Visualização Multi-dimensional:

Mineração Visual de Dados multidimensionais e aplicações Parte II – Variações e Aplicações

Rosane Minghim

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Basic Concepts

- Text Preprocessing
- Data and text mining
- Projection techniques
- Point Placement Strategies

Text Preprocessing

1. Stopwords elimination
2. Extraction of words radicals (stemming)
3. Creation of n-grams
4. Frequency count and Luhn's lower cut (n-grams appearing less then x times are ignored)
5. Weighting process (*term-frequency inverse document-frequency - (tfidf)*)

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Result is a Vector Model

- Attributes: terms (n-grams)
- Value: term weight
- Table Data

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Vector Representation – term weighting

- tf – term frequency
- tfidf – tf x idf = tf x inverse document frequency

$$w_{ik} = tf_{ik} \times log\left(\frac{N}{n_k}\right)$$

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Vector Representation

	$term_1$	$term_2$	$term_3$	$term_4$	...	$term_m$
Doc_1	0.92	0.62	0.92	0.10	...	0.67
Doc_2	0.13	0.11	1.00	0.34	...	0.33
Doc_3	0.52	0.00	0.00	0.44	...	0.77
...	...	...	...	...	...	...
Doc_n	0.02	0.12	0.22	0.92	...	0.00

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Vector Representation – Similarity calculatin

EUCLIDEAN

$$sim_{i,j} = \sqrt{(w_{i,1} - w_{j,1})^2 + \ldots + (w_{i,k} - w_{j,k})^2}$$

MANHATAN

$$sim_{i,j} = |w_{i,1} - w_{j,1}| + \ldots + |w_{i,1} - w_{j,1}|$$

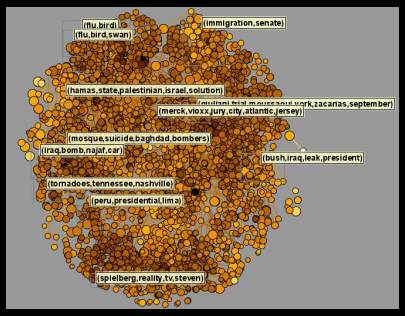
COSINE

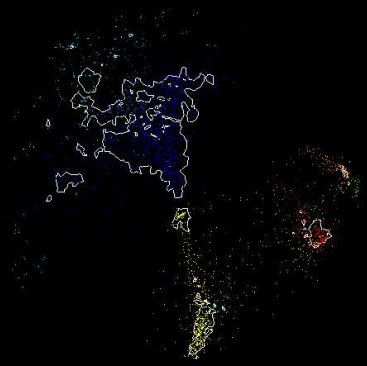
$$sim_{i,j} = \frac{(w_{i,1} \times w_{j,1}) + \ldots + (w_{i,k} \times w_{j,k})}{(w_{i,1}^2 + \ldots + w_{i,k}^2) \times (w_{j,1}^2 + \ldots + w_{j,k}^2)}$$

Alternative to Vector Representation

- Similarity Calculation text against text
  - Ex: NCD Normalized Compression Distance
    - Approximation of Kolmogorov Complexity

Visual representations: graphs, surfaces, volumes, triangulations





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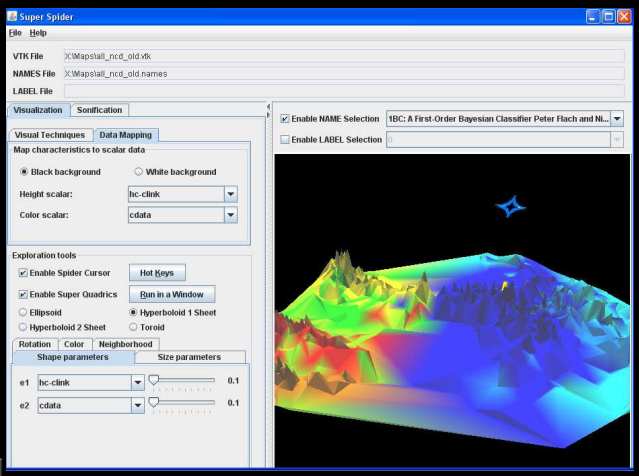

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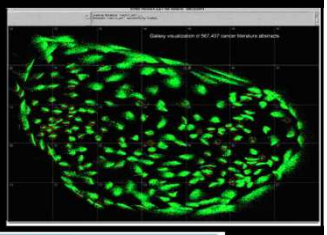
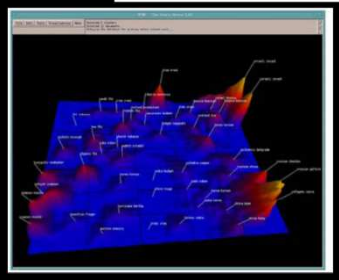
IN-SPIRE

- Spatial Paradigm for Information Retrieval - Pacific Nortwest National Laboratories
- Two Visualization Metaphors:
  - Galaxies – dimensional reduction
  - Themescape





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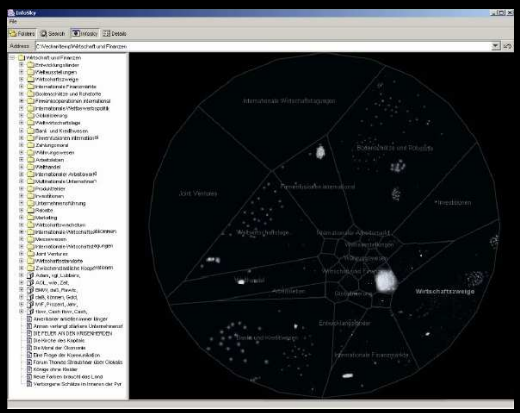
InfoSky

