

CIS 4930/6930-002

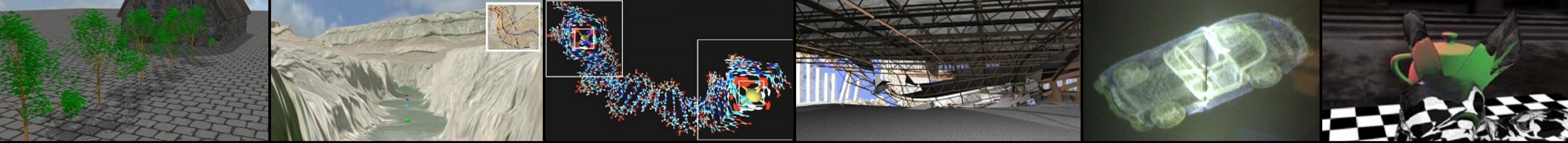
DATA VISUALIZATION



VISUALIZING SETS

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University of South Florida

slides credits Miriah Meyer (U of Utah)



REMINDERS

3/26/2018 – Paper Review 3 Due

3/28/2018 – Project 6 Due



SCHEDULE NOTES

4/5/2018 – Lecture by Ghulam Quadri
(Visualization + Stats)

4/9/2018 & 4/11/2018 – Lectures by Mustafa Hajij
(Visualization + Machine Learning)

Material from these lectures will (definitely) be on the final.



Tables

Items

Attributes

Networks & Trees

Items (nodes)

Links

Attributes

Fields

Grids

Positions

Attributes

Geometry

Items

Positions

Clusters, Sets, Lists

Items



THOUGHT EXPERIMENT...

item: lego

attributes:

???



THOUGHT EXPERIMENT...

item: lego

attributes:

color

height

width

length

shape



DATASET

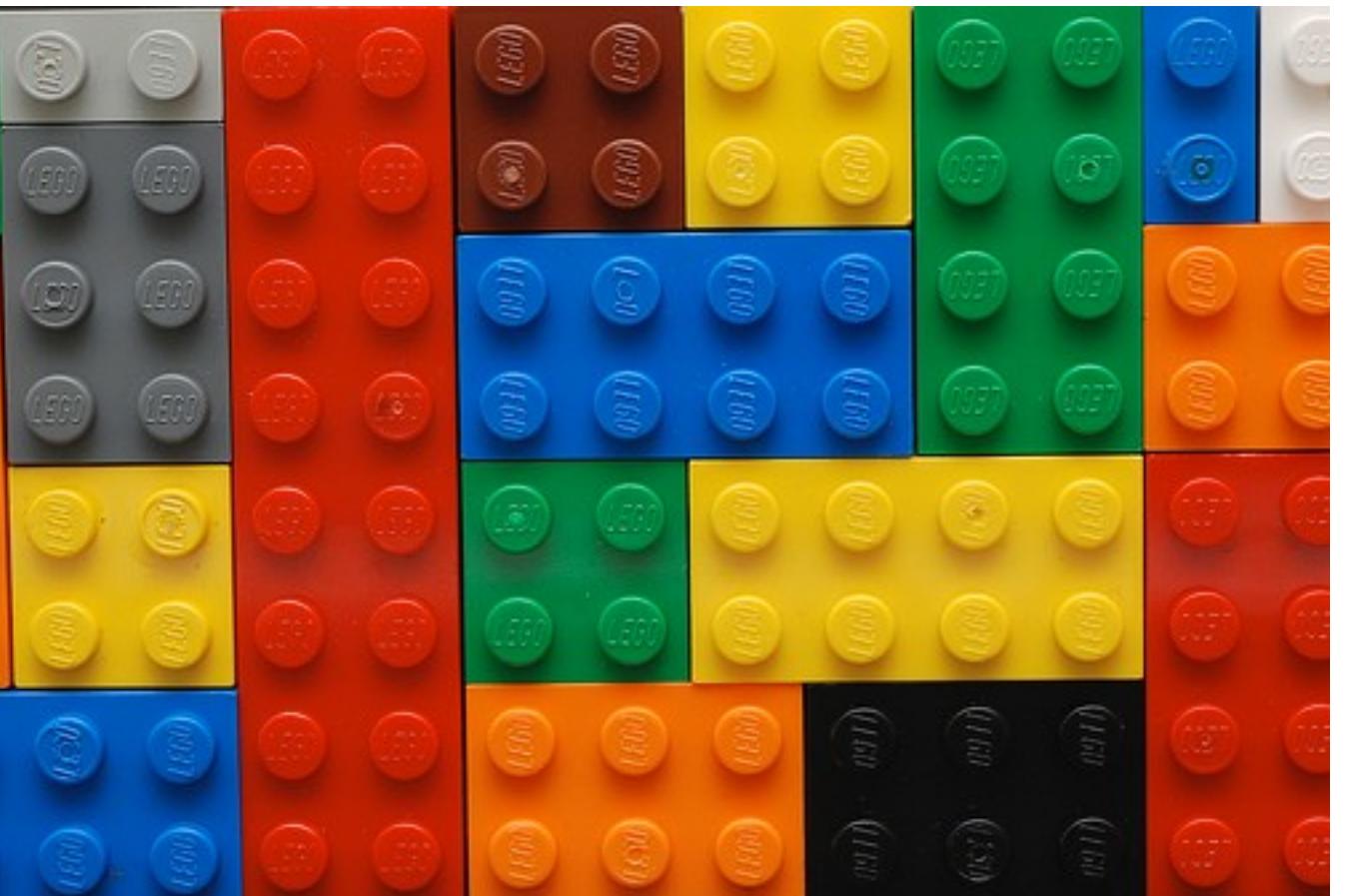


DATASET: MORE REALISTIC



DATASET

where do we start?
we need to organize!
but, how?



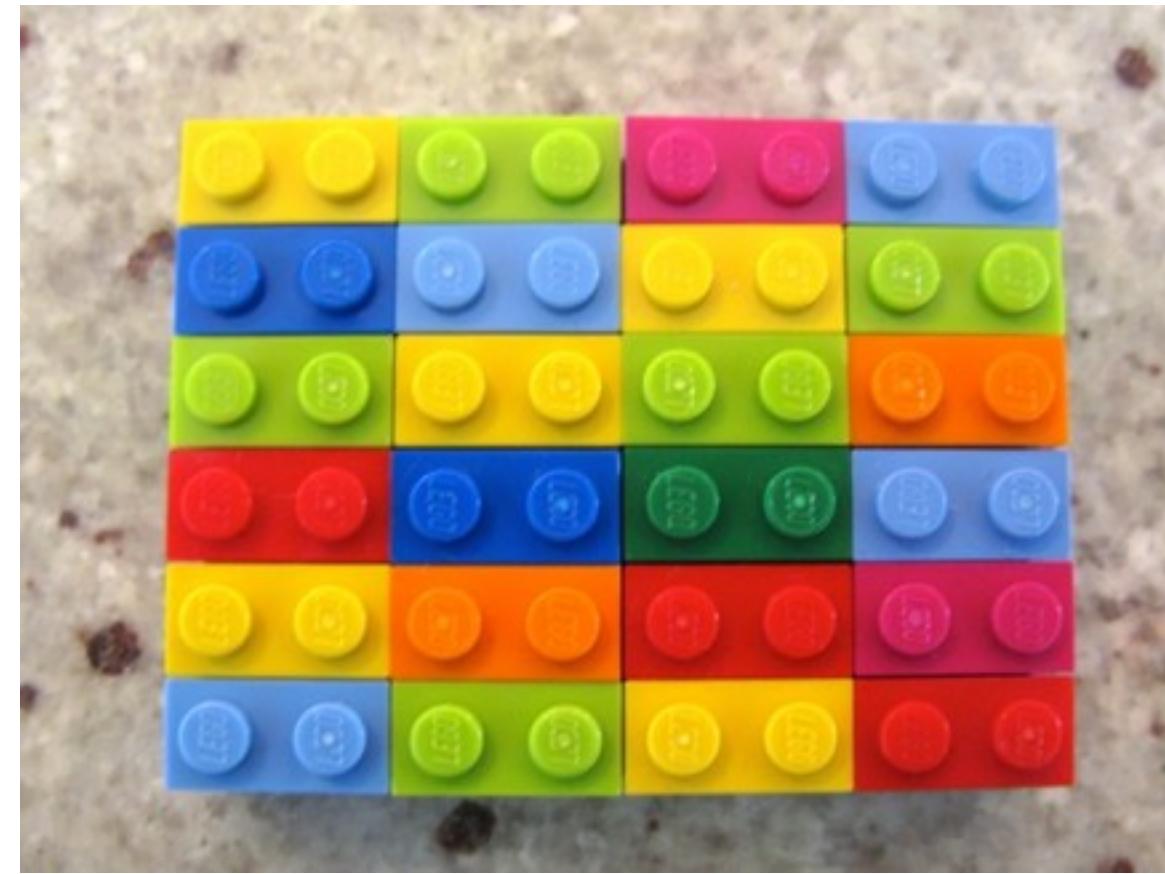
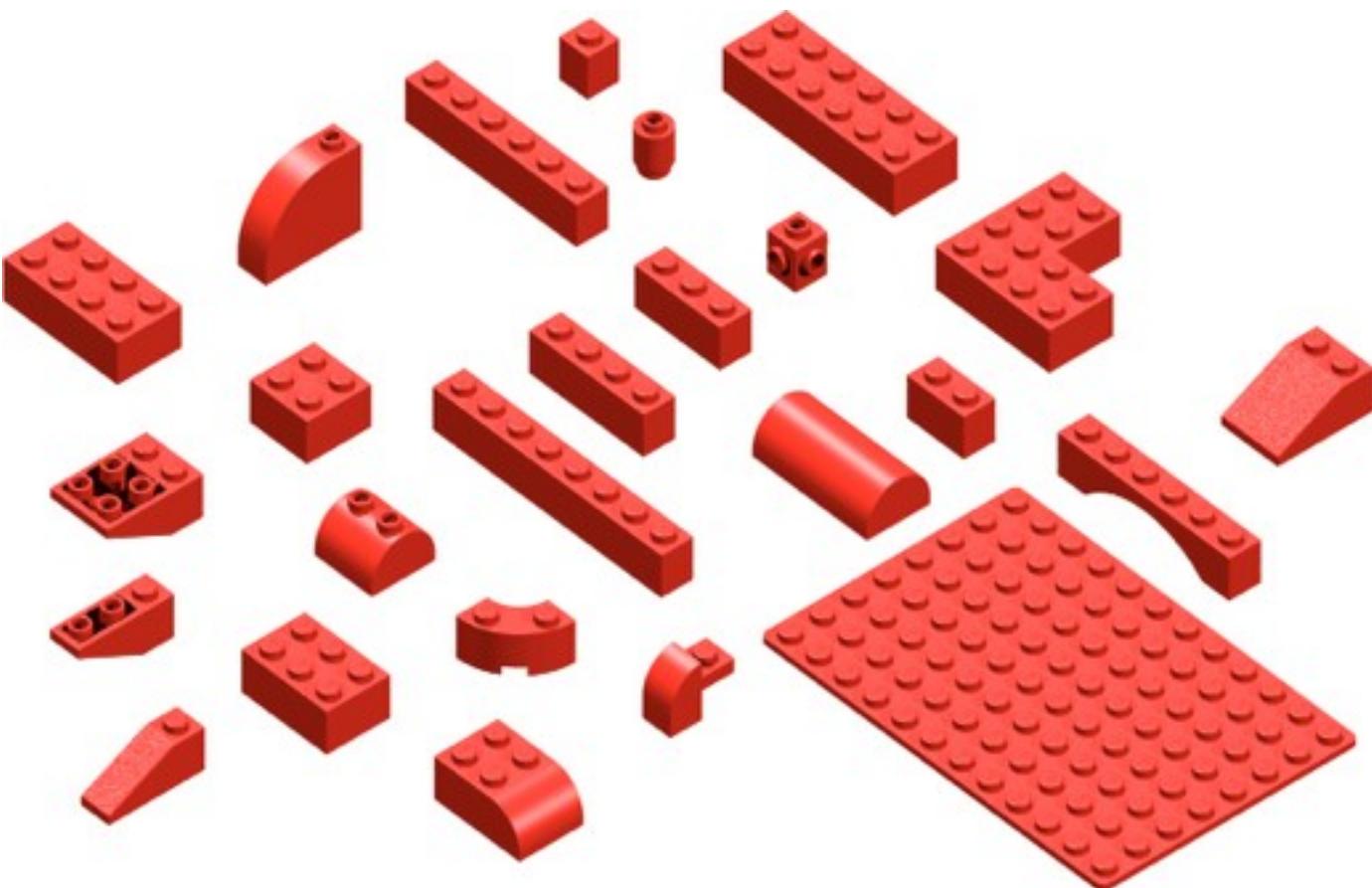
DATASET

sort by color



DATASET

sort by size, shape



DATASET

task: organization
drawbacks?



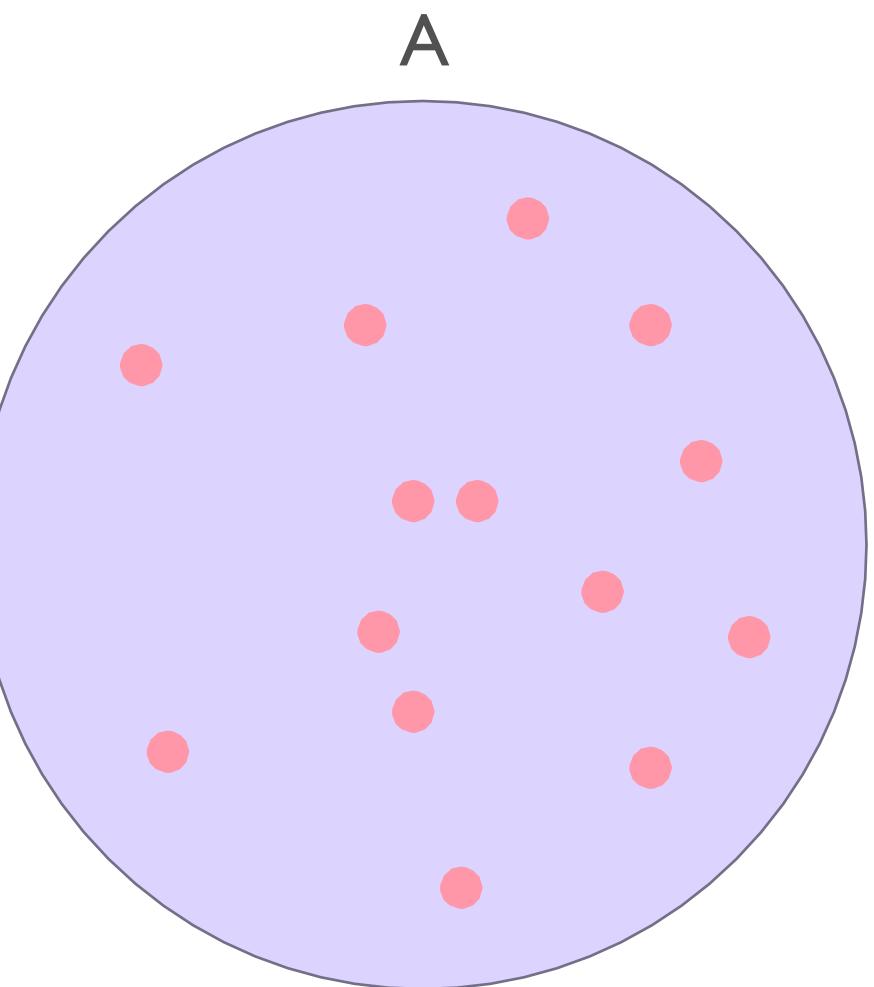
DATASET

organization leads us to a set problem
so what are sets?



