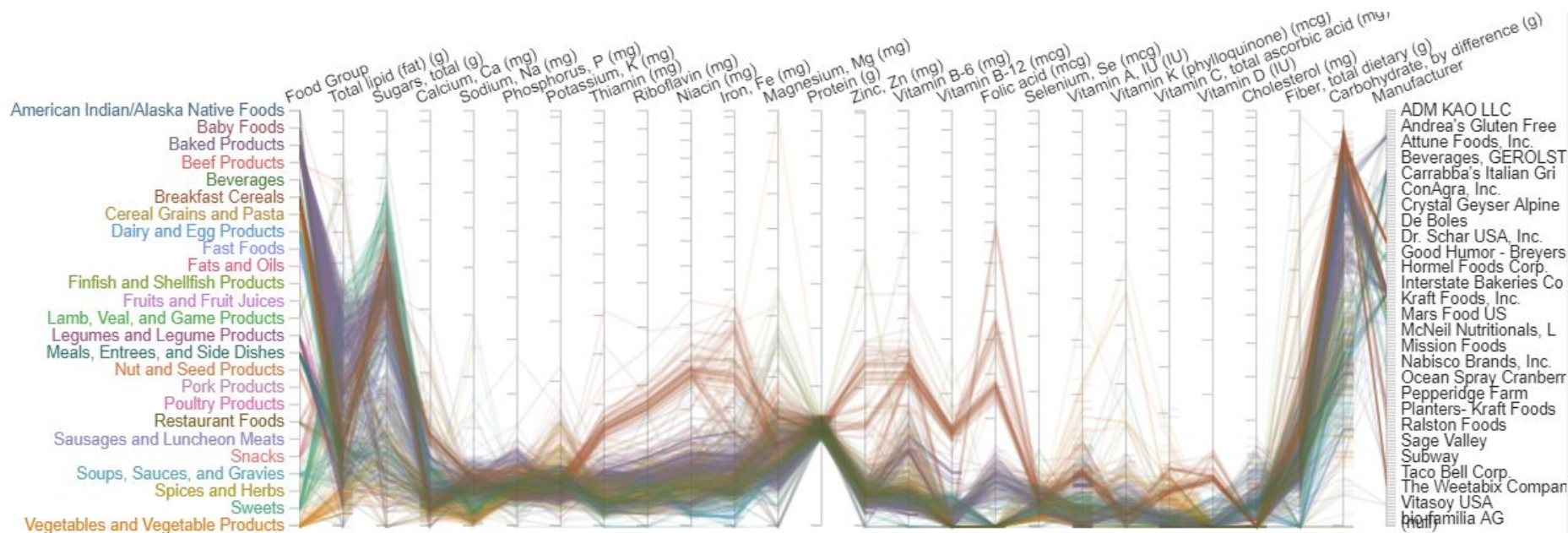


(d)