Granitzer (Granitzer et al., 2004) also employs galaxy metaphor



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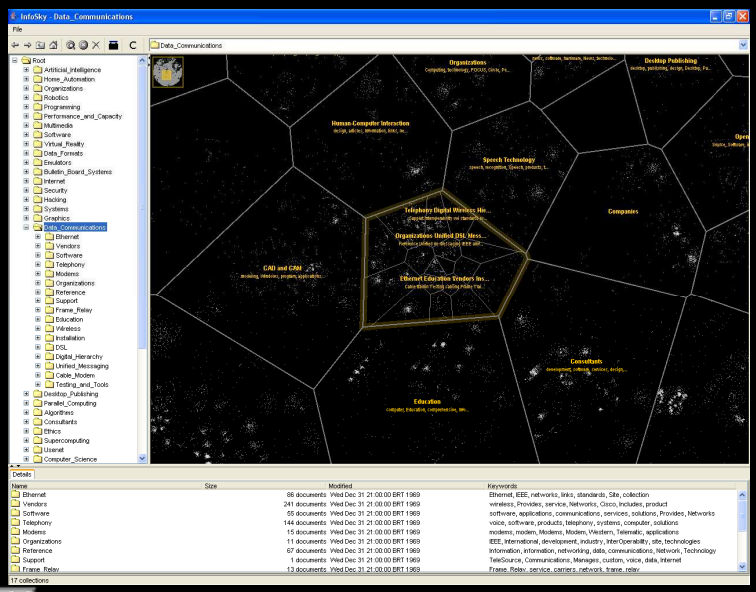
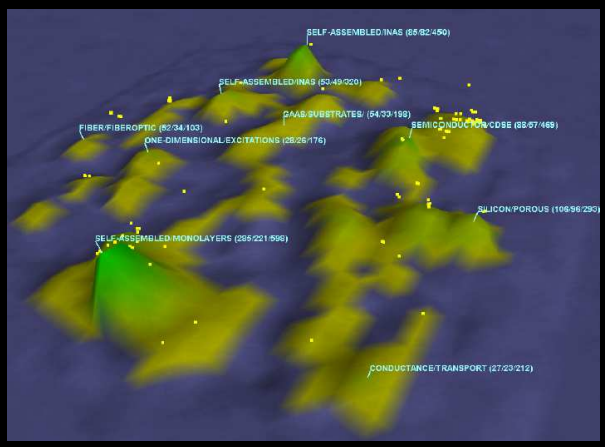


http://en.know-center.at/forschung/wissenserschliessung/downloads_demos/infosky_demo

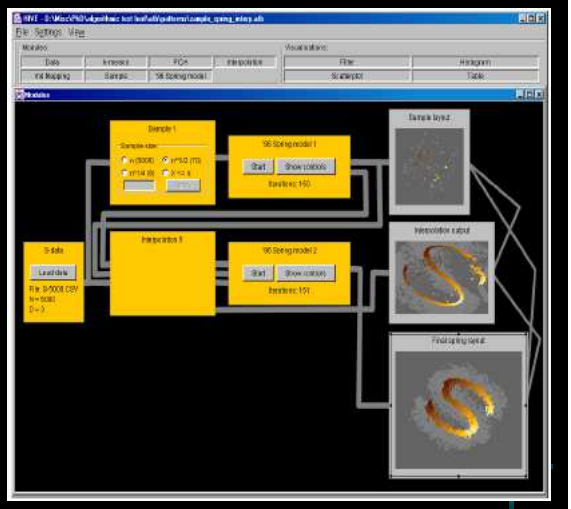
VxInsight

- Sandia National Laboratories, mountain metaphor (Boyack et al., 2002).



HIVE (Ross and Chalmers 2003)

- Interconnected components:
  - Import
  - Transform
  - Render multi-dim data



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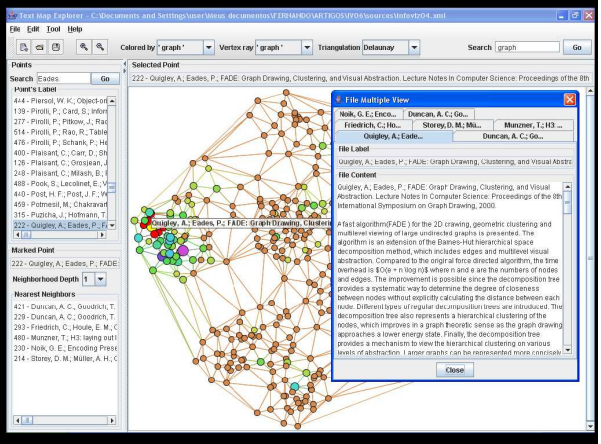
Projection Explorer (PEx)

- Projection and Point placement
- Precision
- Graphs and surfaces (Super Spider)