SET THEORY

set
a collection of objects
some set: A



SET THEORY

set

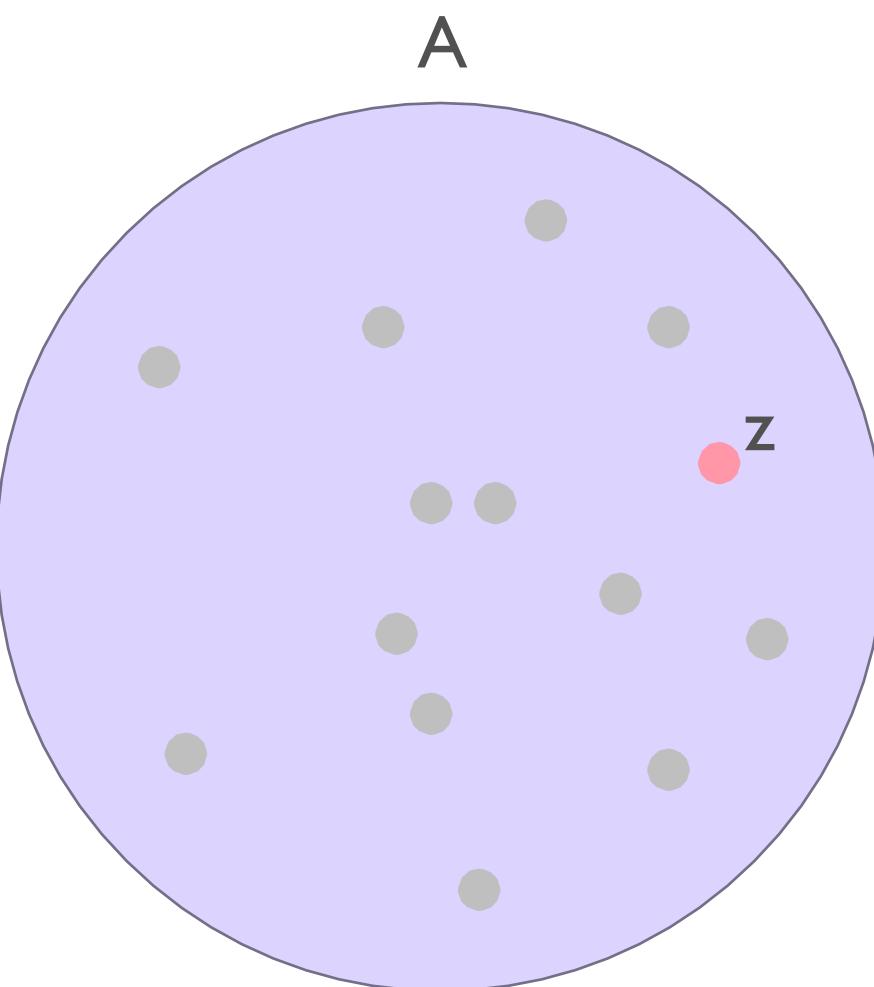
a collection of objects

some set: A

object

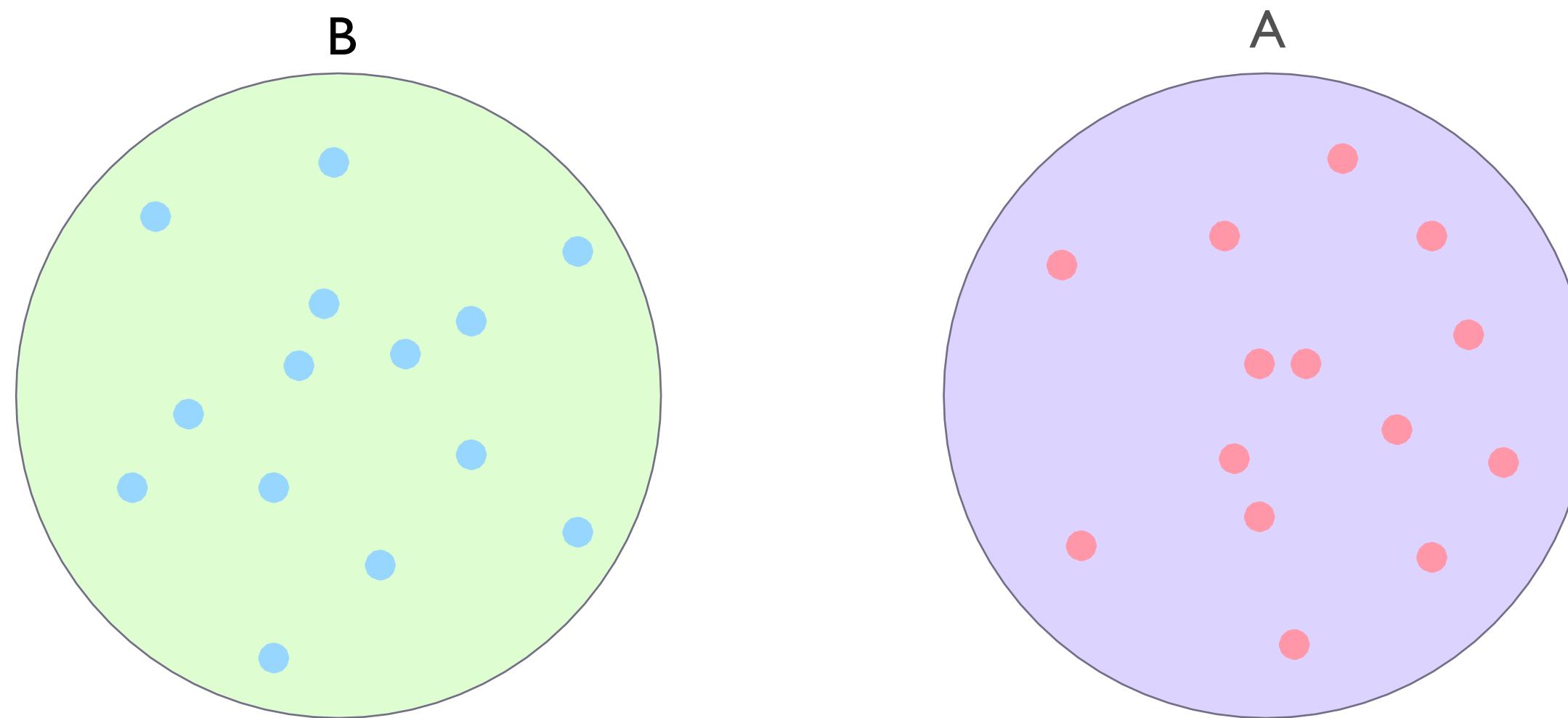
some object: z

$z \in A$



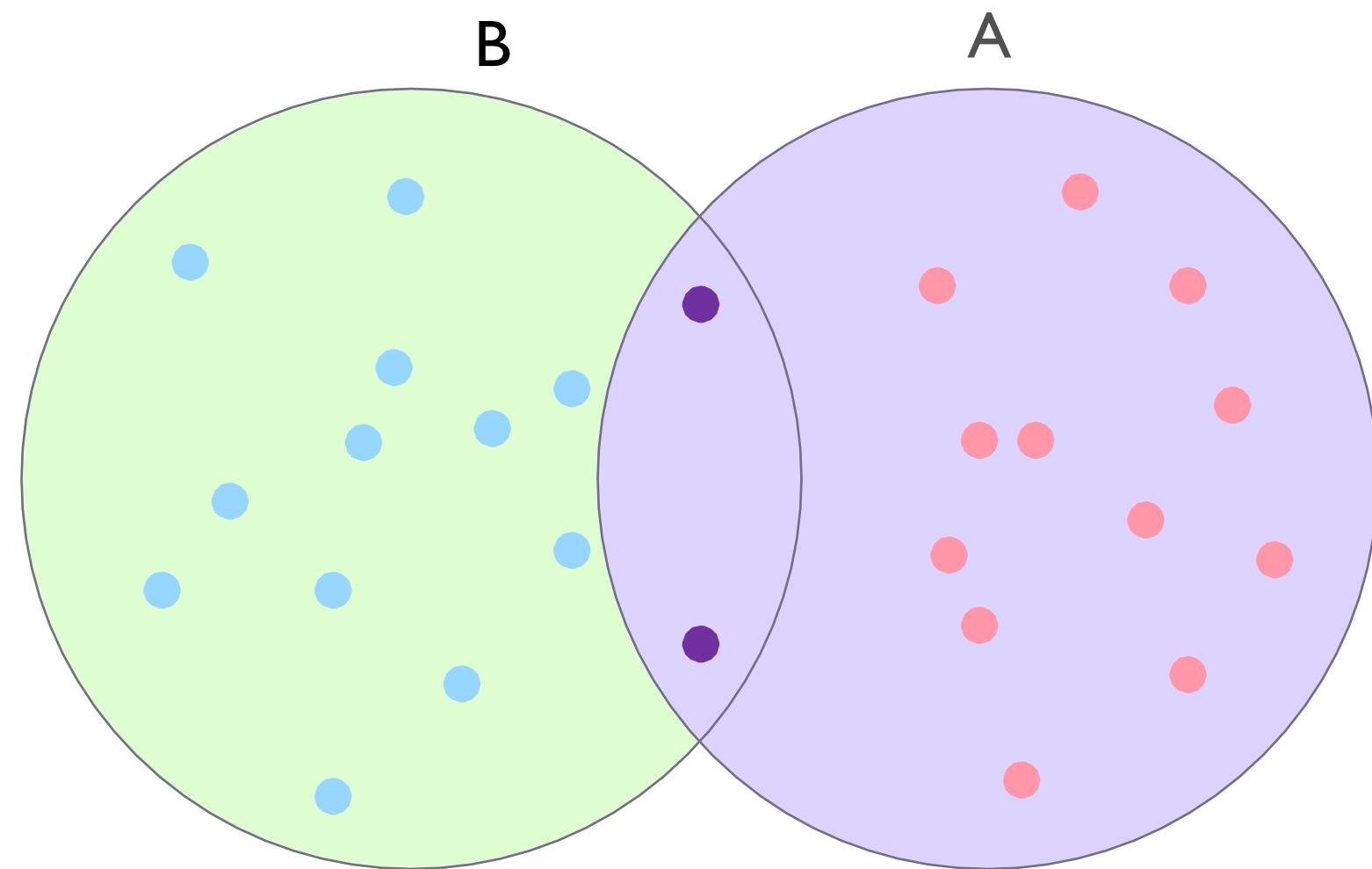
SET THEORY

multiple sets: A & B



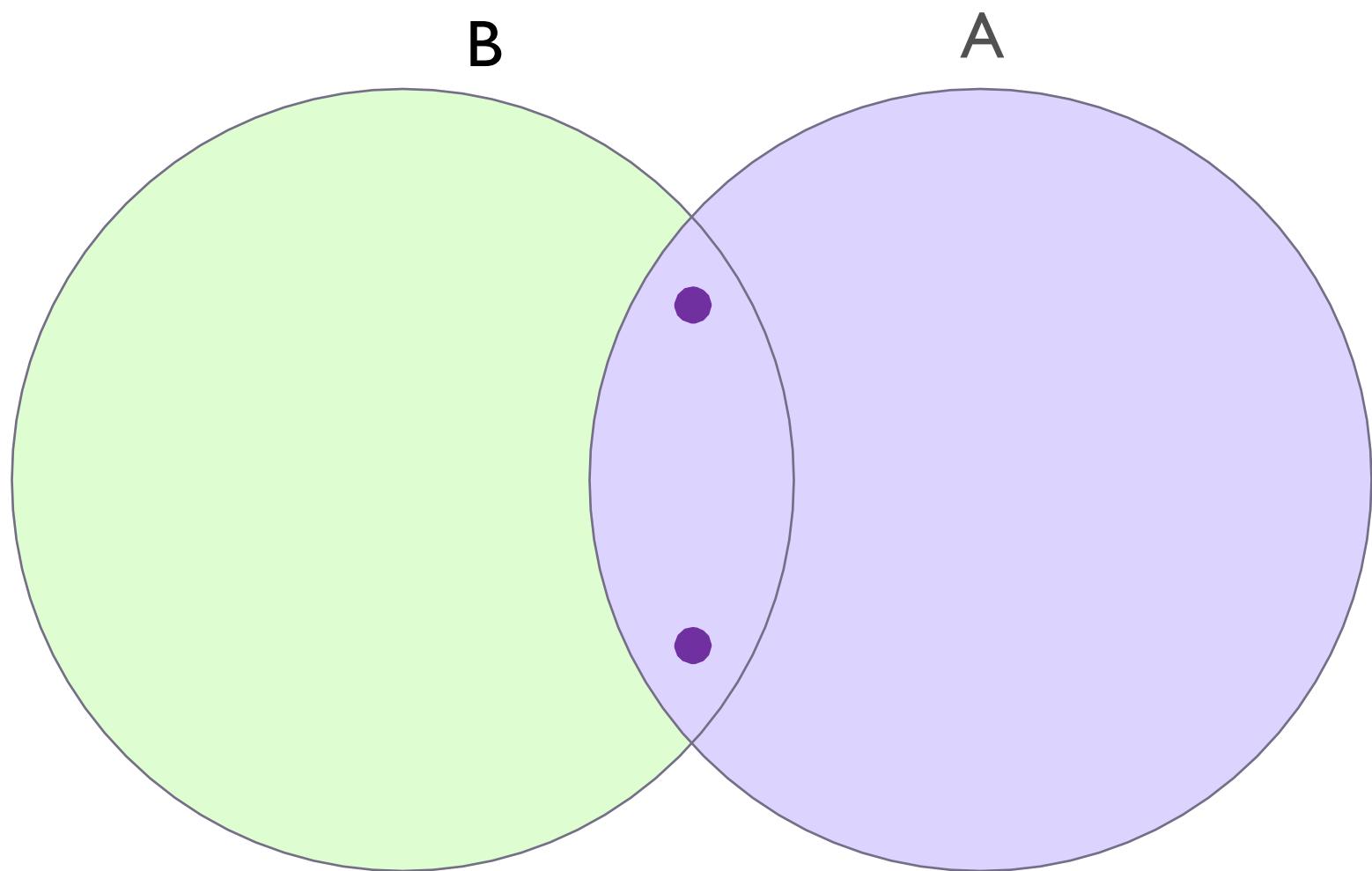
SET THEORY

union: $A \cup B$



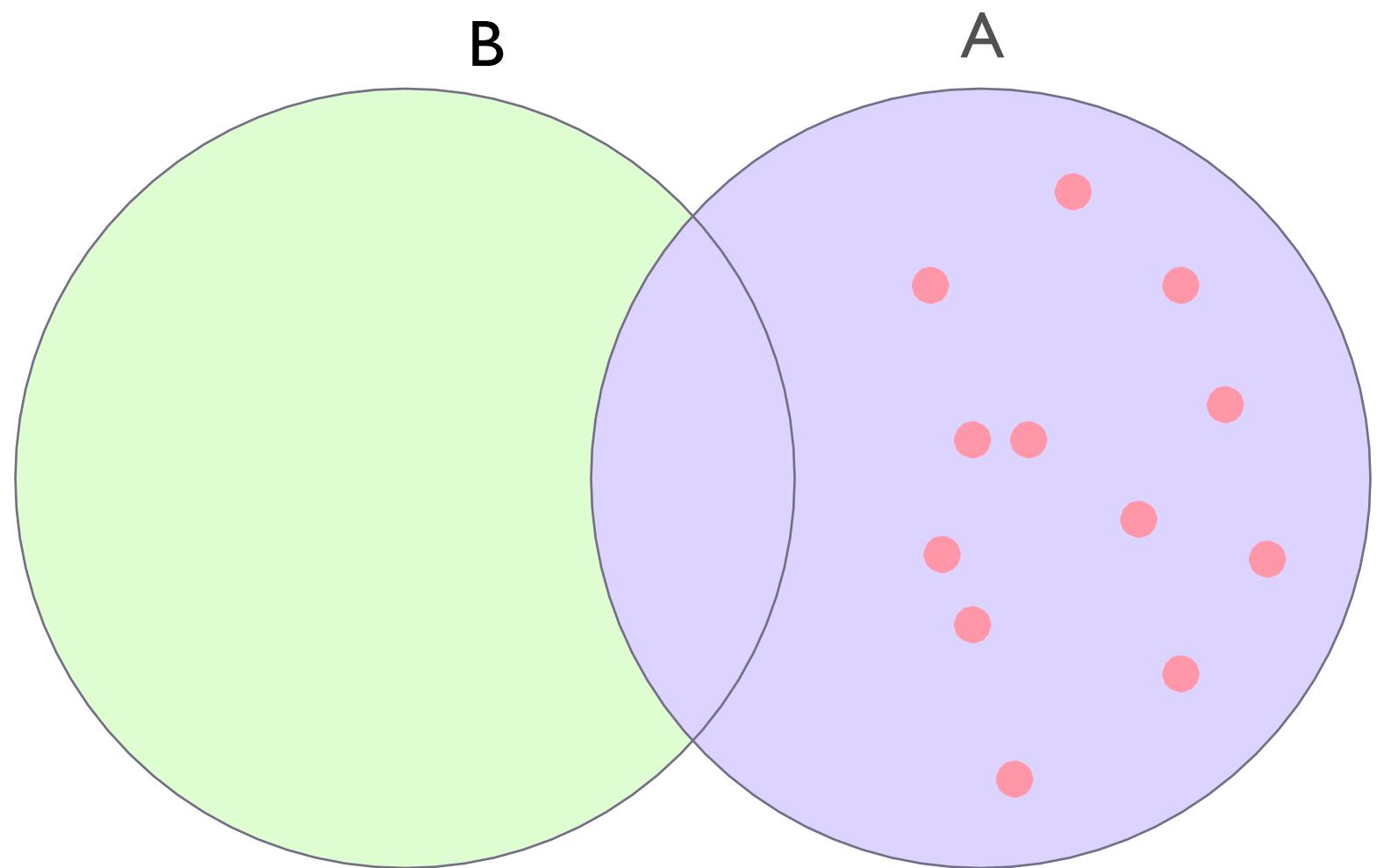
SET THEORY

intersection: $A \cap B$



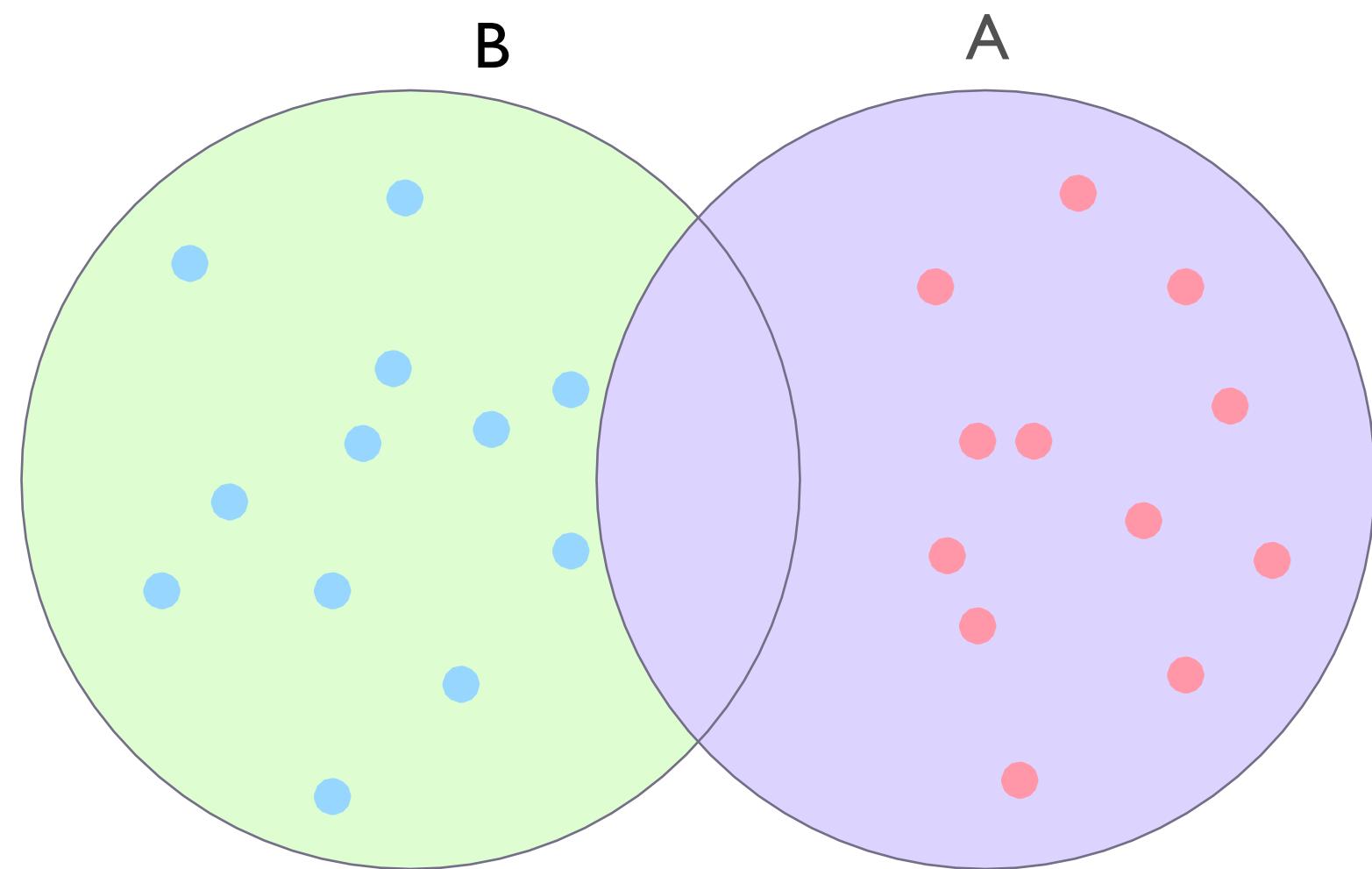
SET THEORY

set difference: $A \setminus B$



SET THEORY

symmetric difference: $A \ominus B$

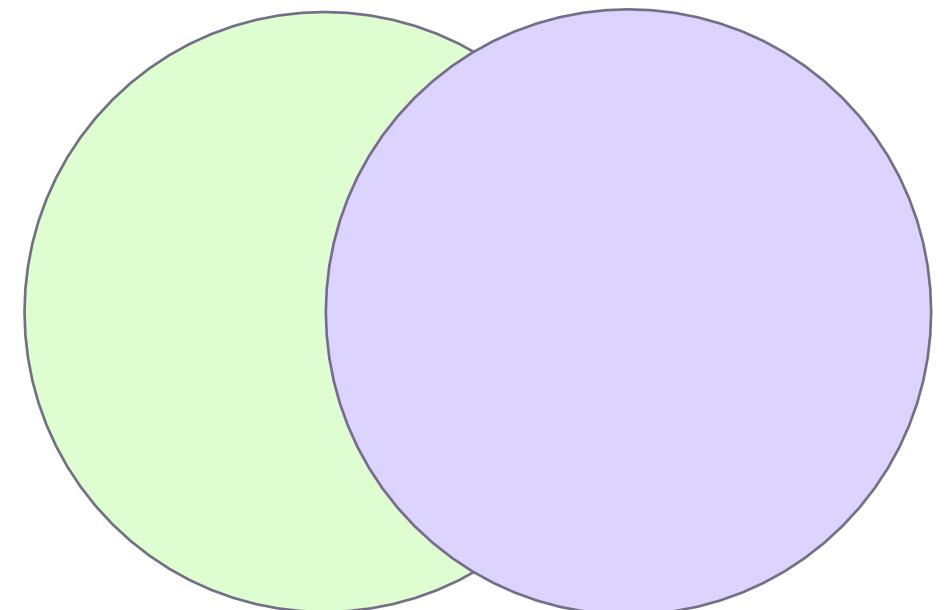


[HTTP://STUDENTS.BROWN.EDU/SEEING-
THEORY/INDEX.HTML](http://students.brown.edu/seeing-theory/index.html)