Parallel Coordinates

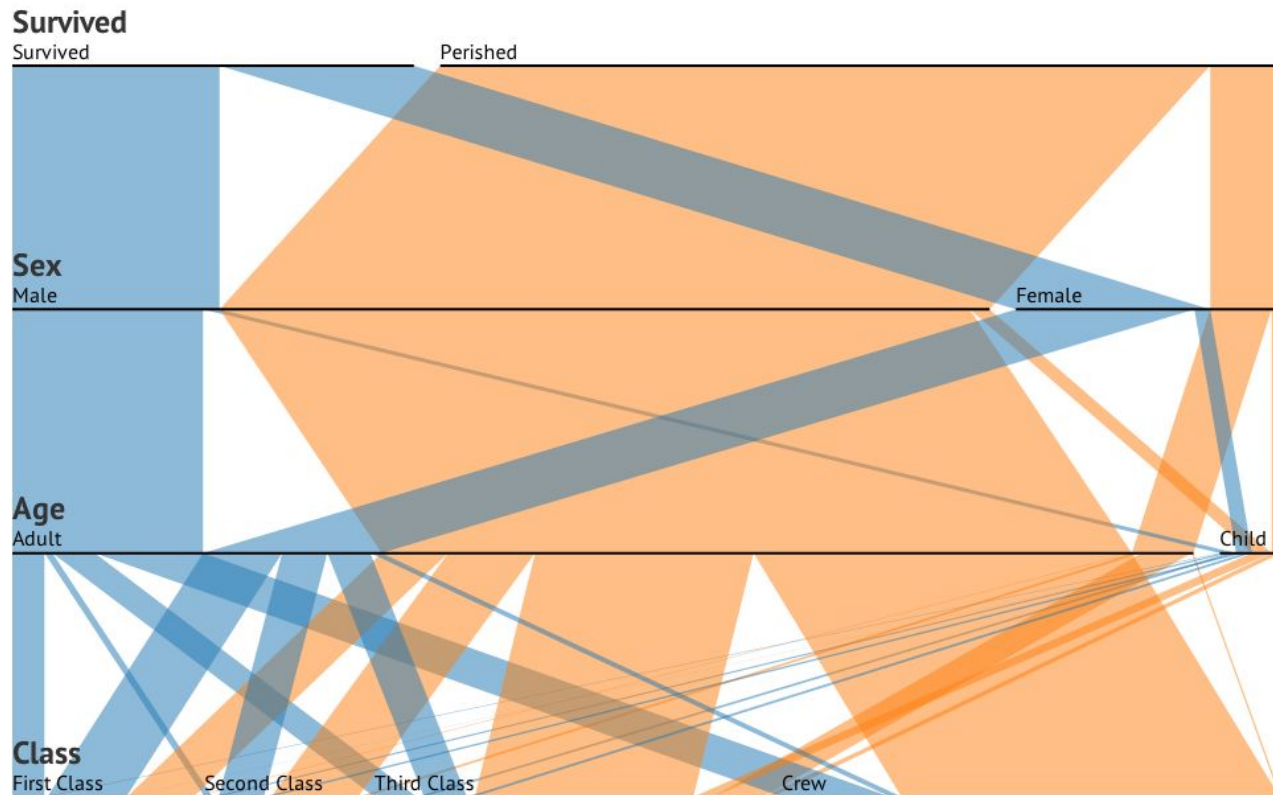


Parallel coordinates



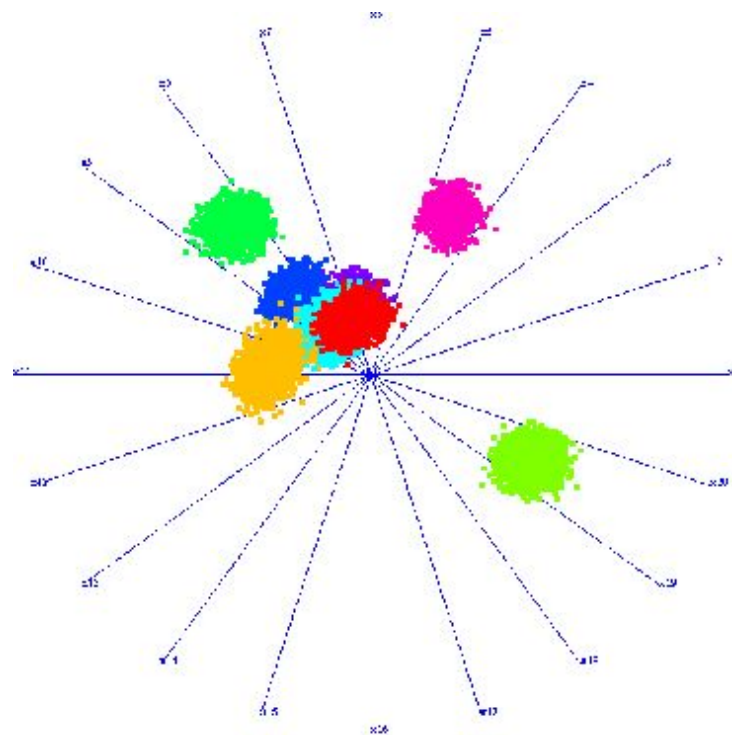
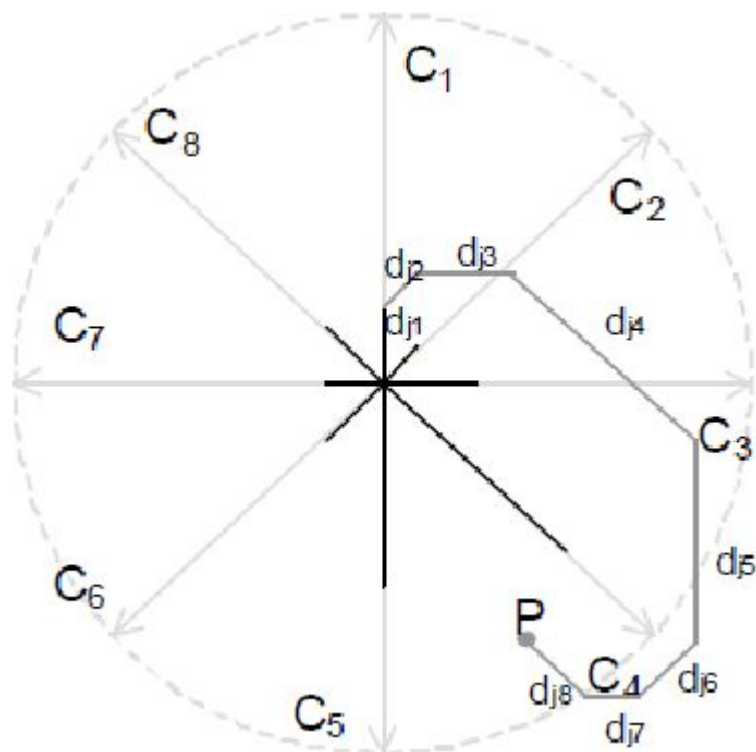
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Parallel Sets



Star Coordinates