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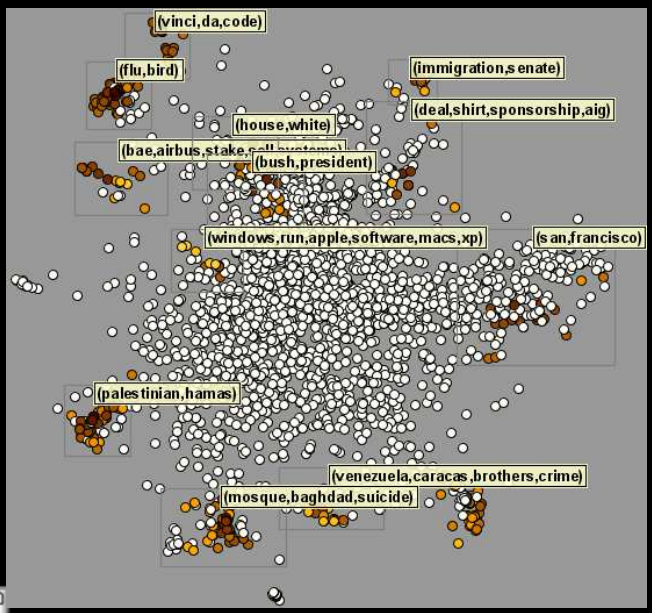
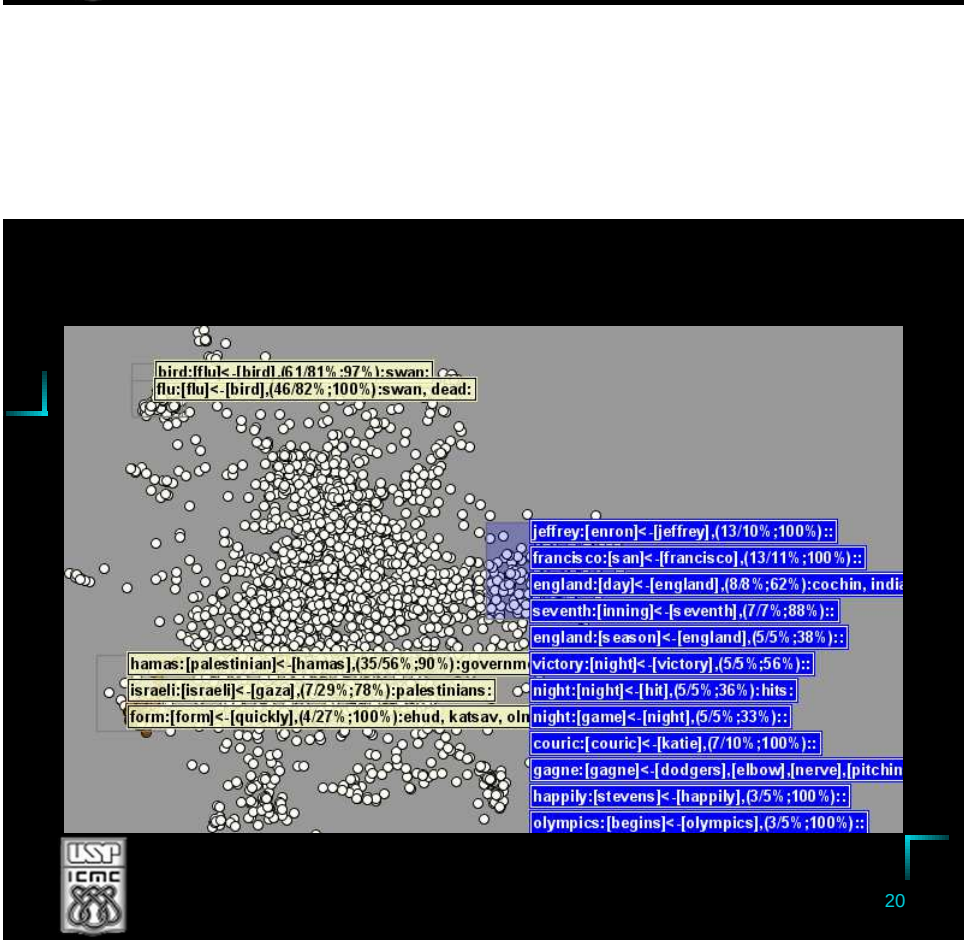
Mapping Text Collections via Projections and Point Placement