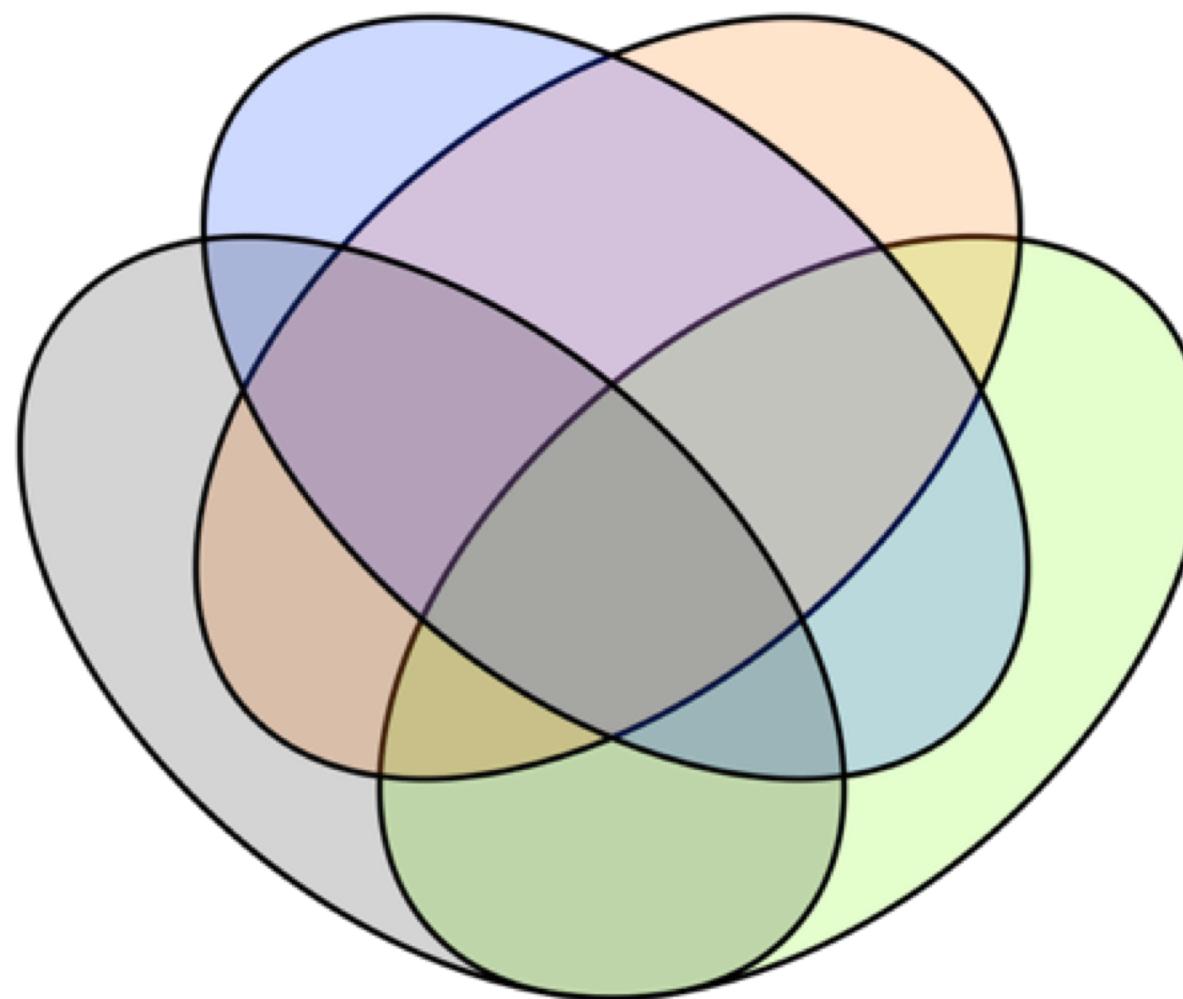
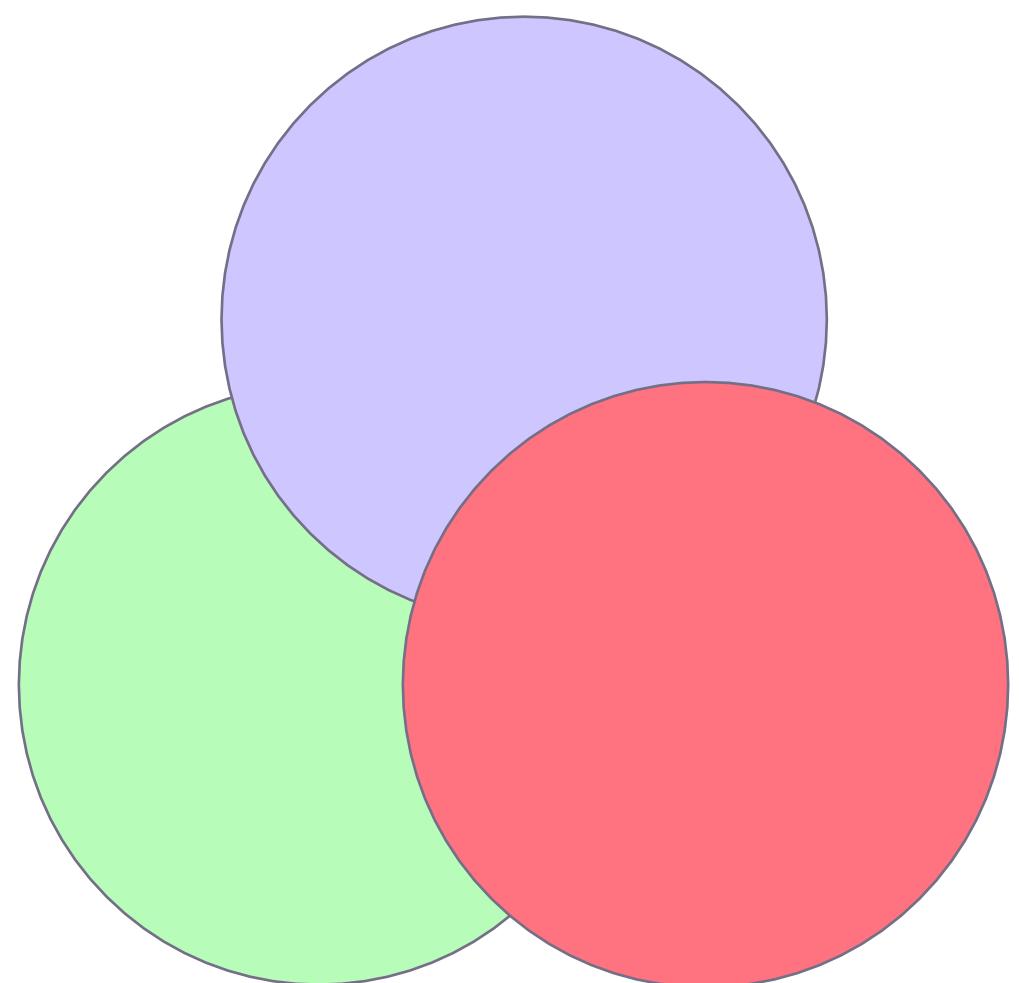


VISUALIZING SETS



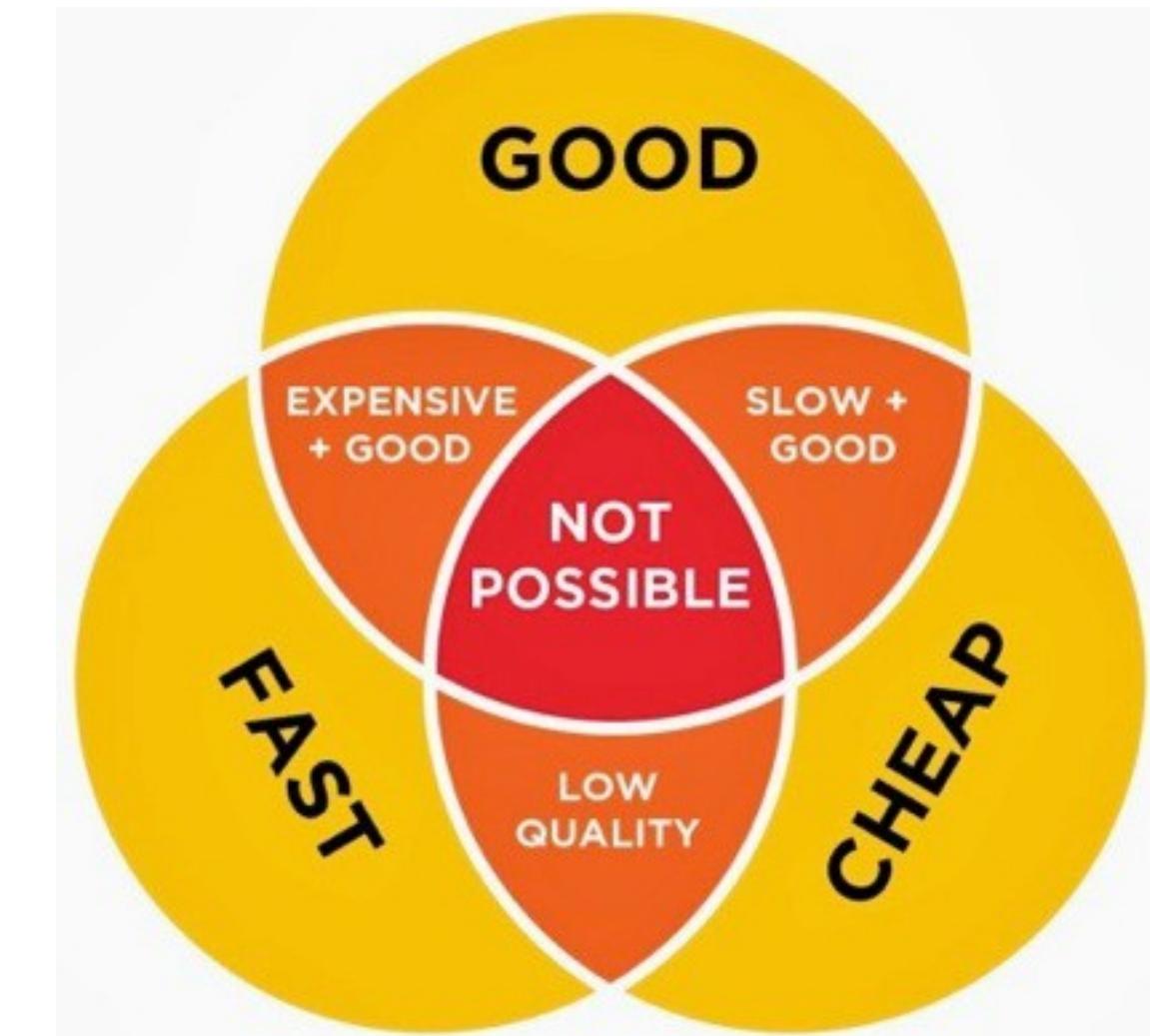
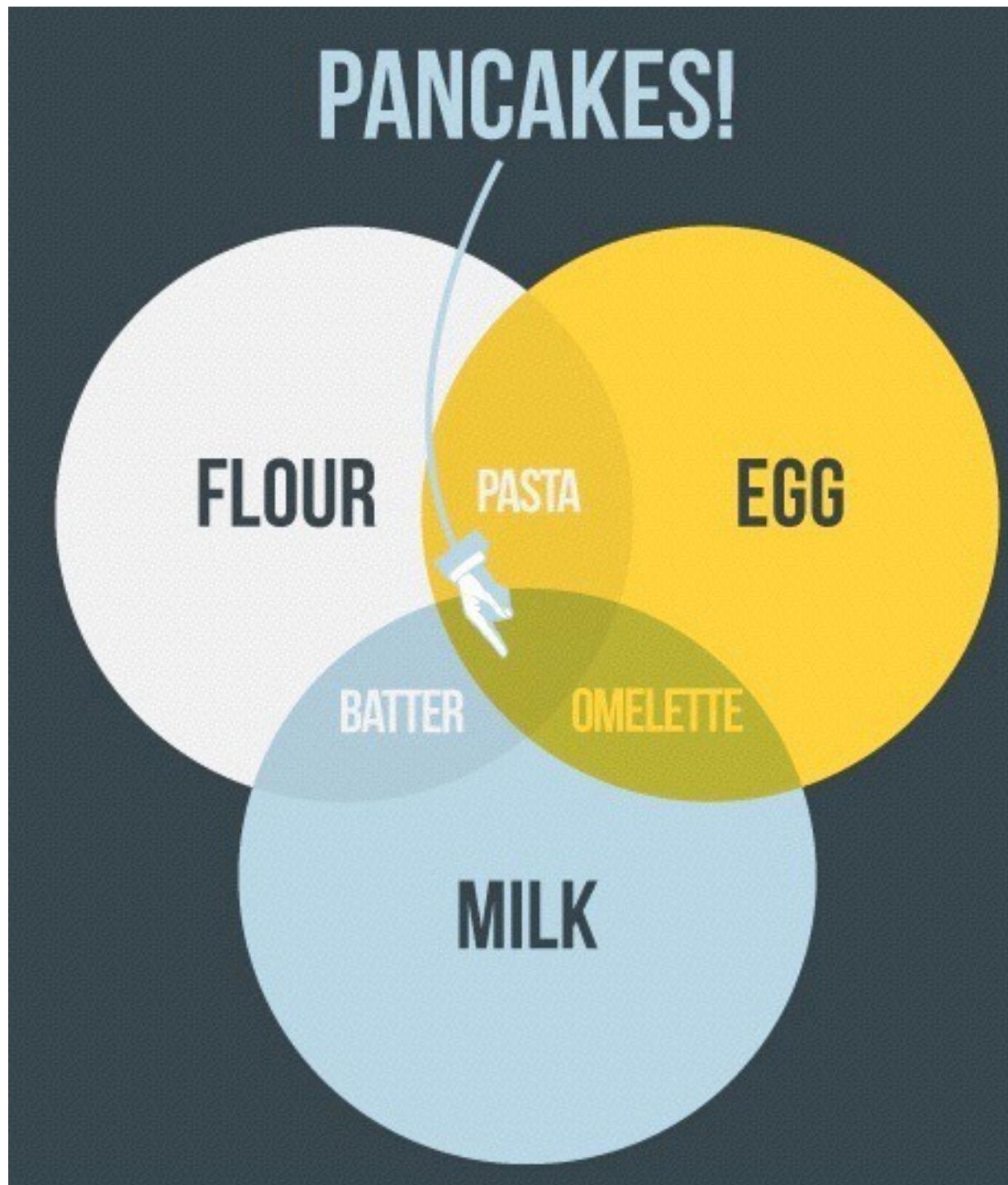


