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Data to Knowledge

## Data Preparation

- Data is:
- fetched
  - cleaned
  - filtered
  - processed

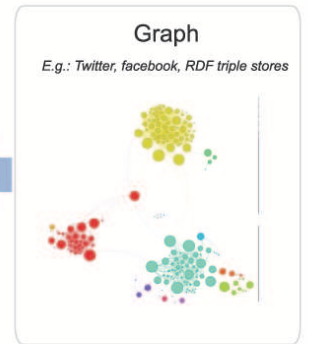
They are organised in a unique structure called «Formal Context» which provide all the relations objects/attributes.

**Structured Data**  
 E.g.: Tables, databases, spreadsheets.

	A	B	C	D
1. Affiliate	State	Members	Annual Fee	
2. Norfolk	VA	205	50	
3. Houston	TX	49	35	
4. Manhattan	NY	637	75	
5. Albany	NY	196	60	
6. Washington	DC	483	80	
7. Richmond	VA	412	30	
8. Memphis	TN	77	25	
9. Brooklyn	NY	276	70	
10. Boston	MA	155	45	
11. Waltham	MA	32	45	
12. Schenectady	NY	49	35	
13. Newark	NJ	219	30	
14. Hornsboro	VA	94	25	
15.				

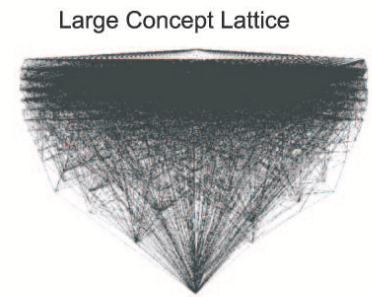
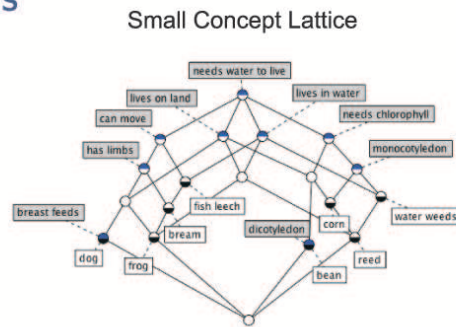
**Formal Context**

	needs water to live	lives in water	lives on land	needs chlorophyll	dicotyledon	monocotyledon	eat nerve	has limbs	breast feeds
fish leech	x	x					x		
bream	x	x					x	x	
frog	x	x					x	x	
dog			x						x
water weeds	x	x		x			x	x	x
reed	x	x		x			x		
bean			x	x	x				
corn			x	x	x				



## Formal Concept Analysis

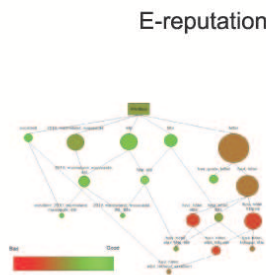
- FCA structures information into Galois lattices.
- Concepts are sets of objects sharing the same set of attributes.
- Inclusion of subconcepts defines a partial order on concepts.
- The structure to represent the resulting partially ordered set is called «Galois Lattice».
- Problem : usually Galois lattices have too many nodes and edges and its visualization is cumbersome



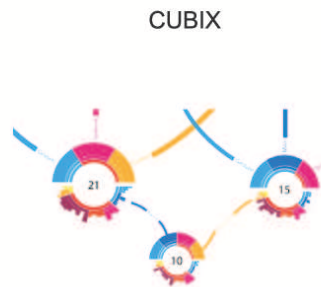
Exponential growing of the lattice with the number of attributes and objects.

## Visual Analytics

- Visual Analytics allows:
- explore interactively huge lattices
  - use descriptive metaphors
  - retrieval and filtering important concepts as in the e-reputation monitor Evarist.



EVARIST: E-reputation monitoring with sentiment analysis layer working on twitter Twitter [2]



Visual metaphors to explore and understand concept lattice

**Interactive controls for FCA**



Interactive controls for exploring concepts [1]

## Conclusions and Future Work

- Current and future work include the following points:
- Develop metrics for FCA and encode them visually
  - Incrementally update lattice
  - Display association rules
  - Develop new lattice reduction techniques
  - Better layouting algorithm for concept nodes
  - Sophisticated selection and manipulation techniques

## References

[1] C. Melo, B. Le Grand, M.-A. Aufaure and A. Bezerianos (2011). Extracting and Visualizing Tree-like Structures from Concept Lattices, IV 2011, the 15th International Conference on Information Visualization, London, UK, 12-15 July 2011.

[2] Etienne Cuvelier, Marie-Aude Aufaure, A buzz and e-reputation monitoring tool for Twitter based on Galois Lattices, The 19th International Conference on Conceptual Structures (ICCS 2011), University of Derby, United Kingdom, 25th - 29th July, 2011.

[3] Etienne Cuvelier, Marie-Aude Aufaure, EVARIST : un outil de monitoring du buzz et de l'éreputation sur Twitter, 9e Atelier Visualisation et extraction de connaissances, 11ème Conférence Internationale Francophone sur l'Extraction et la Gestion des Connaissances - EGC 2011, Brest, France, Du 25 au 28 janvier 2011.