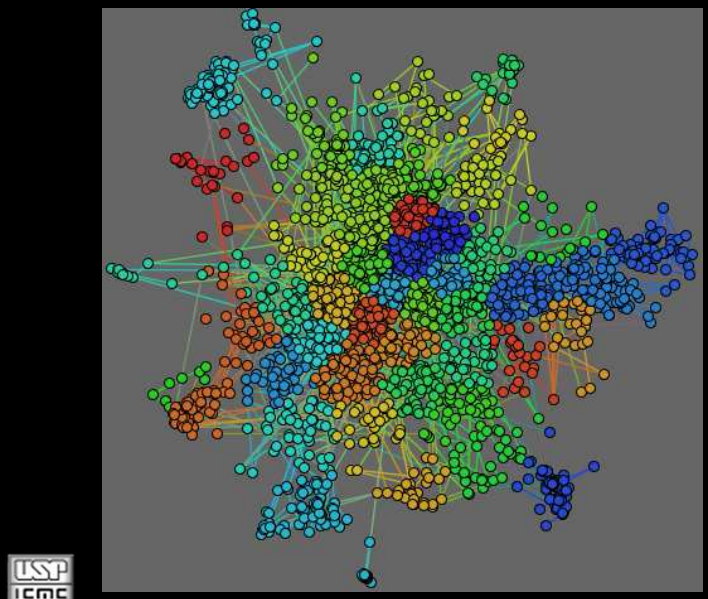
- Positioning and labeling



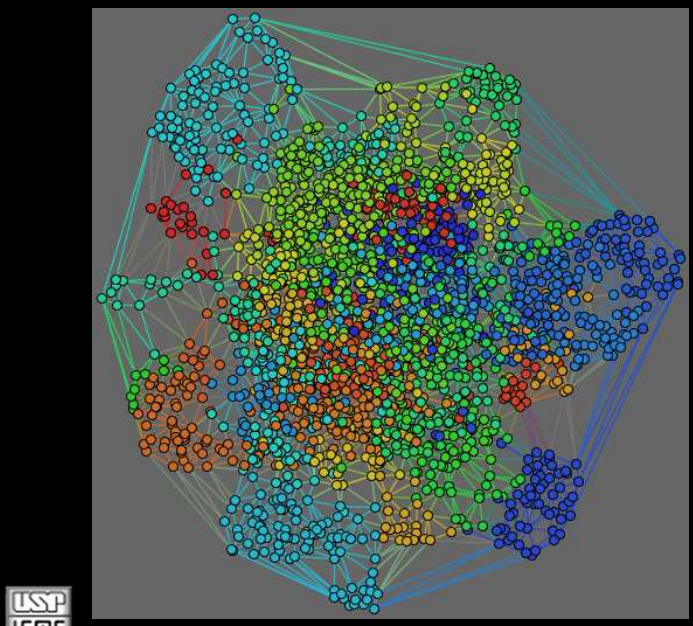
- Detailing topics



- Finding Relationships



- Building a mesh



- Coloring by degree of proximity

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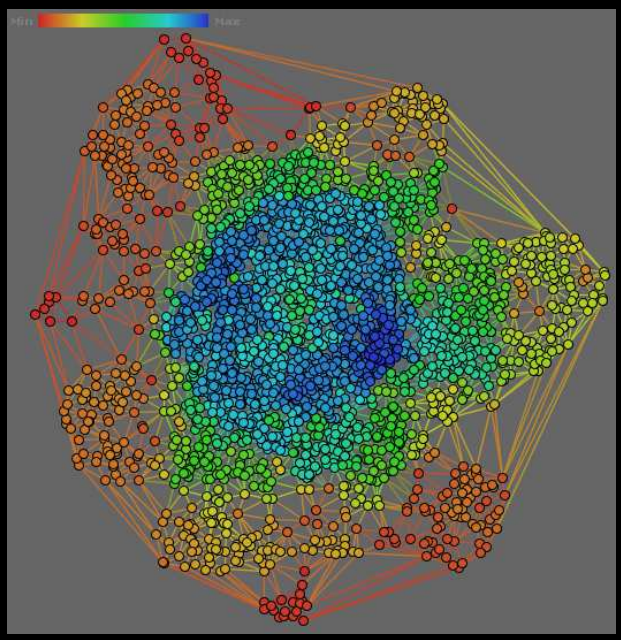

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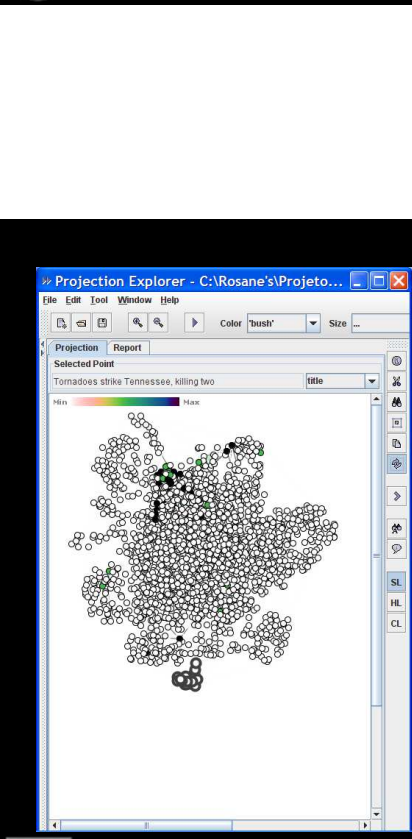
- Coordinating



- Building a Surface

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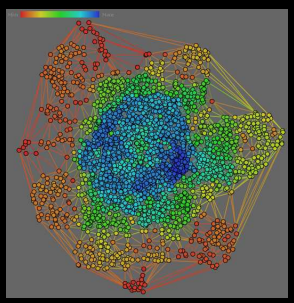