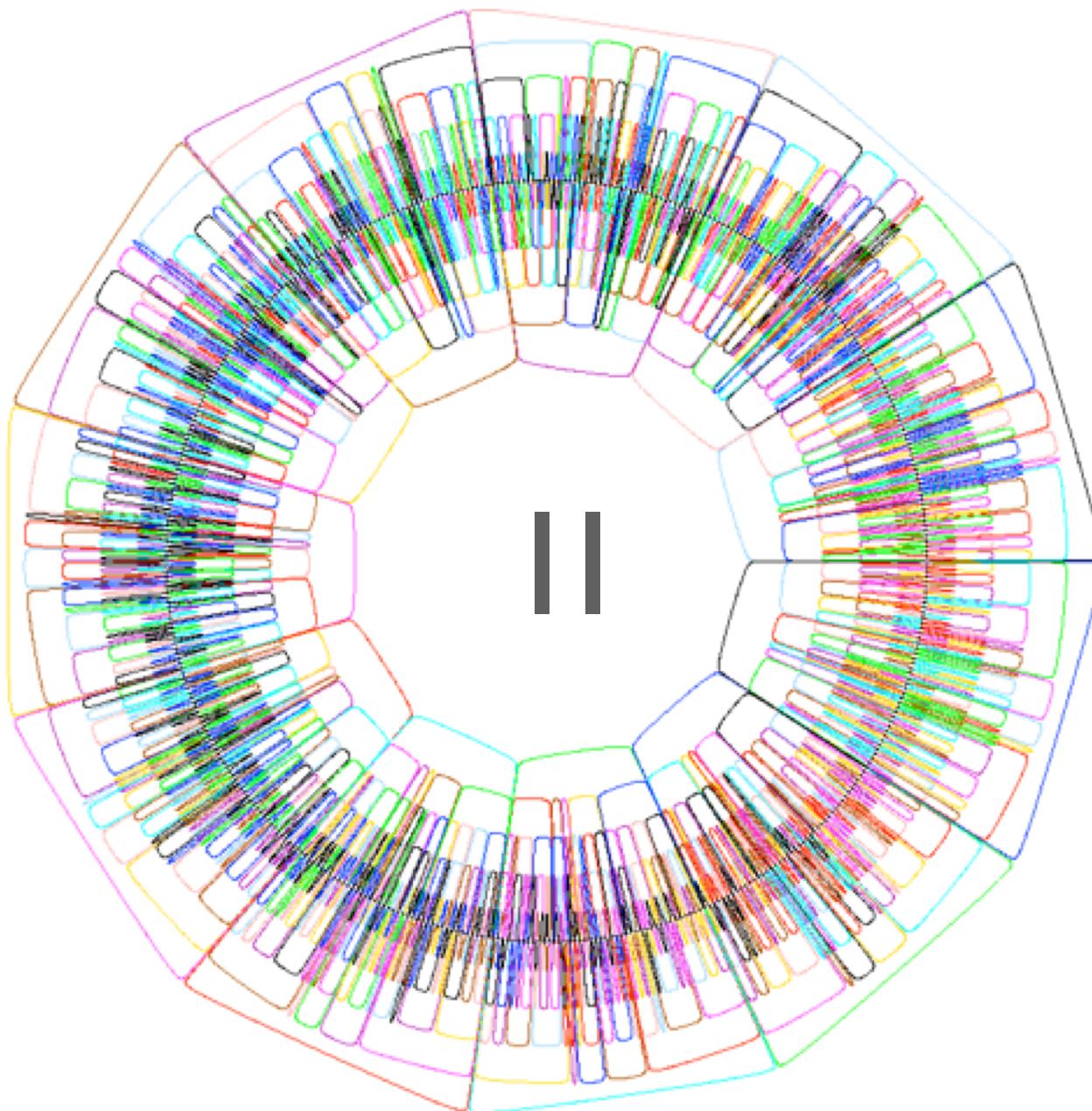
VENN DIAGRAMS
show all possible relationships



VENN DIAGRAMS

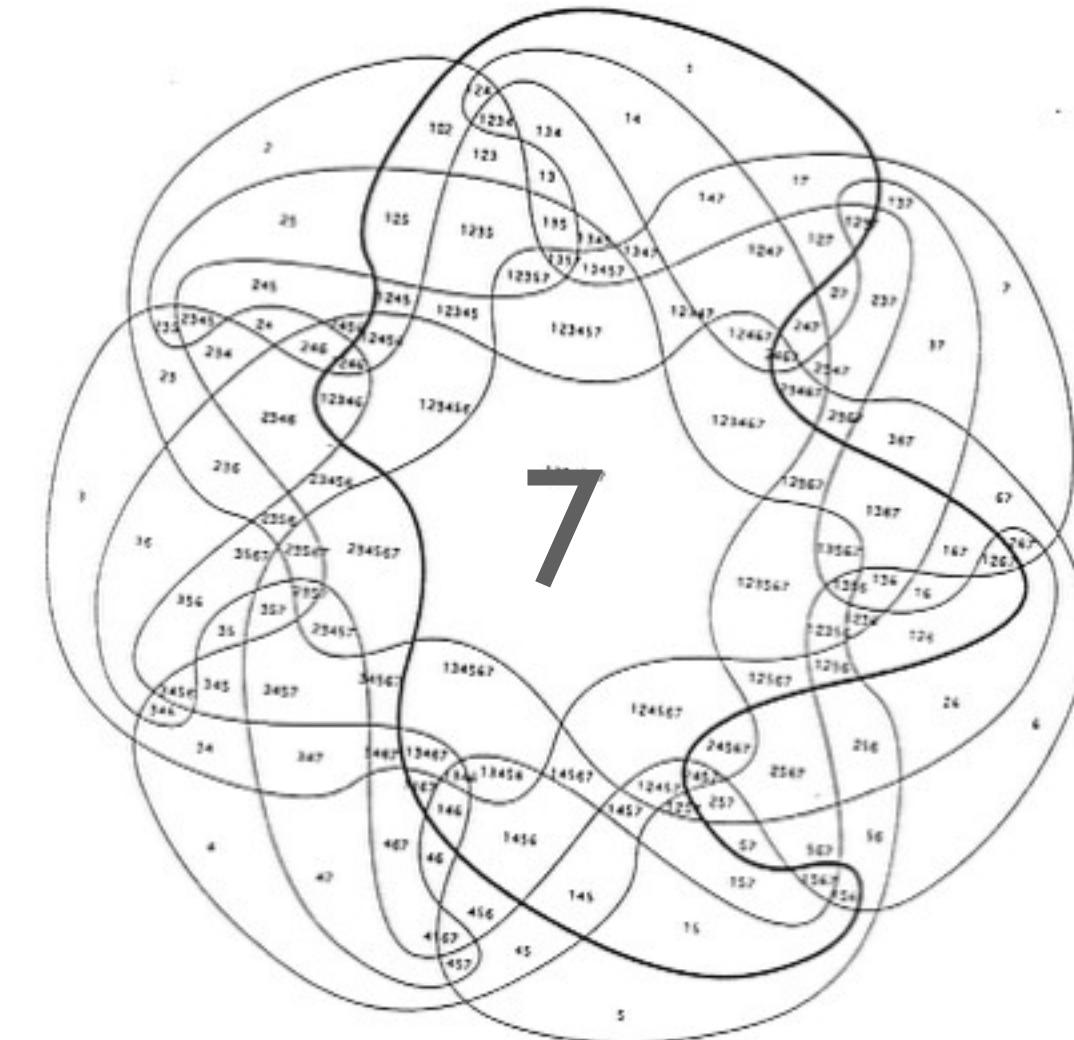
“casual infovis”