5 7 0 6 4 1 2 0

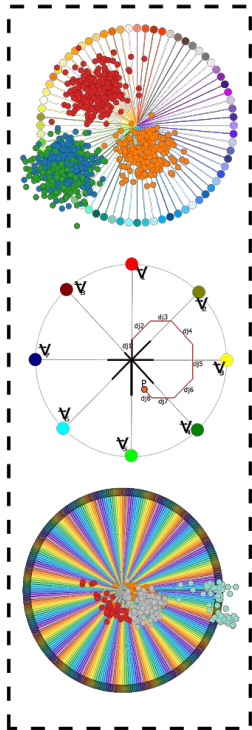


i-Star Coordinates

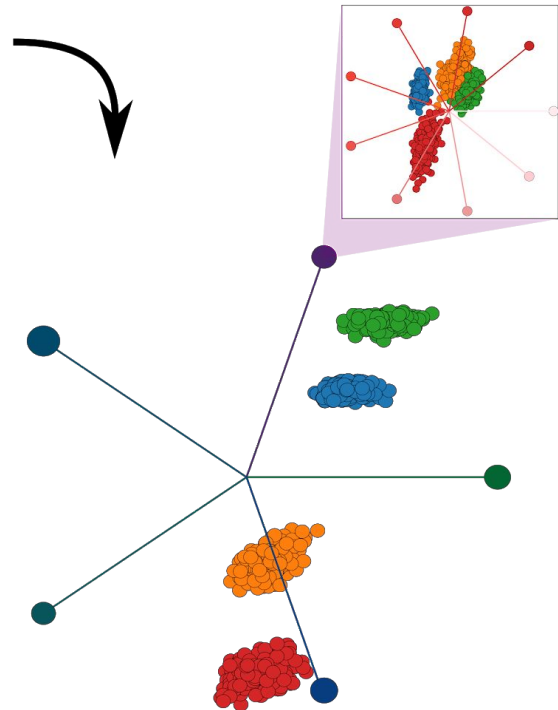
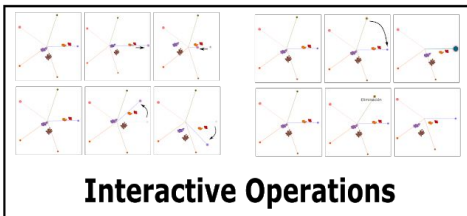
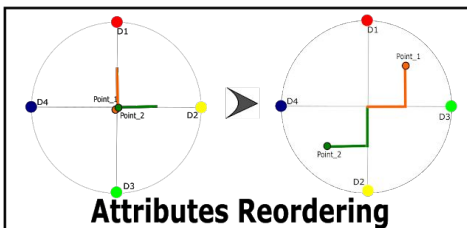
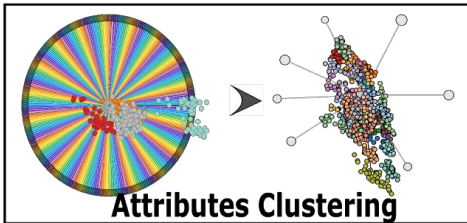
Dataset