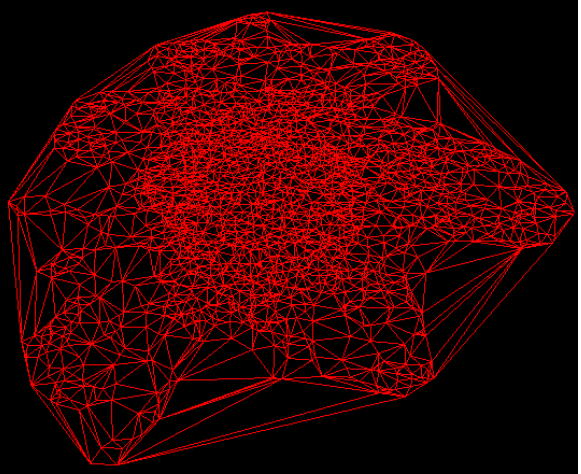

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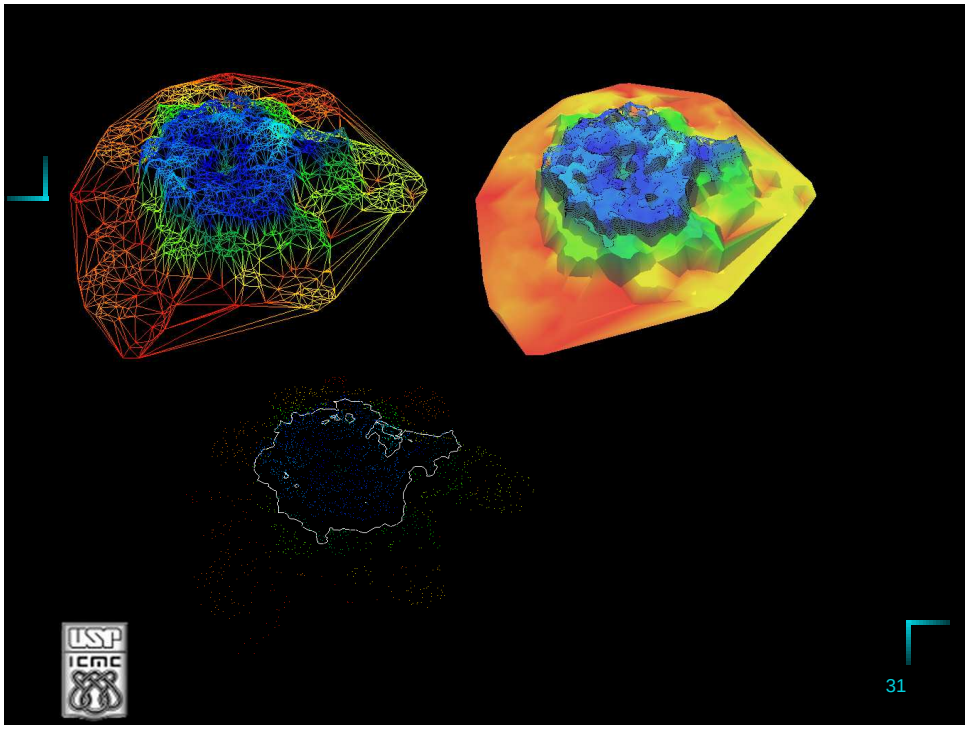

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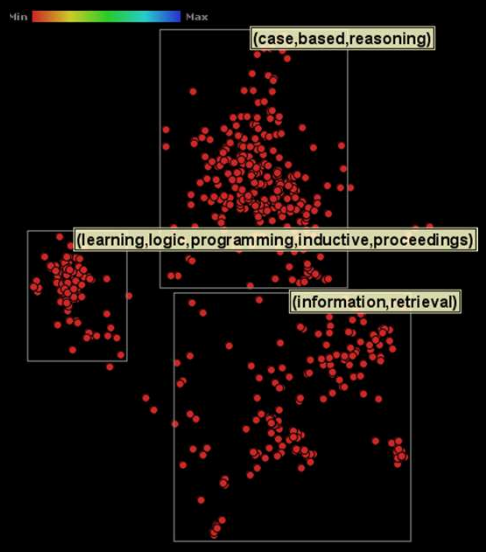
Exemplos de Mapas



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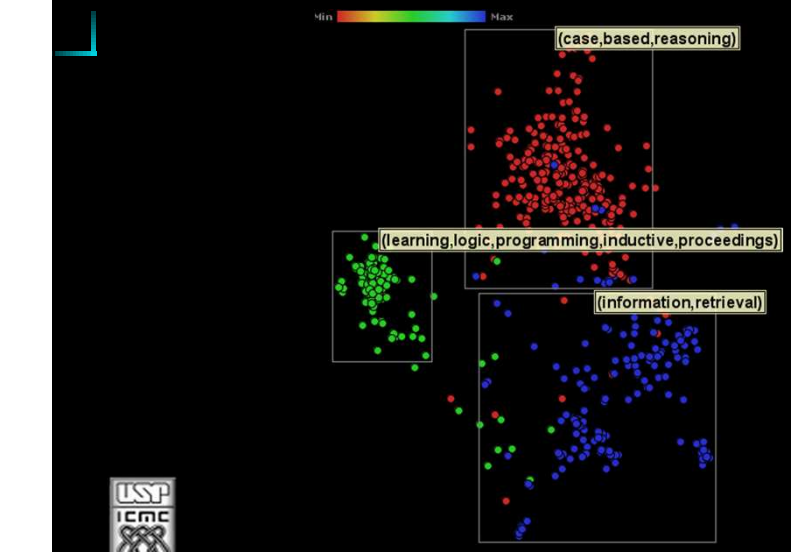
Exemplos de Mapas



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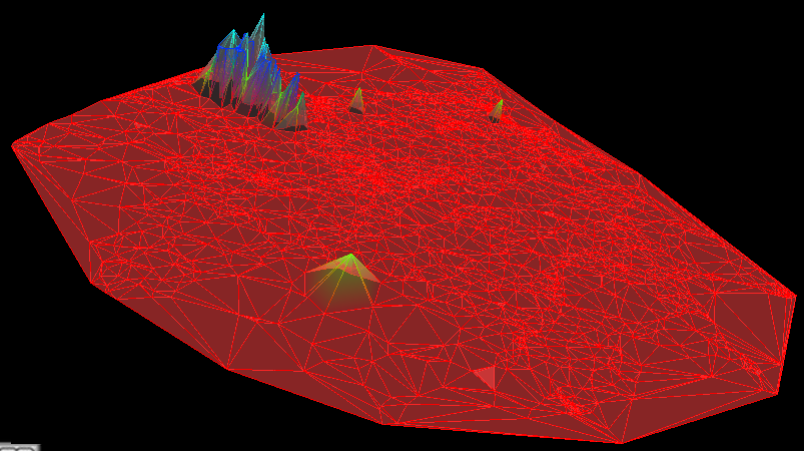
RSS News Flash