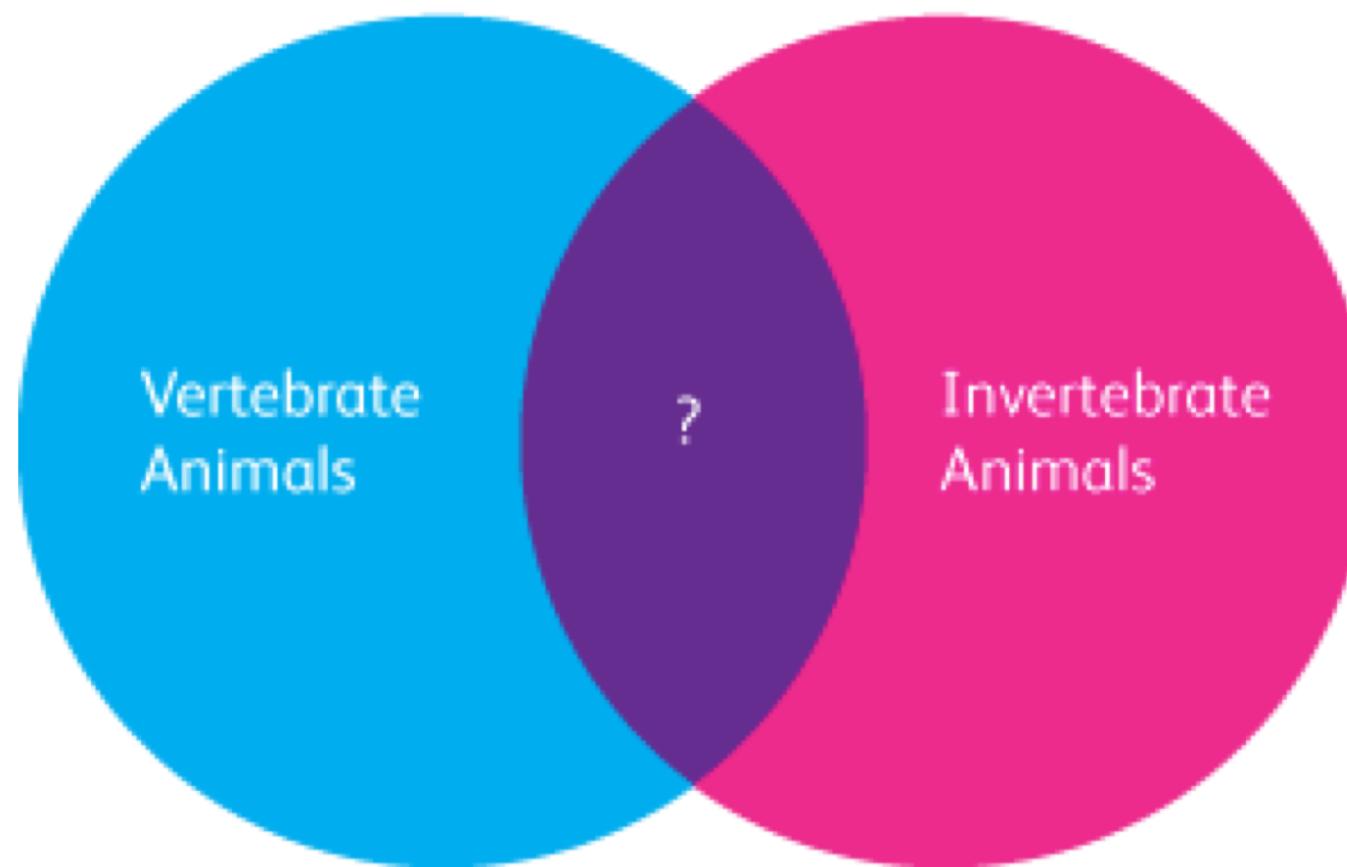
VENN DIAGRAMS

get messy fast



VENN DIAGRAMS

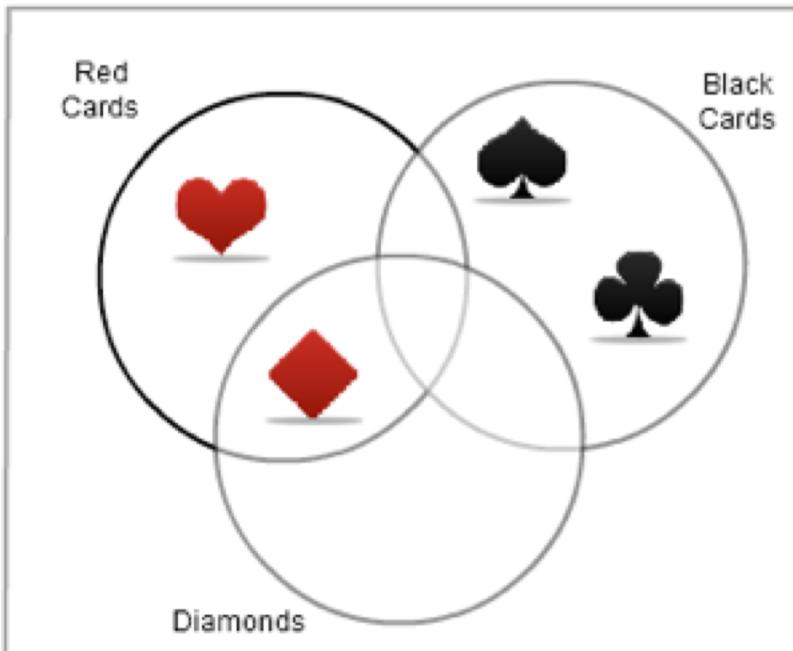
non-sensical



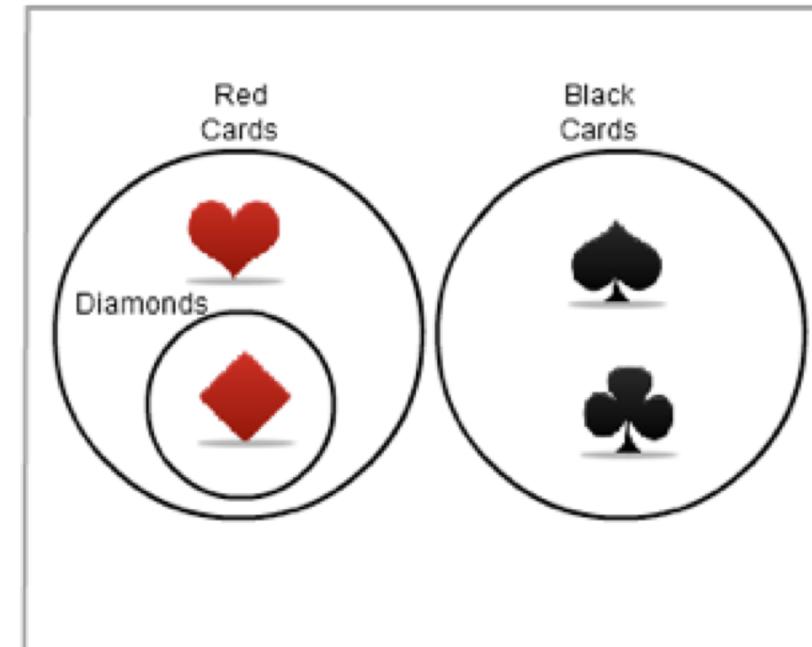
EULER DIAGRAMS

show only existing relationships

V
E
N
N

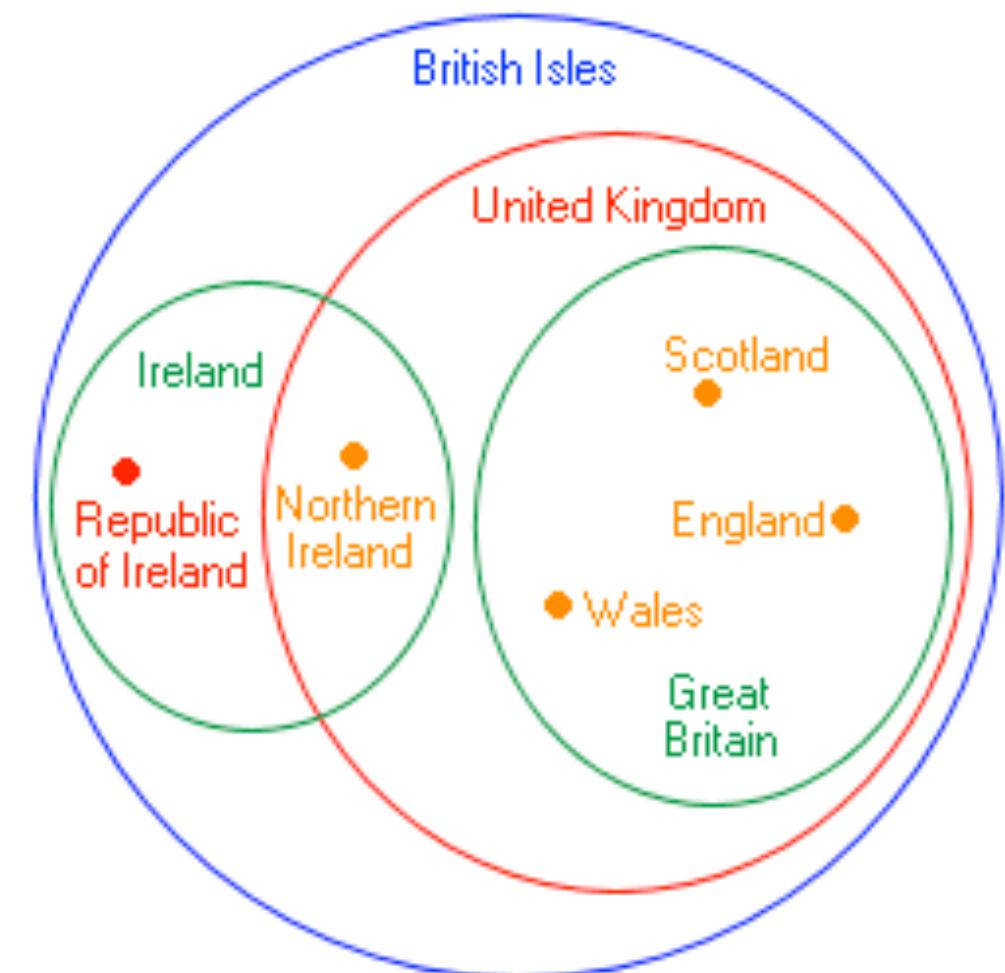


E
U
L
E
R

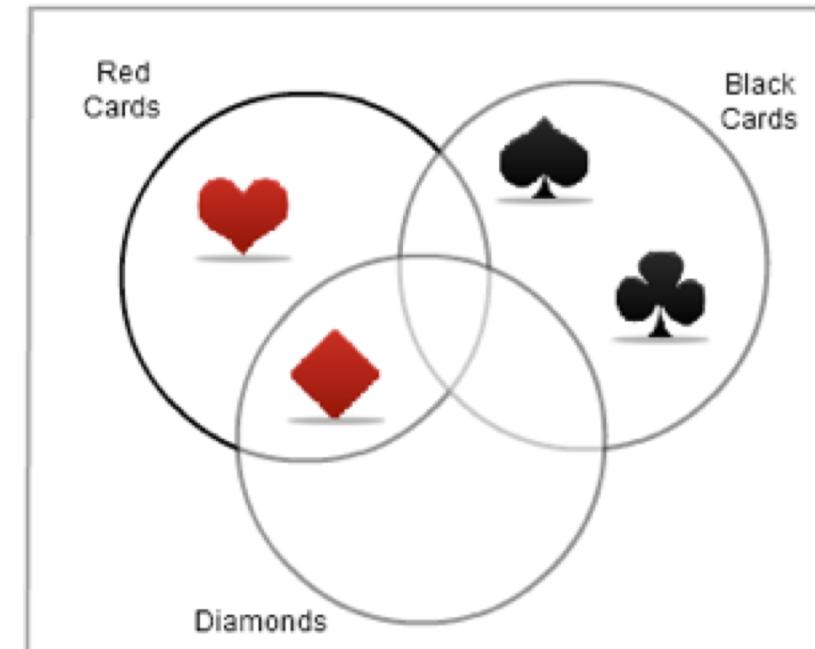


EULER DIAGRAMS

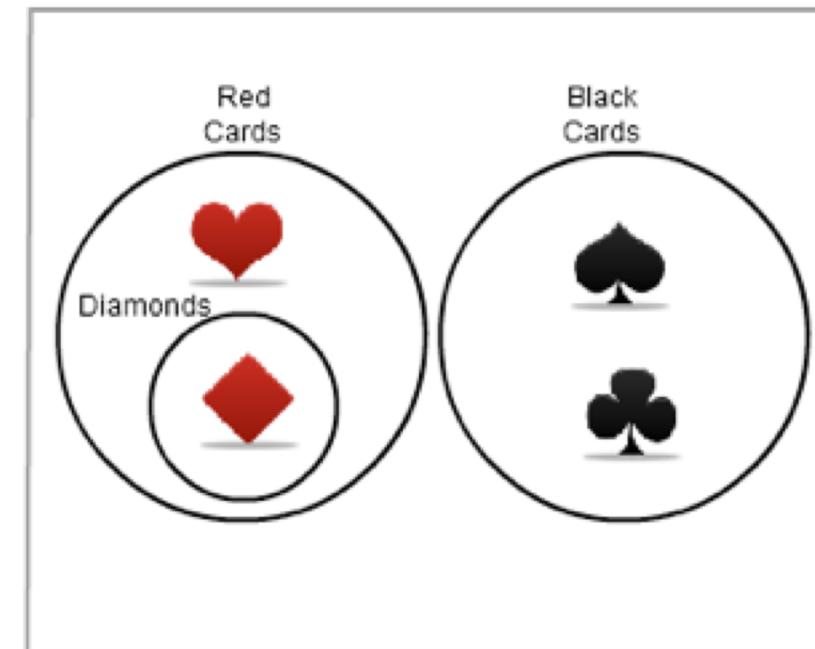
show only existing relationships



V
E
N
N



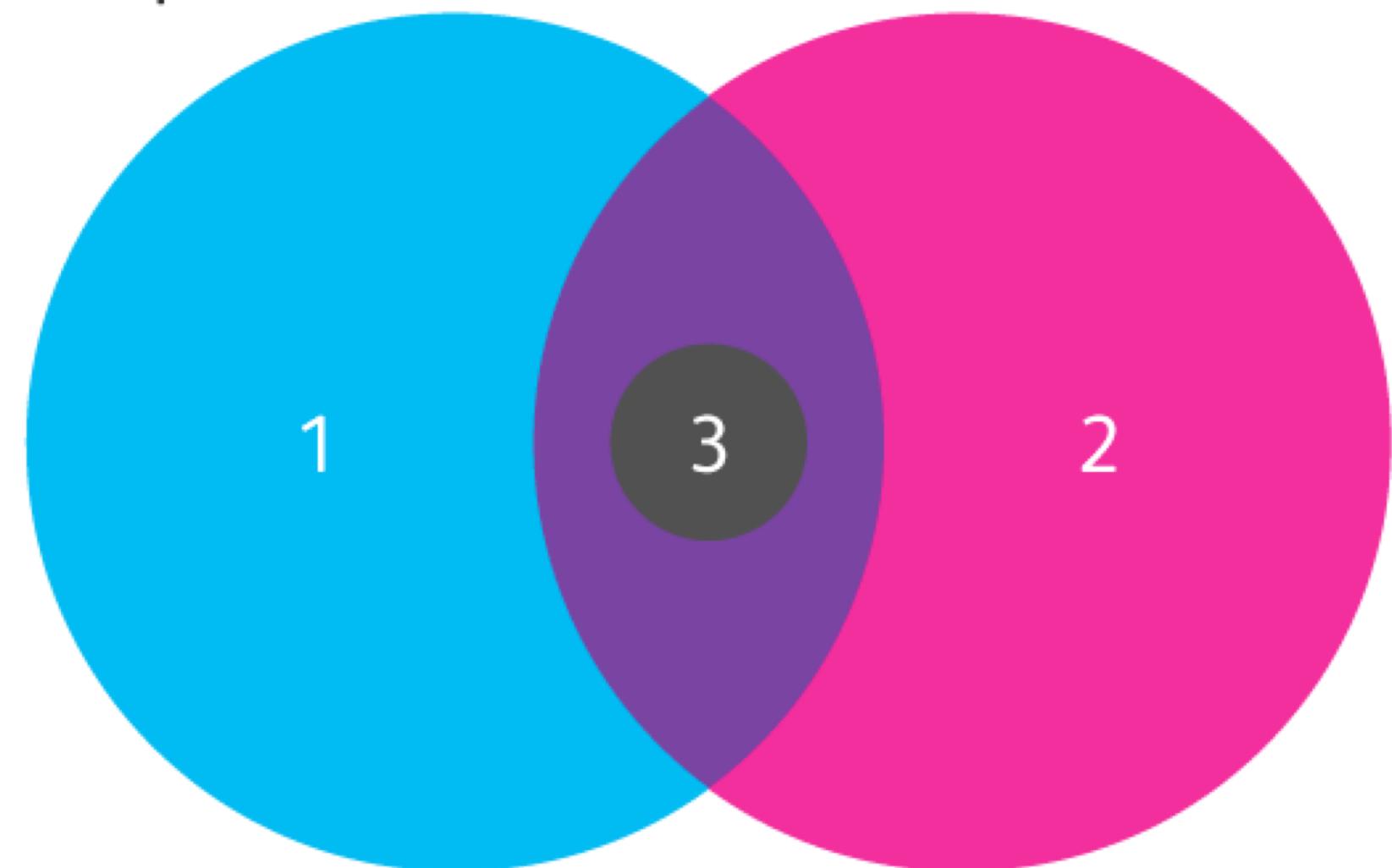
E
U
L
E
R



EULER DIAGRAMS

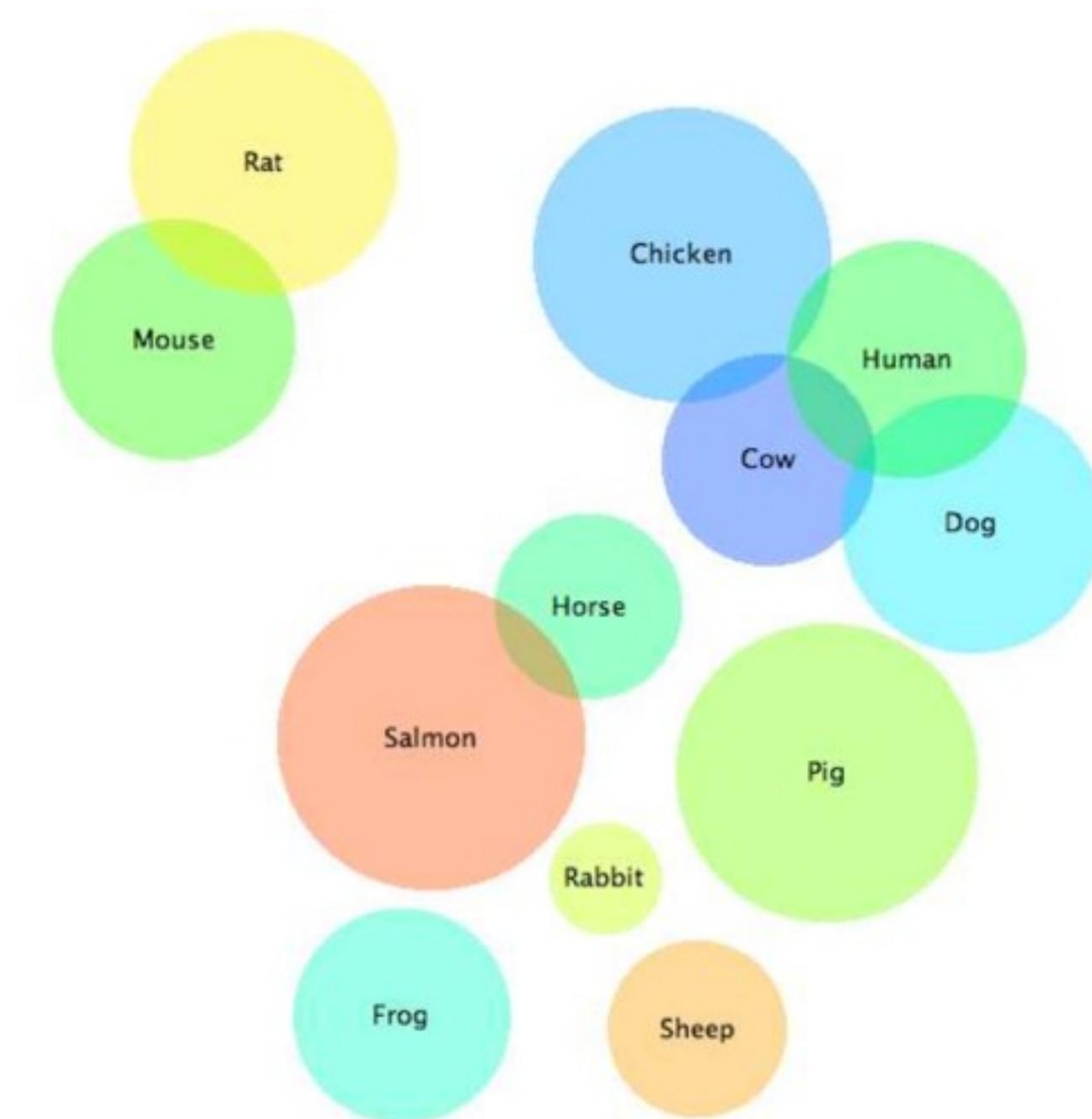
Misunderstood

- 1: People who know what a Venn Diagram is.
- 2: People who know what an Euler Diagram is.
- 3: People who know the difference.



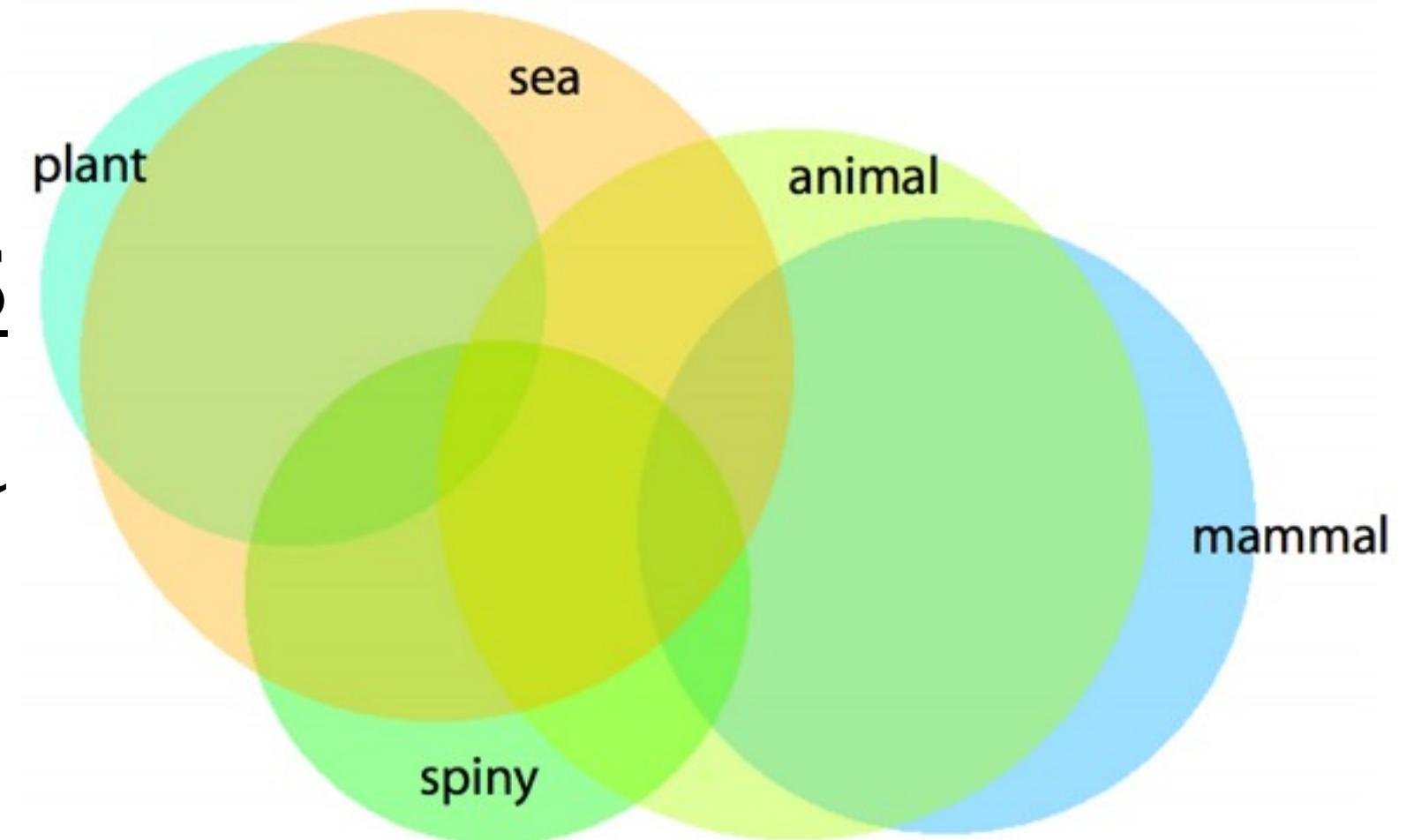
VENN & EULER DIAGRAMS

adjust for area
starts getting tricky!

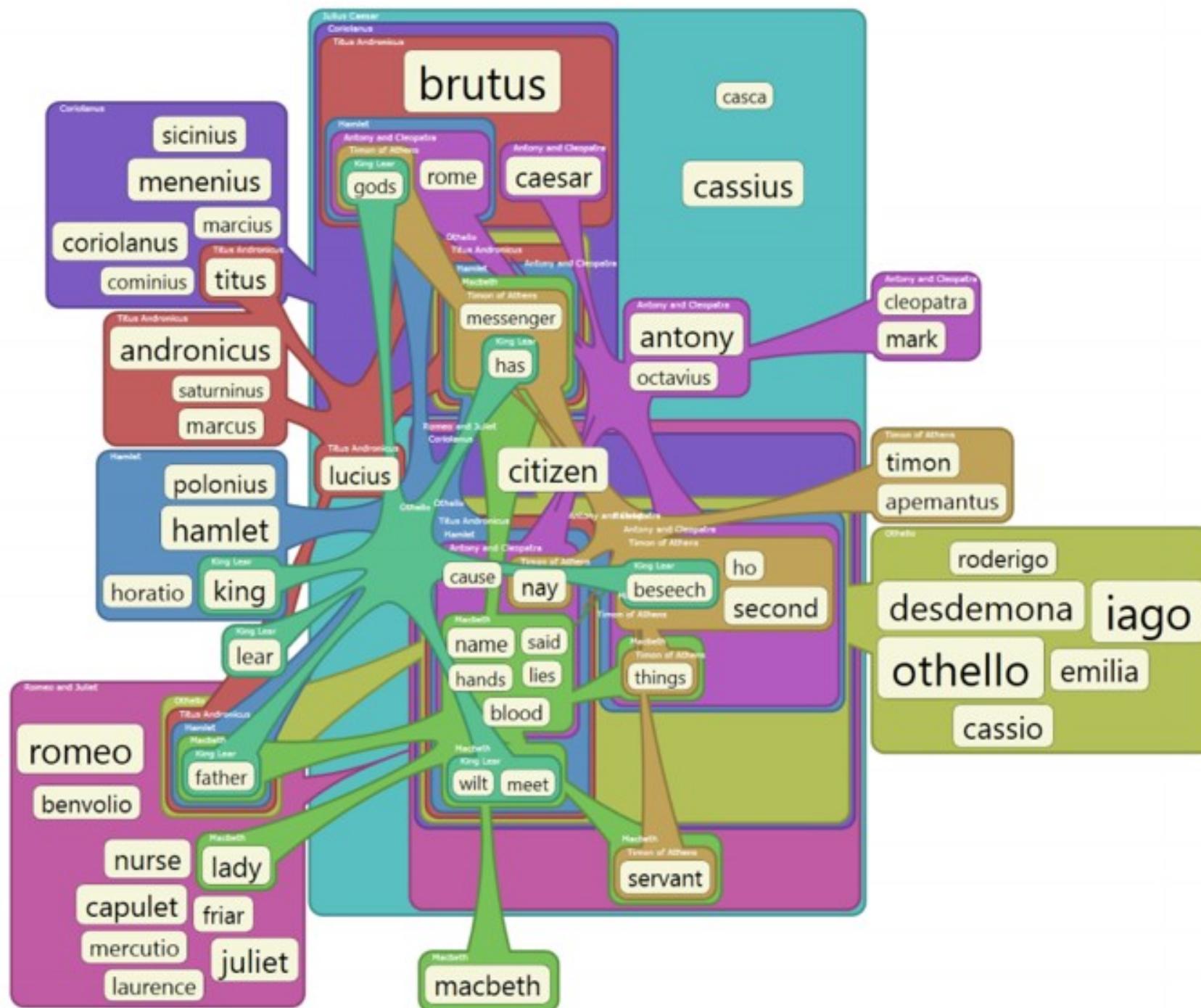


VENN & EULER DIAGRAMS

adjust for area
starts getting tricky!