[illegible]

Linear Mapping

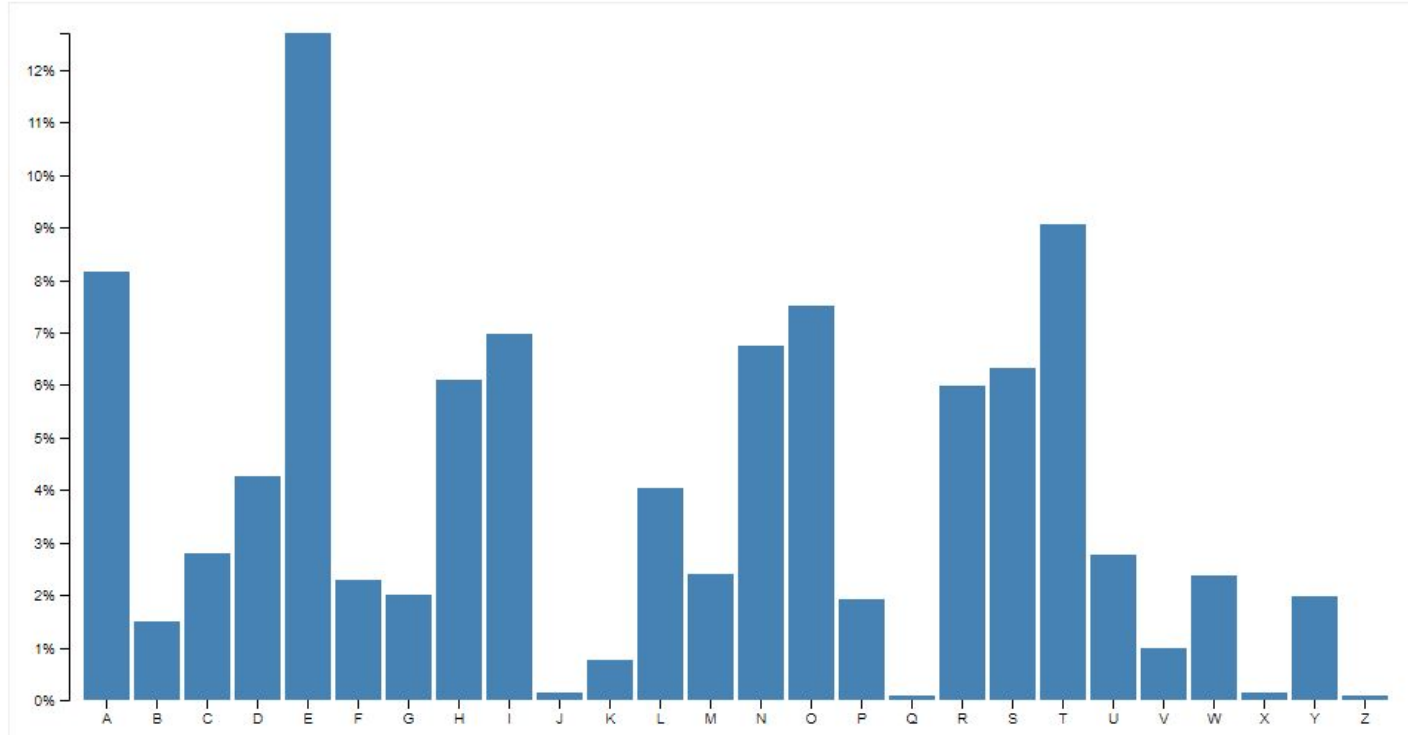


User Interaction



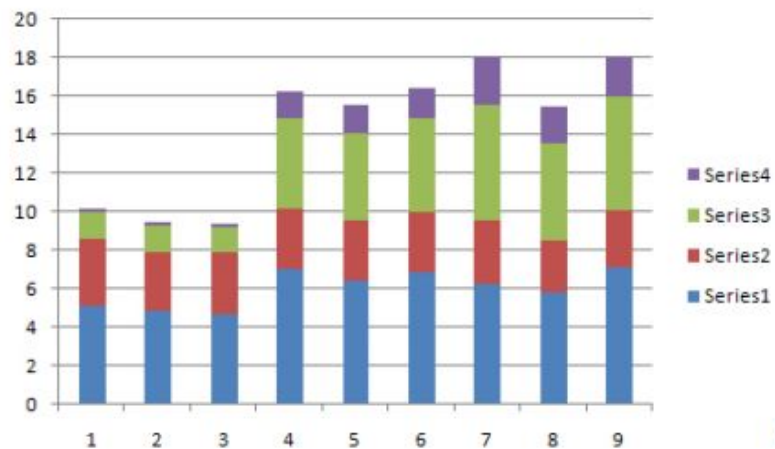
Region based

Bar chart

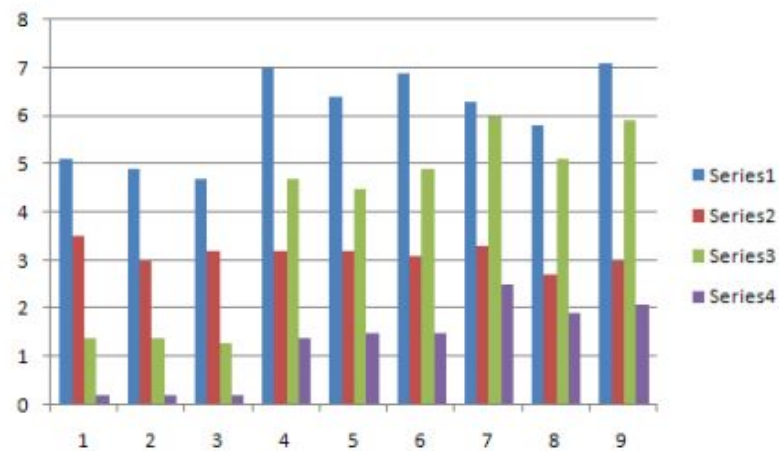