Bird and Flu

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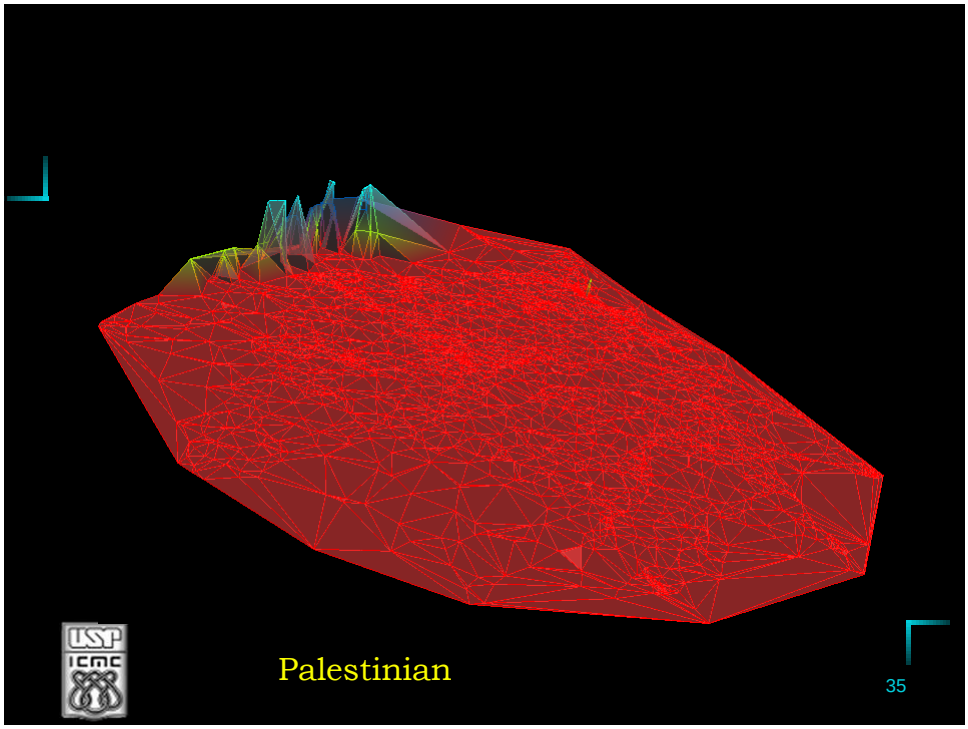
Palestinian
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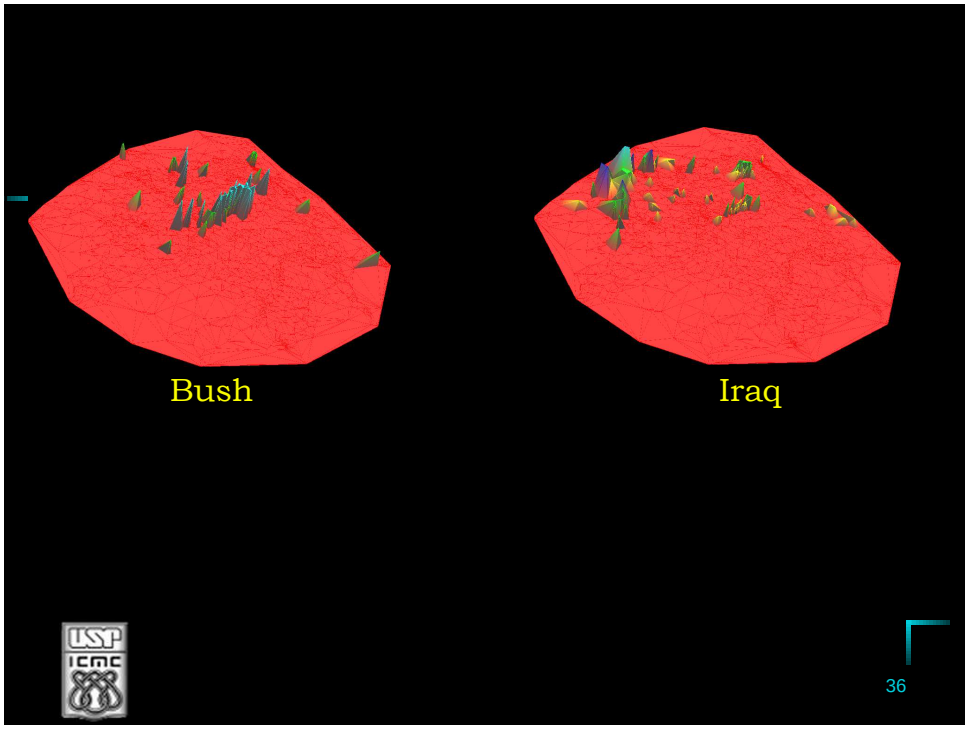
Bush
Iraq