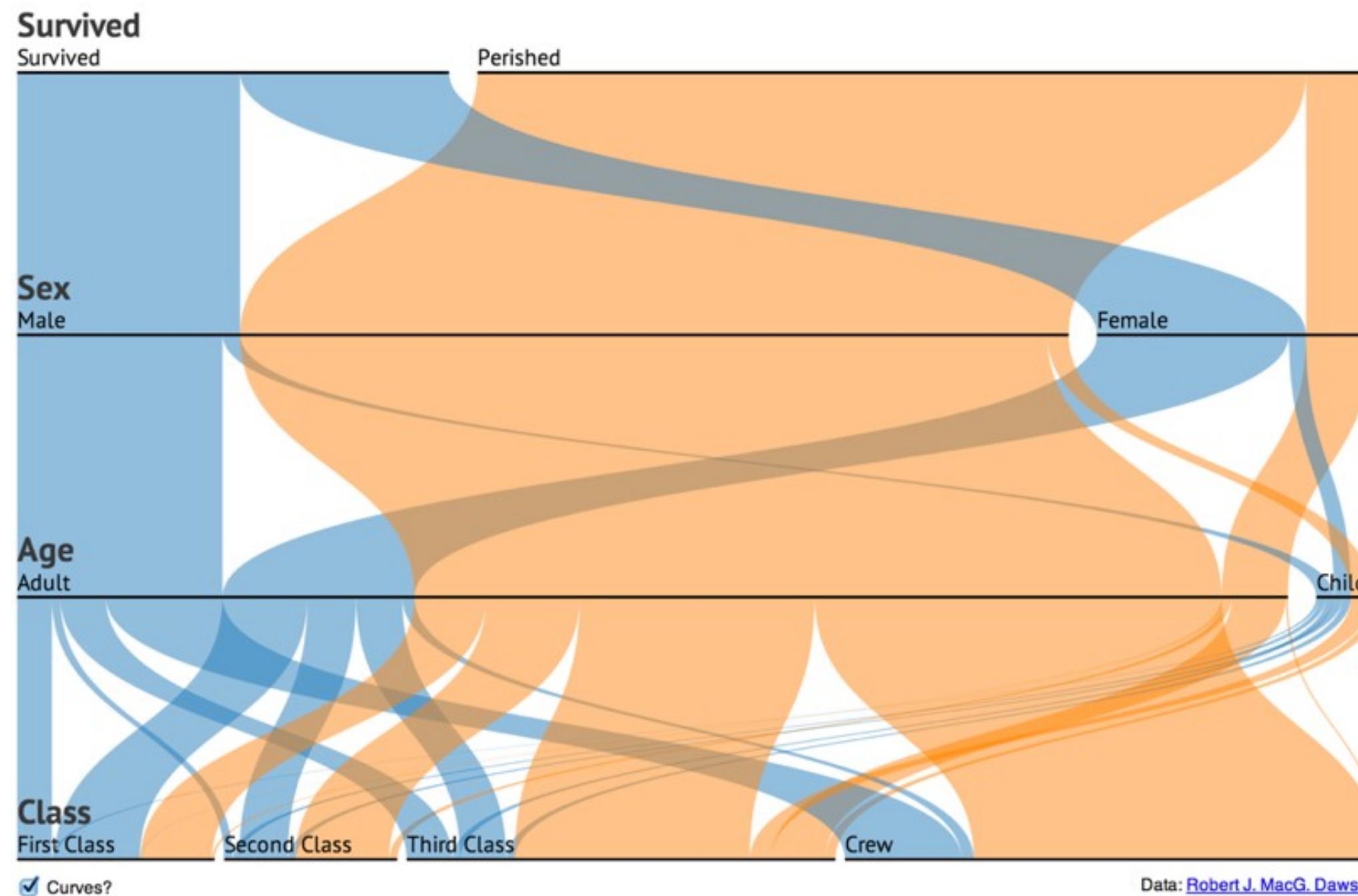


COMPACT EULER DIAGRAMS



PARALLEL SETS

Titanic Survivors



PARALLEL SETS

builds on PC to better handle categorical data

discrete

small number of values

no implied ordering between attributes

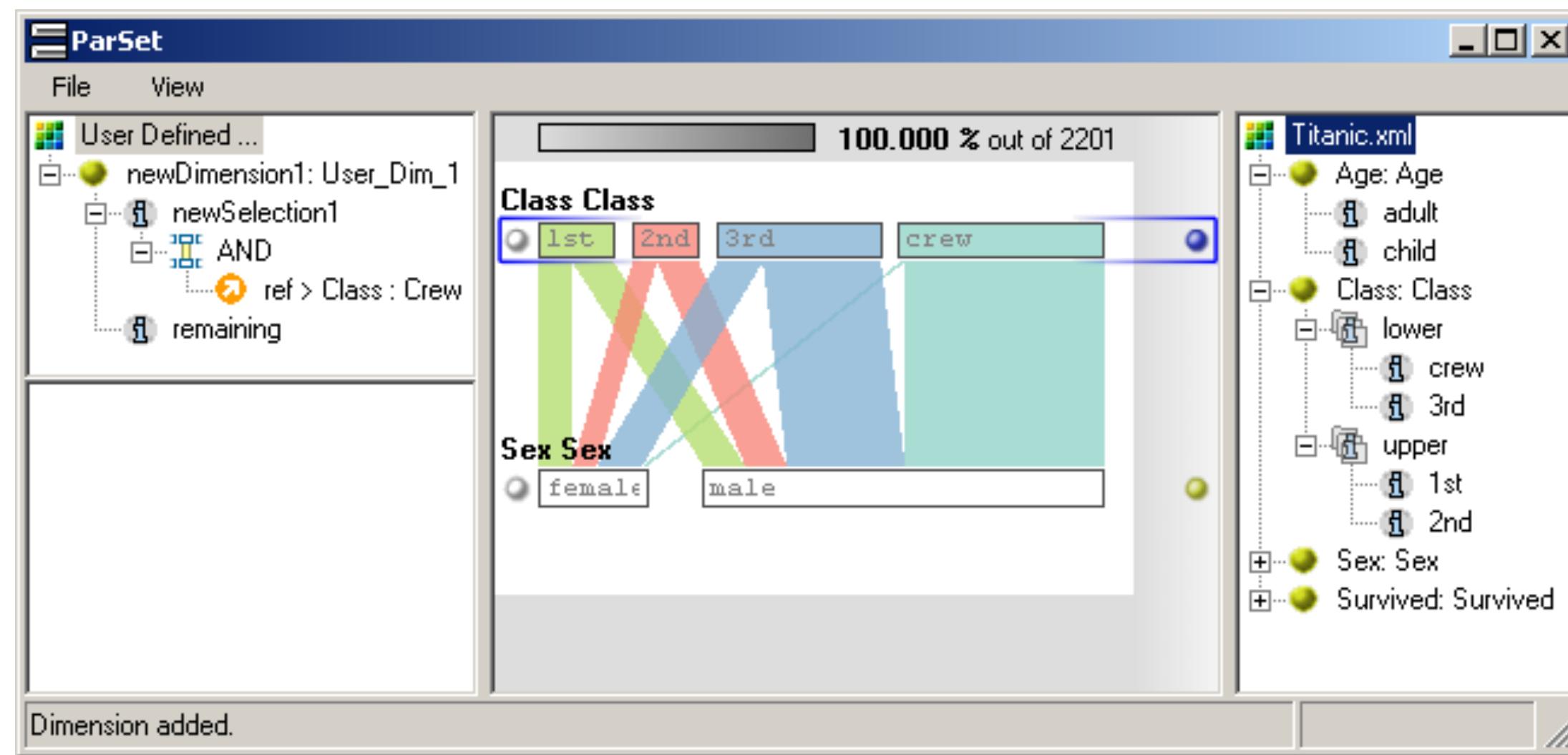
task: find relationship between attributes, not outliers

interaction driven technique



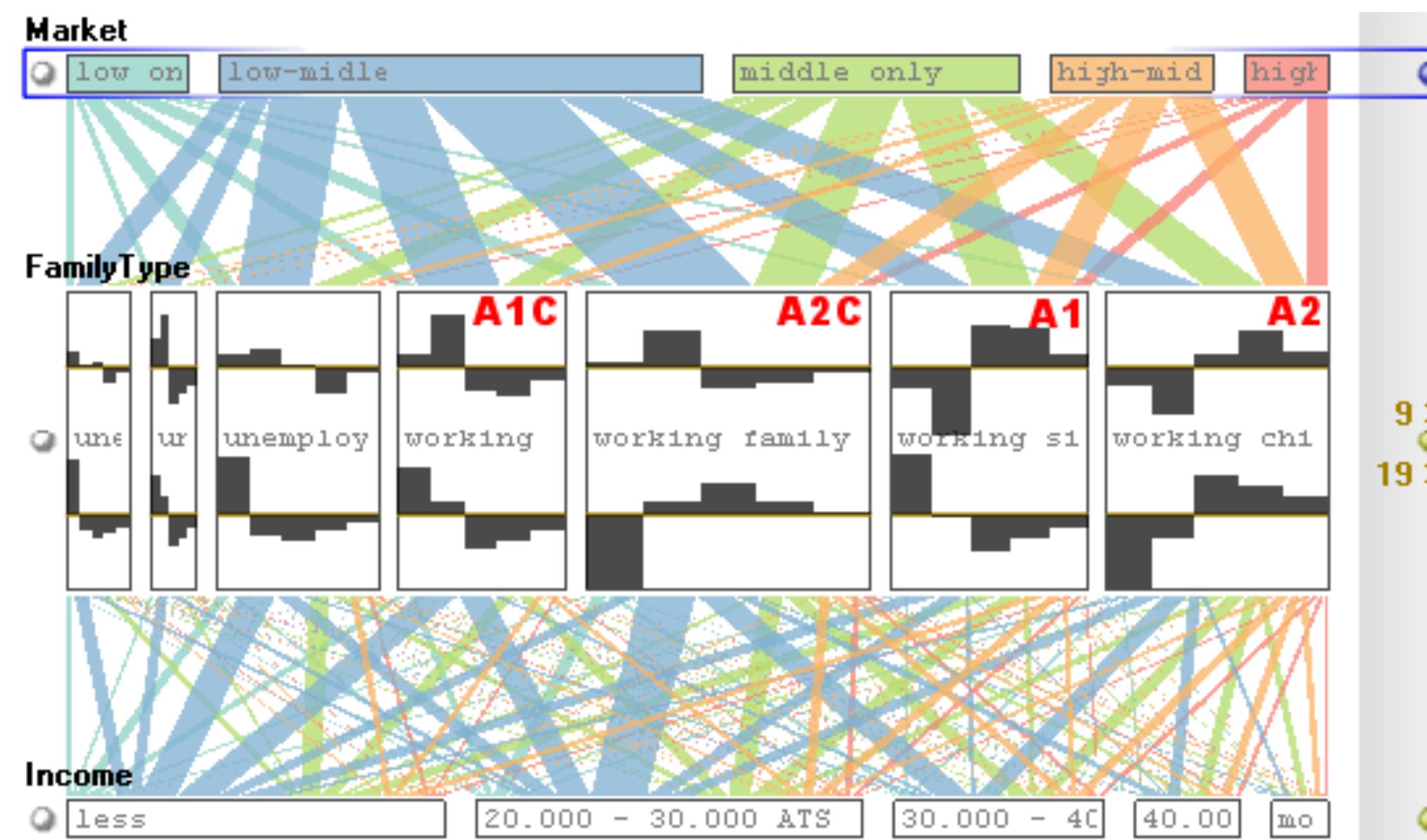
VISUAL ENCODING

boxes scaled by frequency
color coded by values for current active dimension

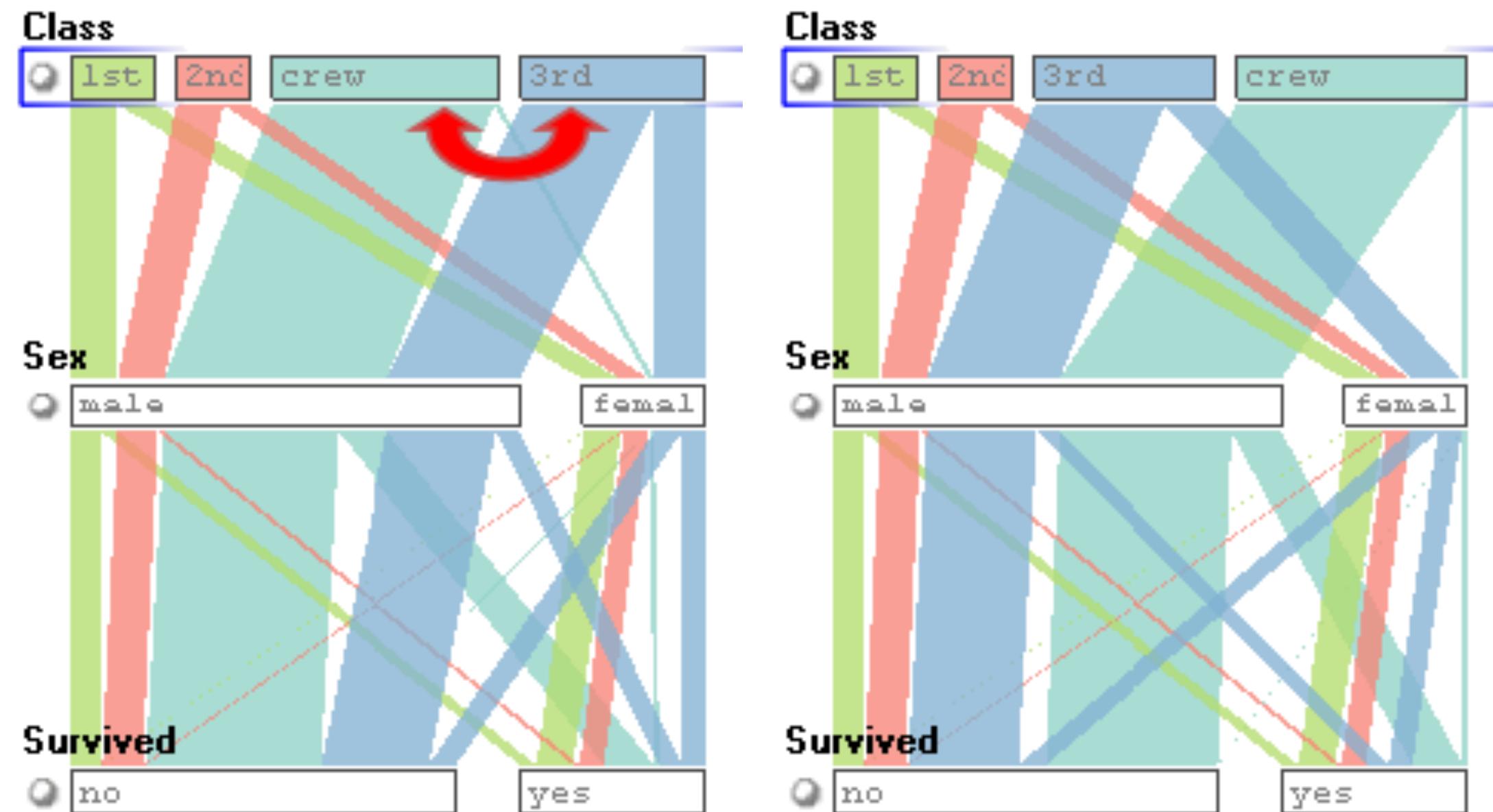


VISUAL ENCODING

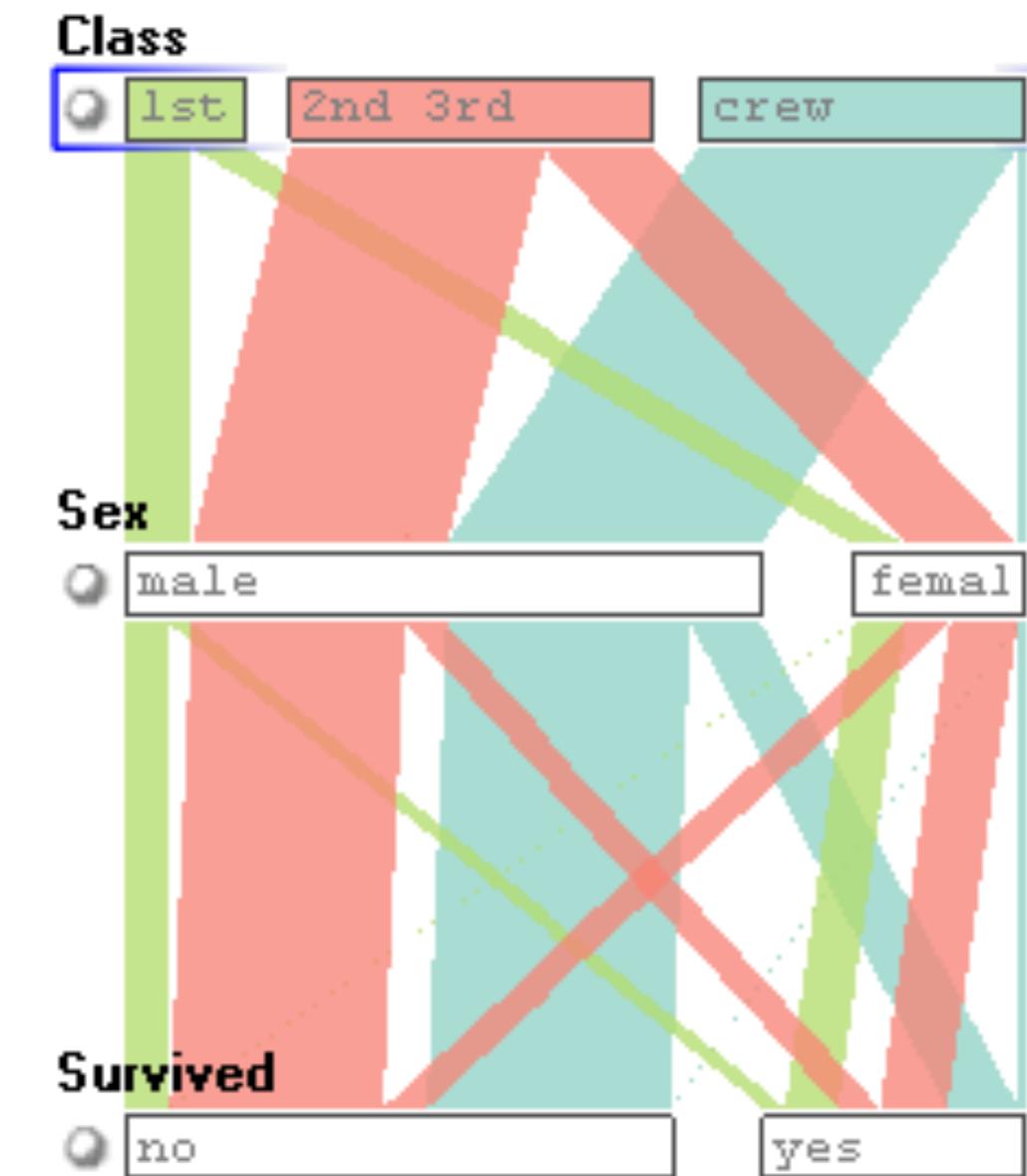
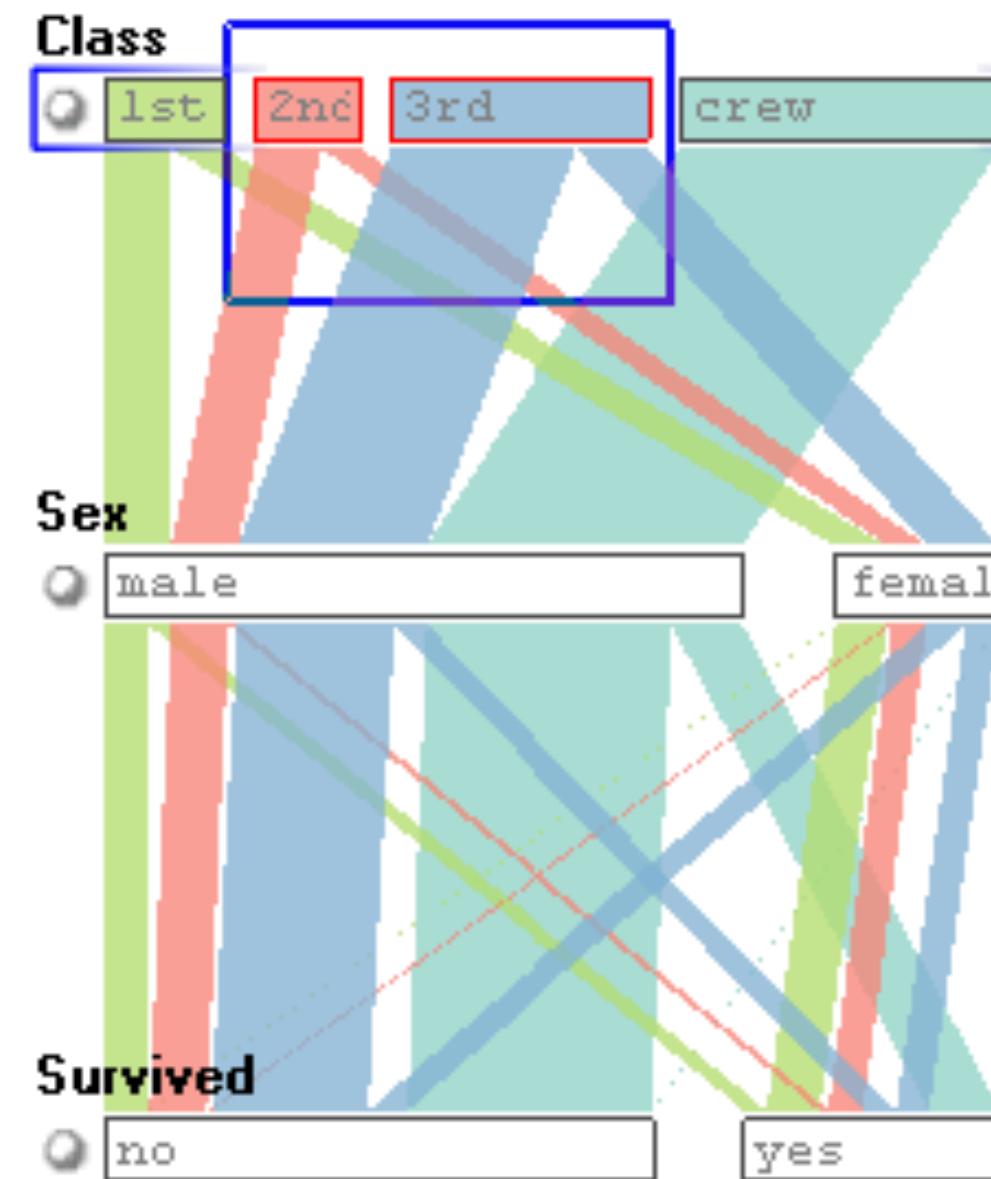
boxes expand to show histogram