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Barchart

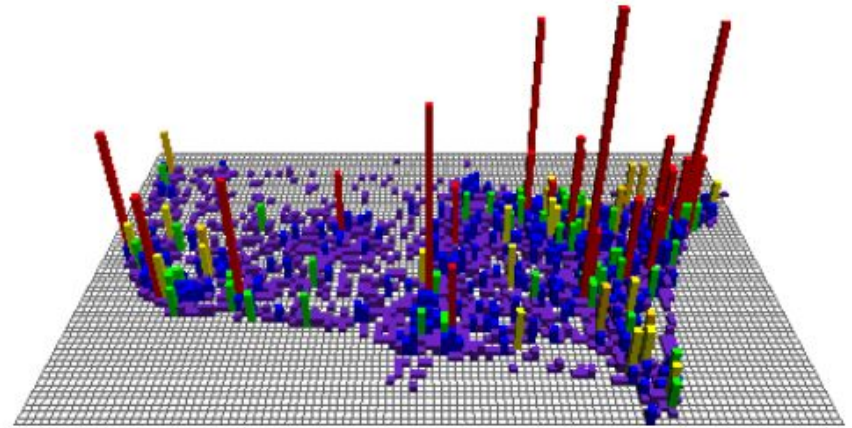
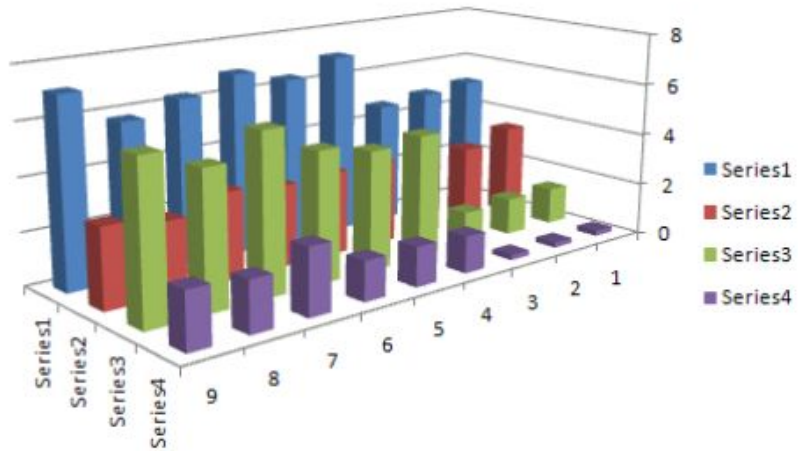


(a)

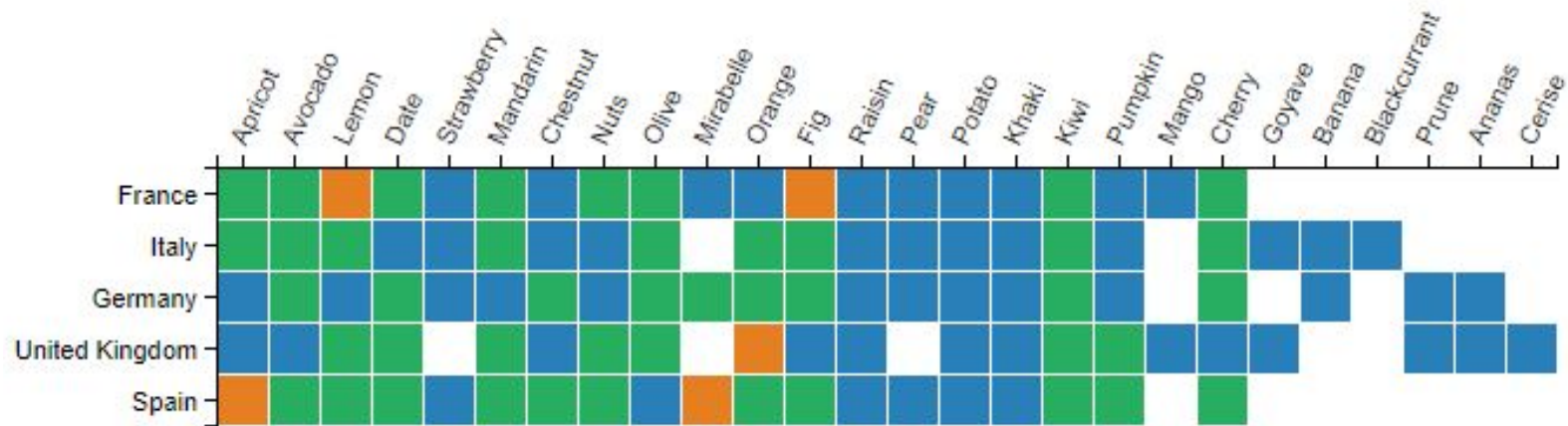


(b)

Barcharts



Heatmaps



Survey plots



Hybrid methods

<https://www.youtube.com/watch?v=bm59Y8QYbAQ>

D3(d3js.org)

JavaScript library for producing dynamic, interactive data visualizations in web browsers