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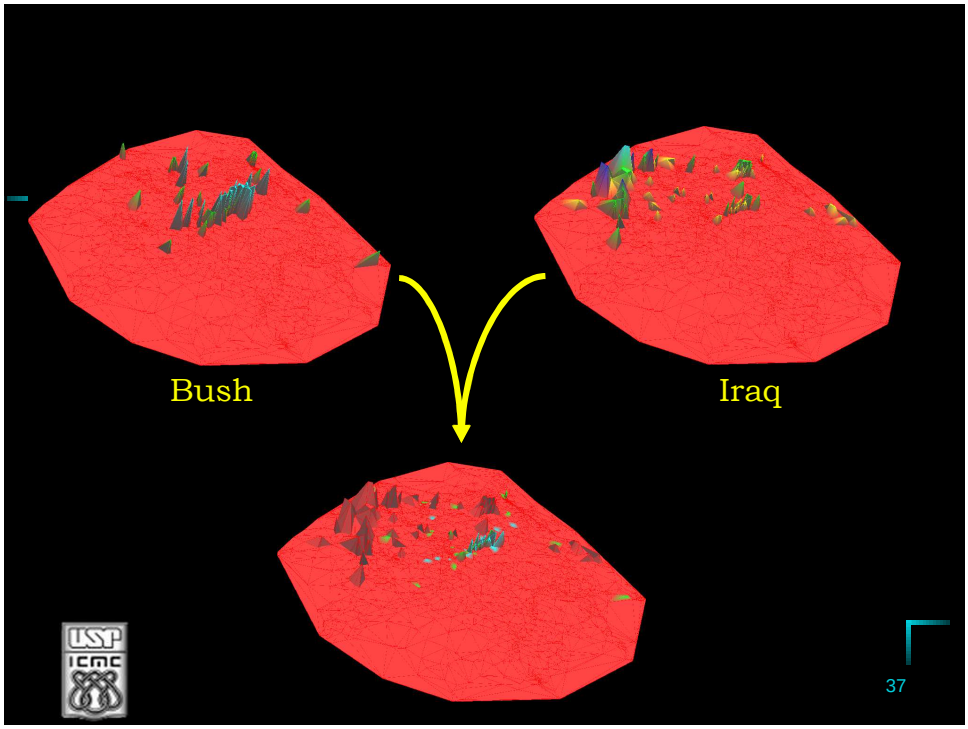
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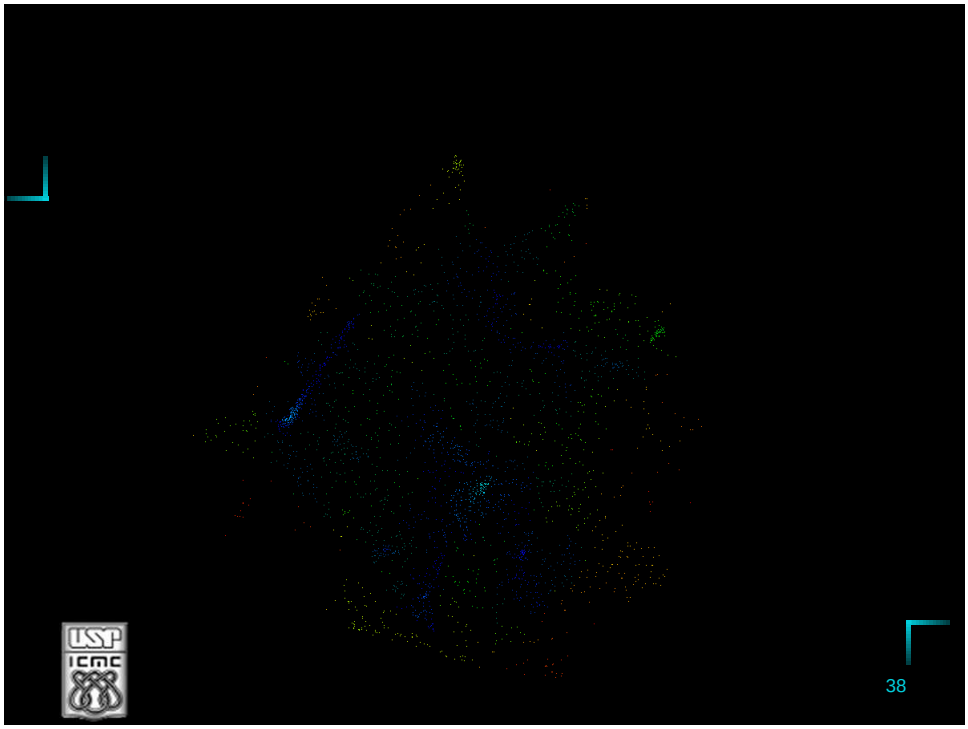
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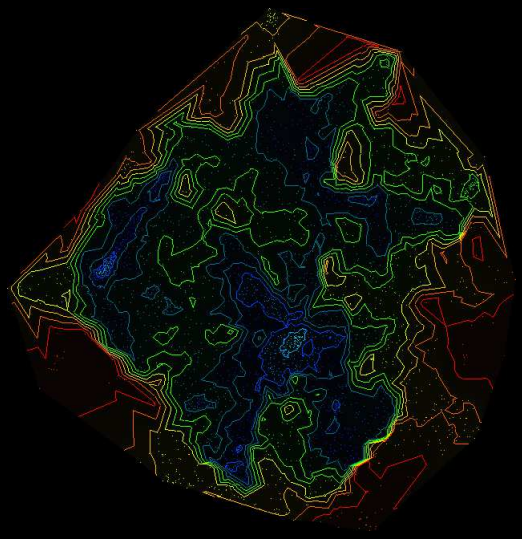
Curvas de Nível