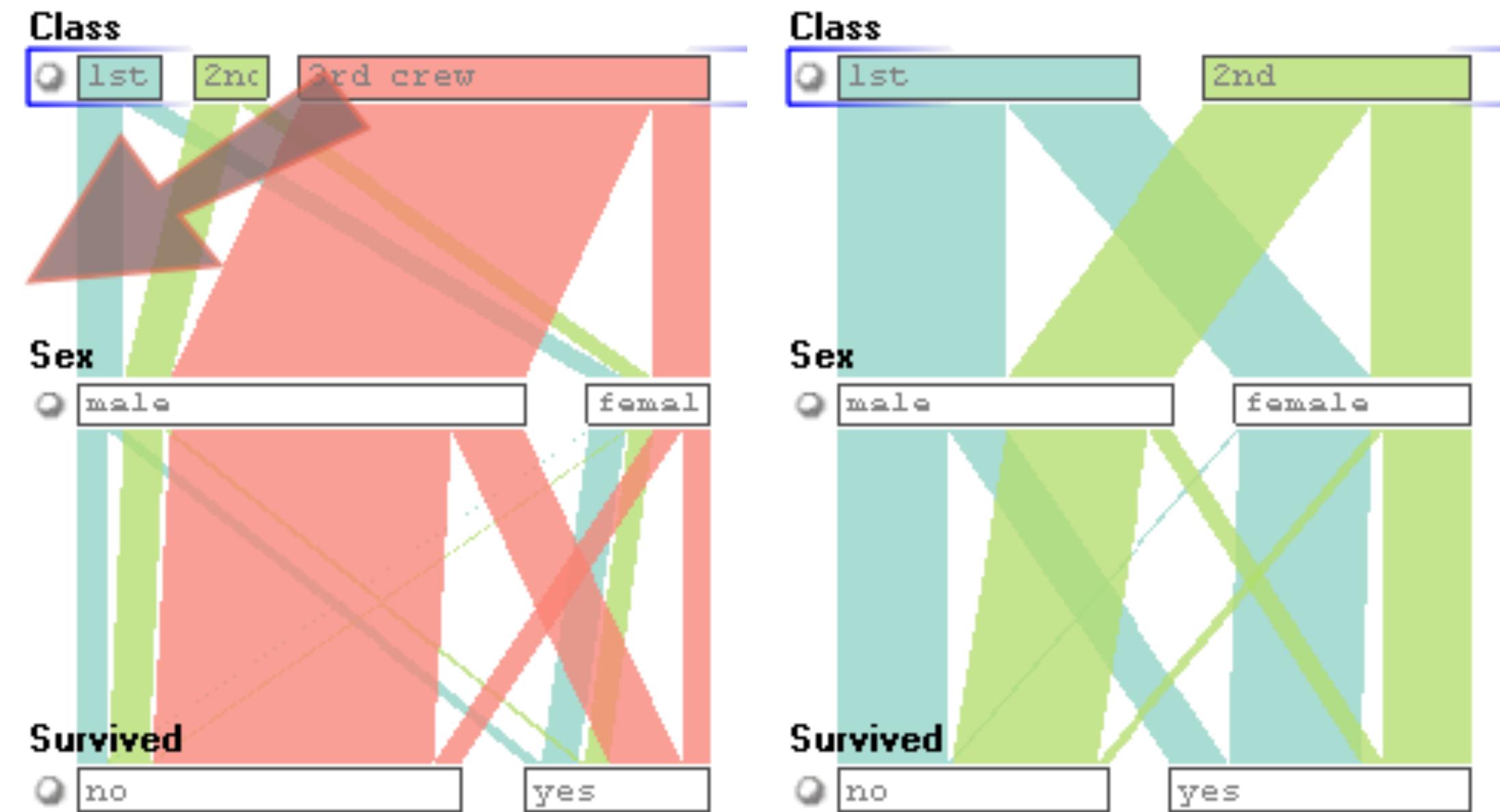
INTERACTION: REORDER



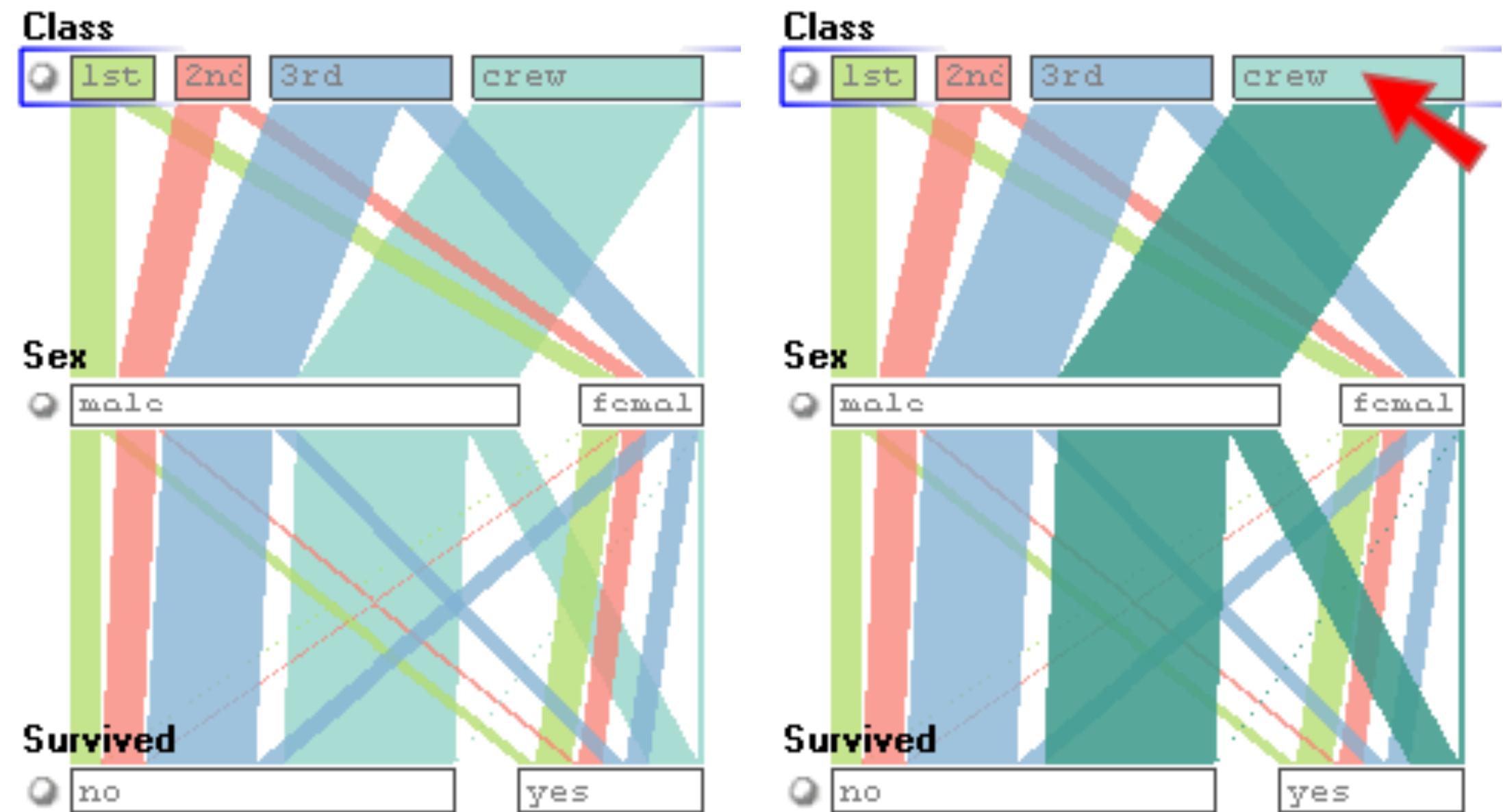
INTERACTION:AGGREGATE



INTERACTION: FILTER



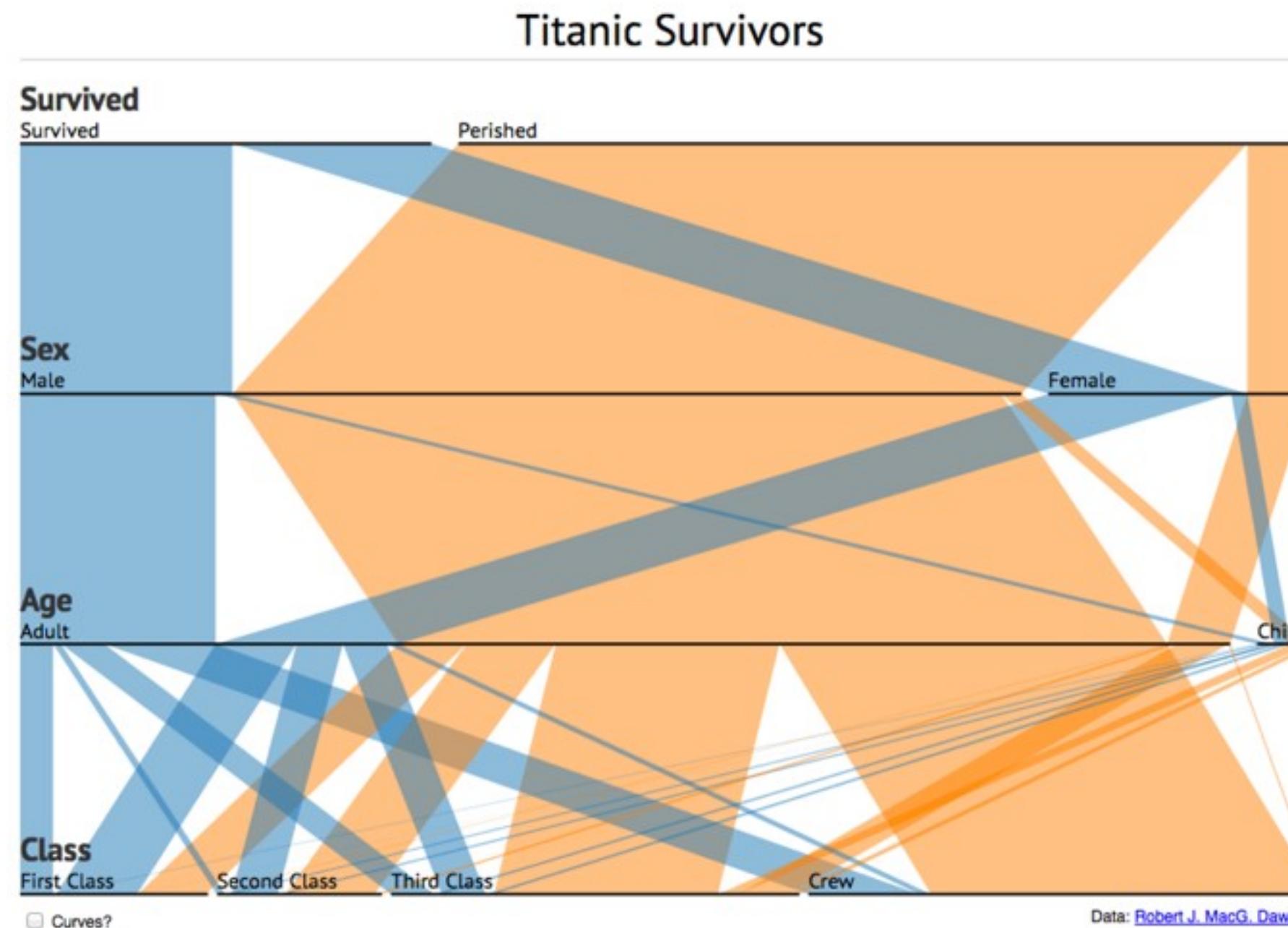
INTERACTION: HIGHLIGHT



CRITIQUE:WHAT DO YOU THINK?

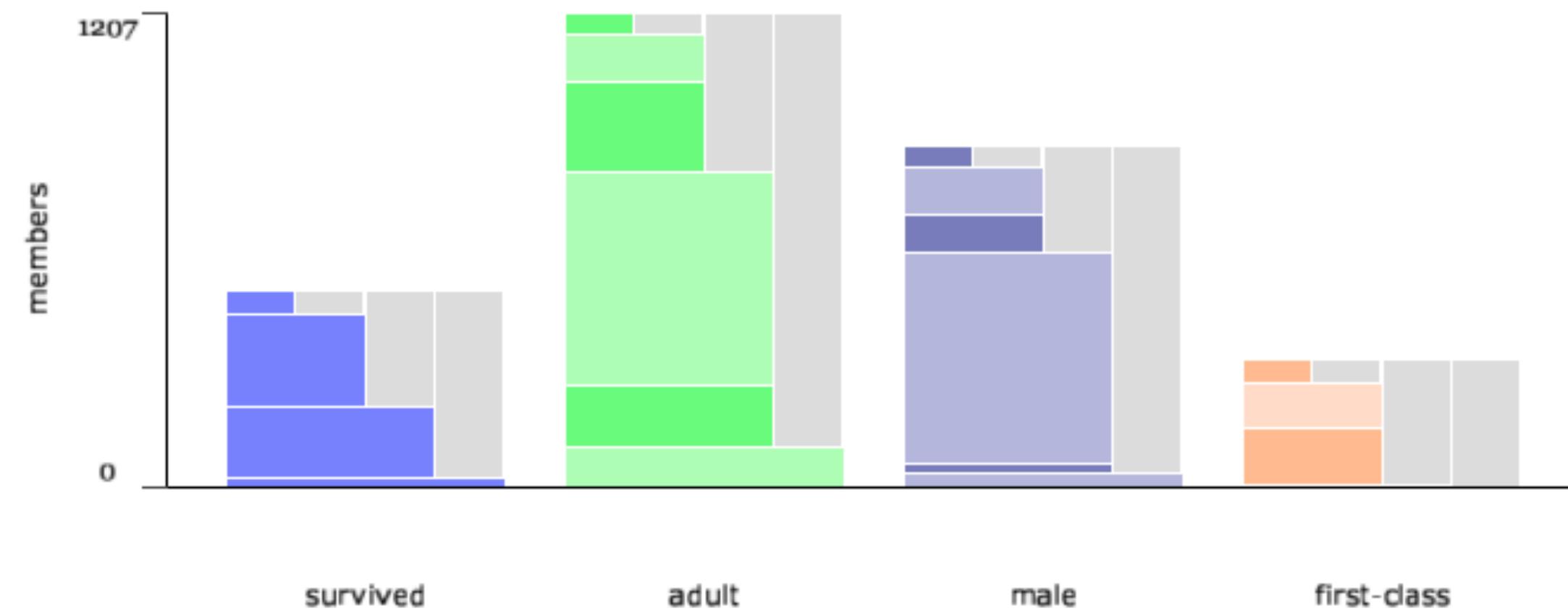
Parallel Sets

A visualisation technique for multidimensional categorical data.



SET O'GRAM

Titanic



REMINDERS

3/26/2018 – Paper Review 3 Due

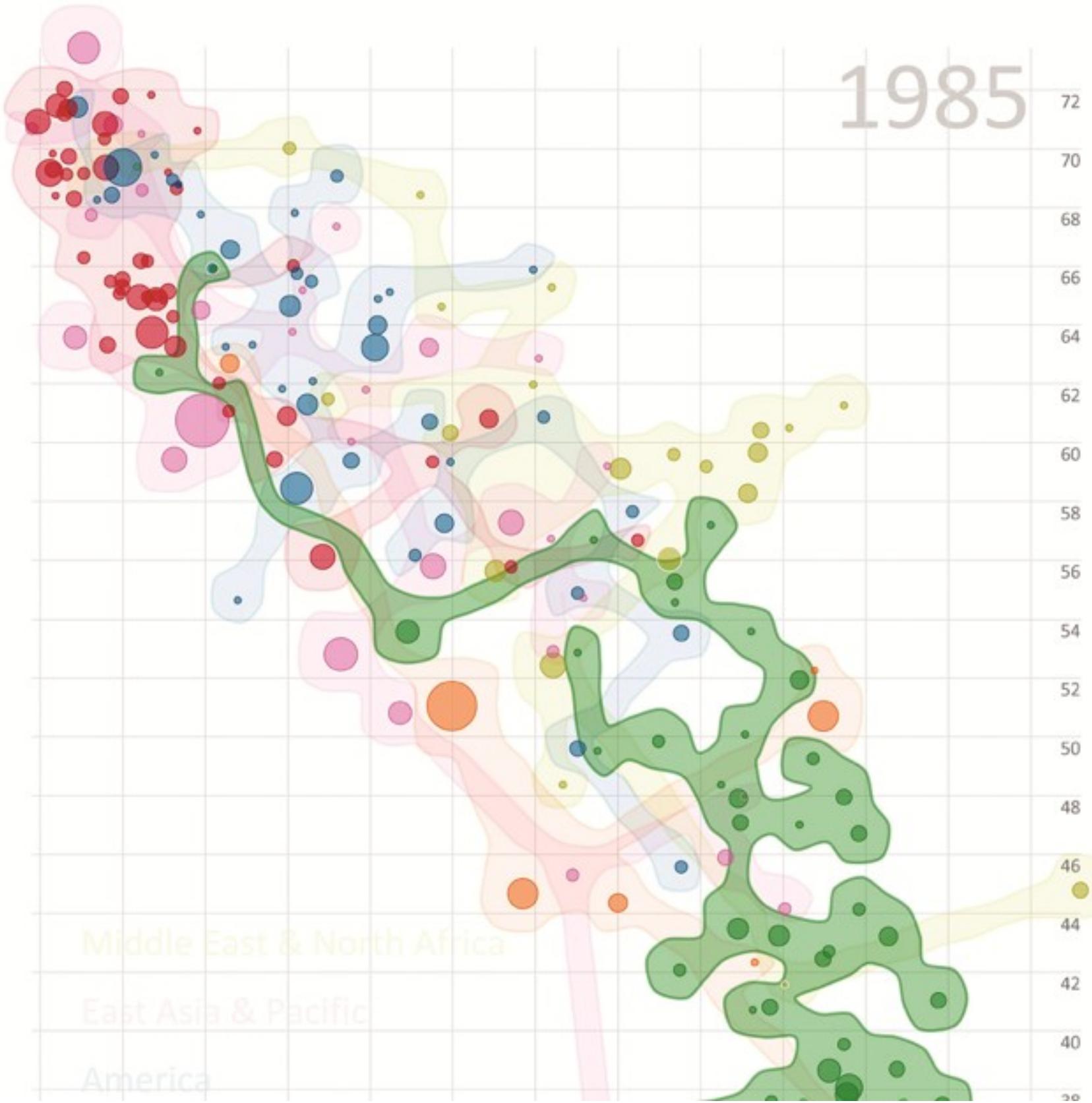
3/28/2018 – Project 6 Due



VISUALIZING SETS WITH CONSTRAINTS

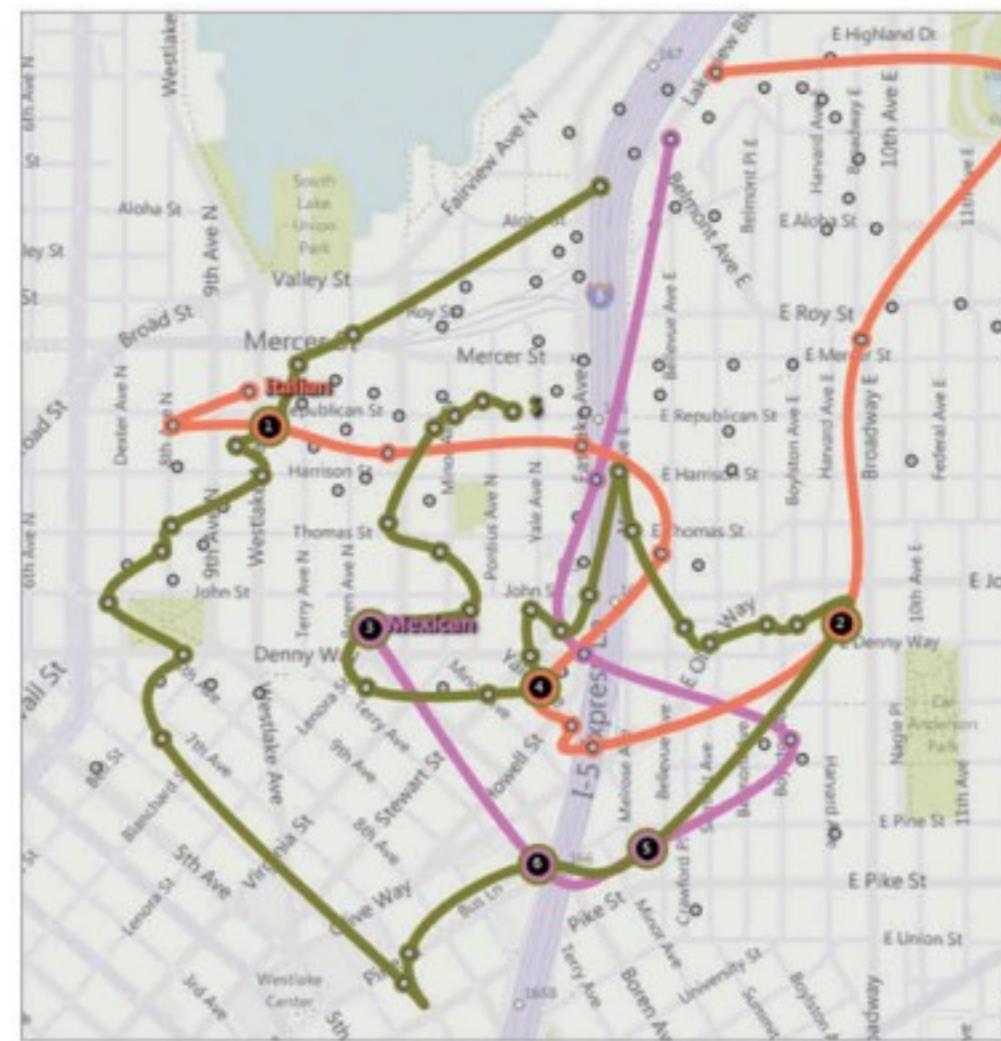


BUBBLE SETS

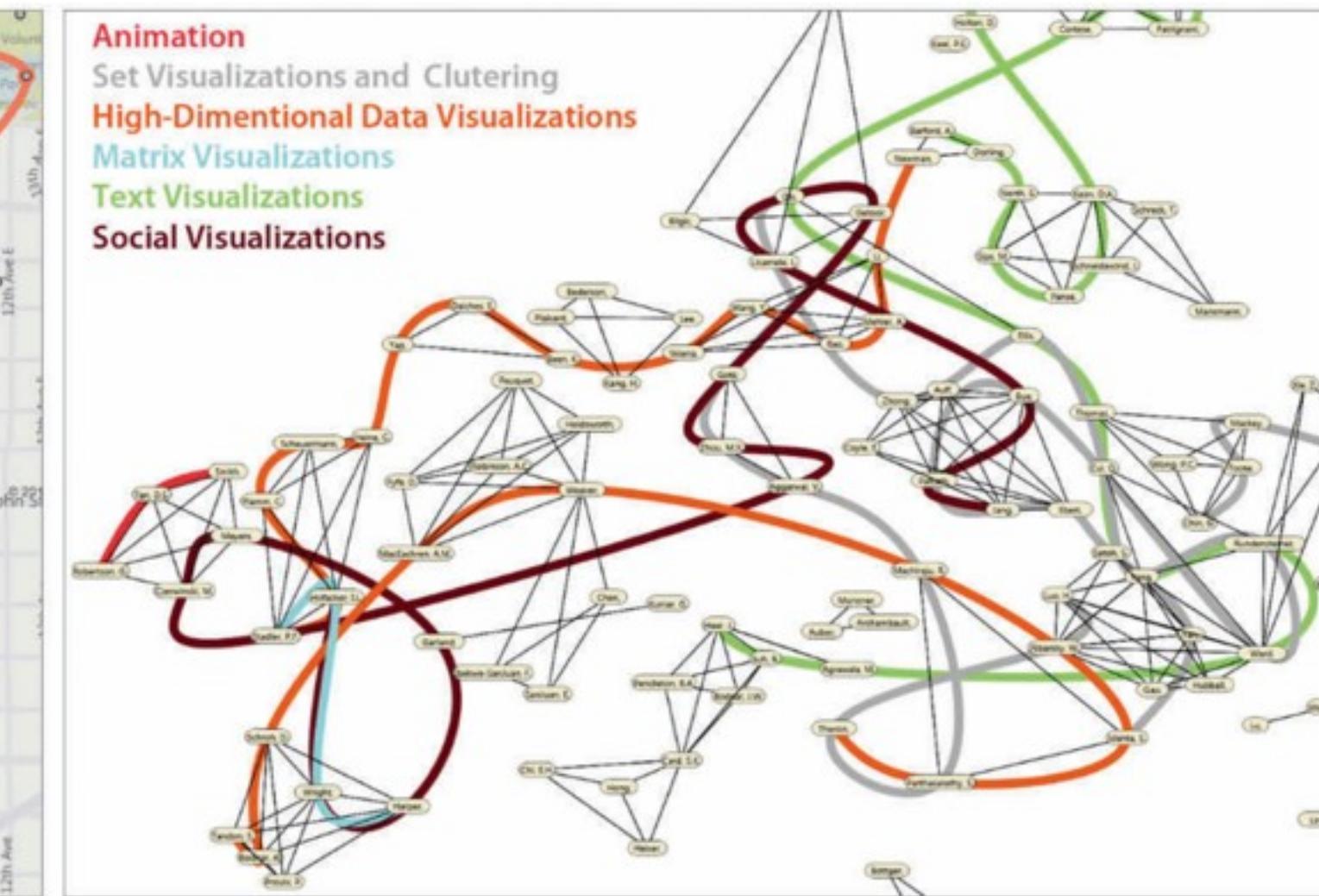


LINE SETS

restaurants



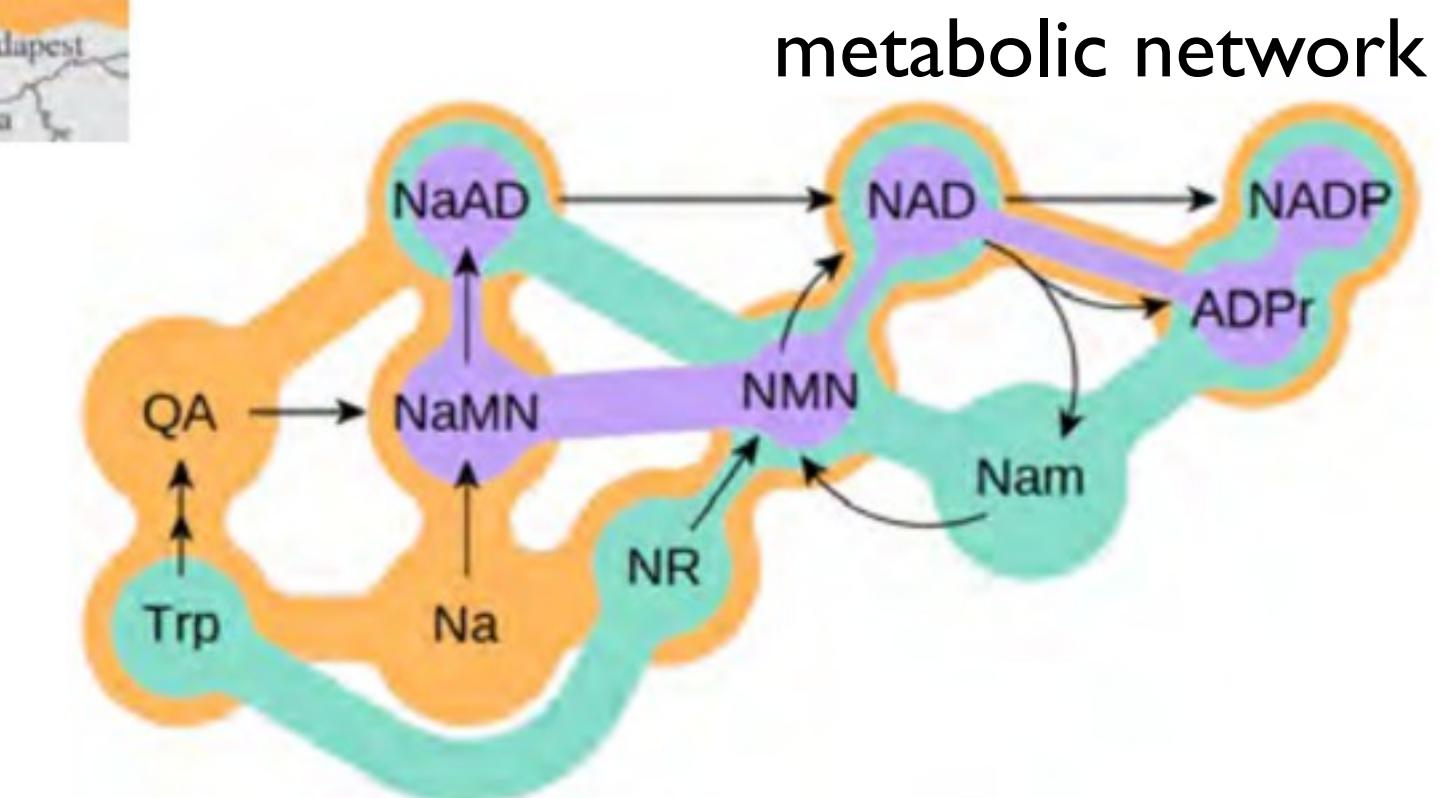
social communities



KELP DIAGRAMS

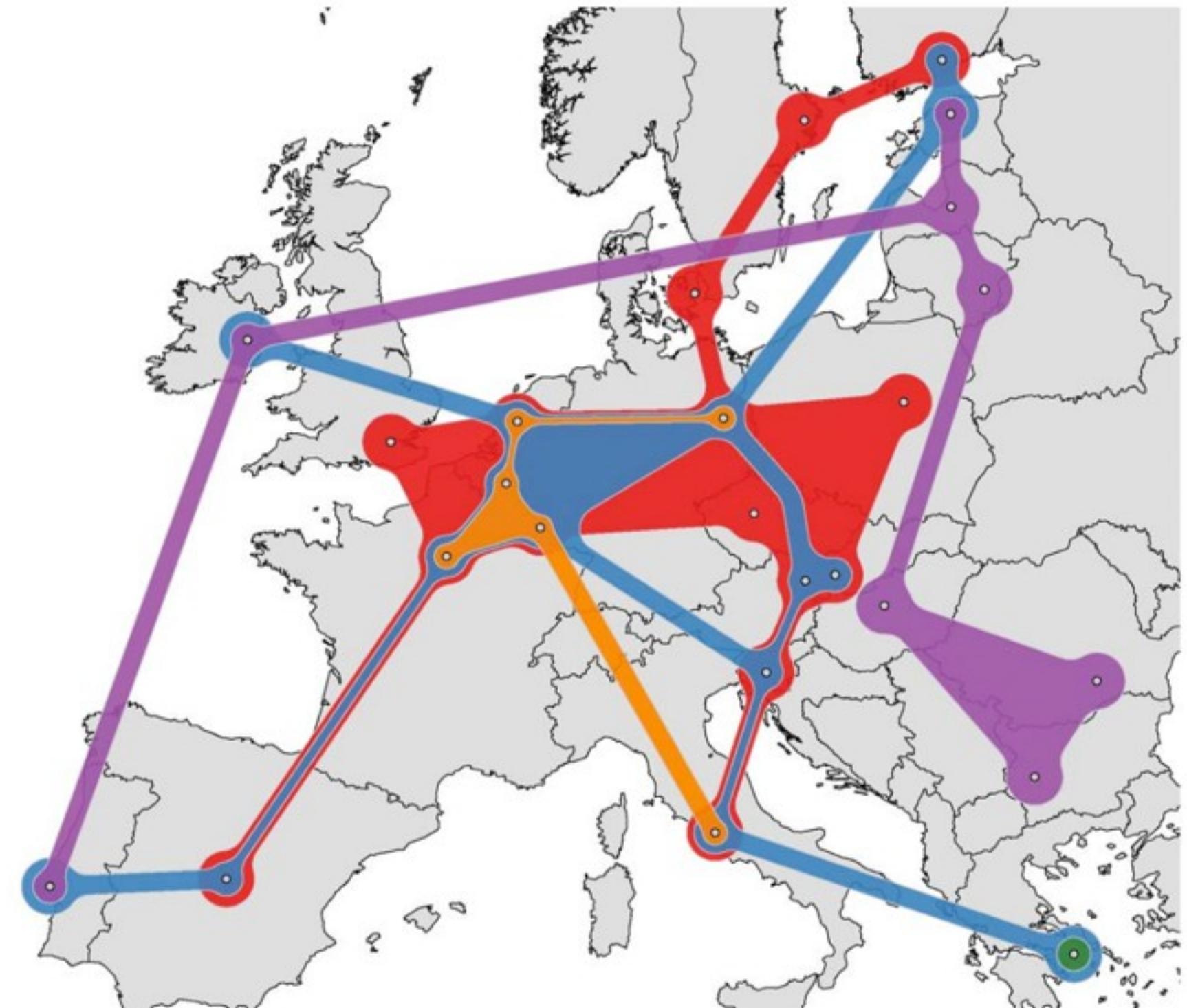


cities on a map



KELP FUSION

cities on map lines & areas



SETS

applies to many datasets

many combinations may be interesting

limited numbers of sets more tractable