Séries Temporais – Vazão em Hidrelétricas

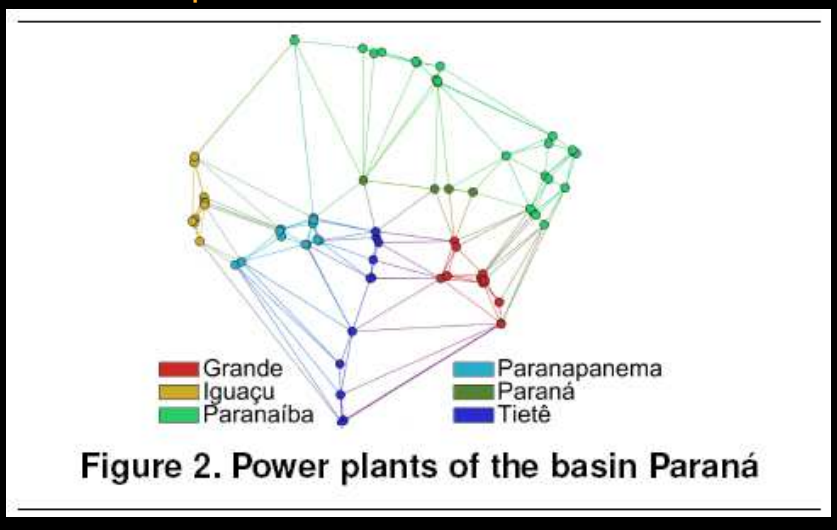
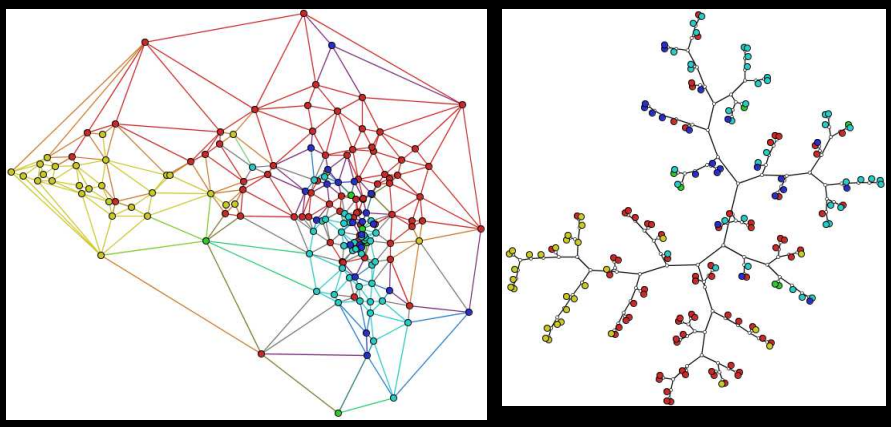


Figure 2. Power plants of the basin Paraná

Further Example - patents



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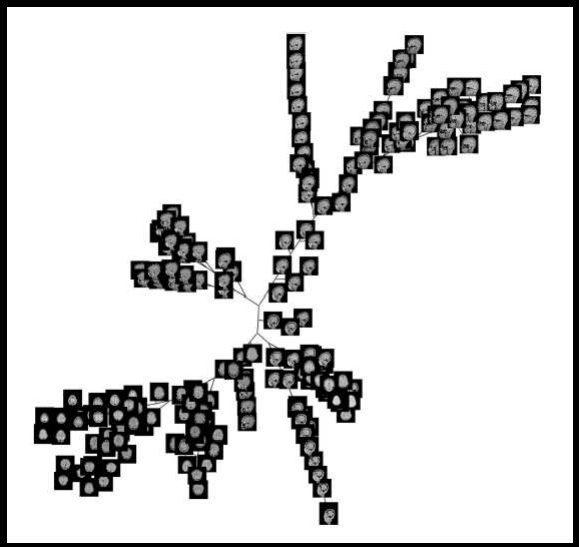
Images



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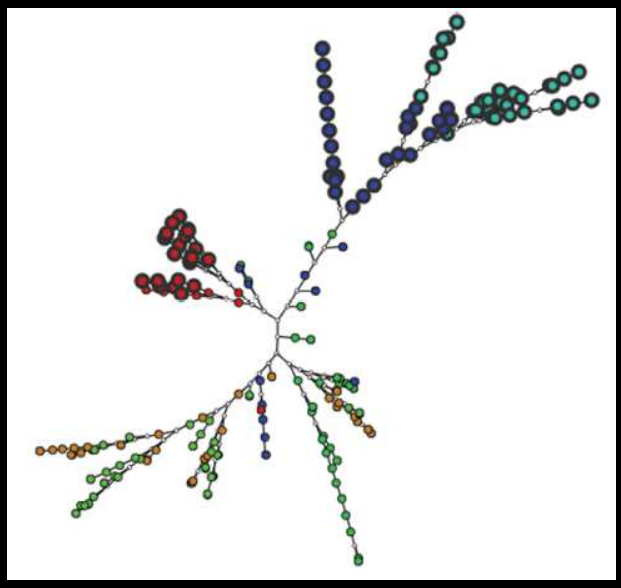
Images



Exercícios

- Download Pex
- Usar os conjuntos de dados presentes no site e explorá-los.
- Registrar as conclusões

- Download Pex-Image
- Fazer o mesmo

  - Infoserver.lcad.icmc.usp.br/infovis2

Referências

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