

# Visualização de Informação

## Parte III

Multi-dimensional Visualization:  
Visual Mining of Text , Images  
and other Multi-dimensionoanl  
entities.

*Rosane Minghim +  
The team*

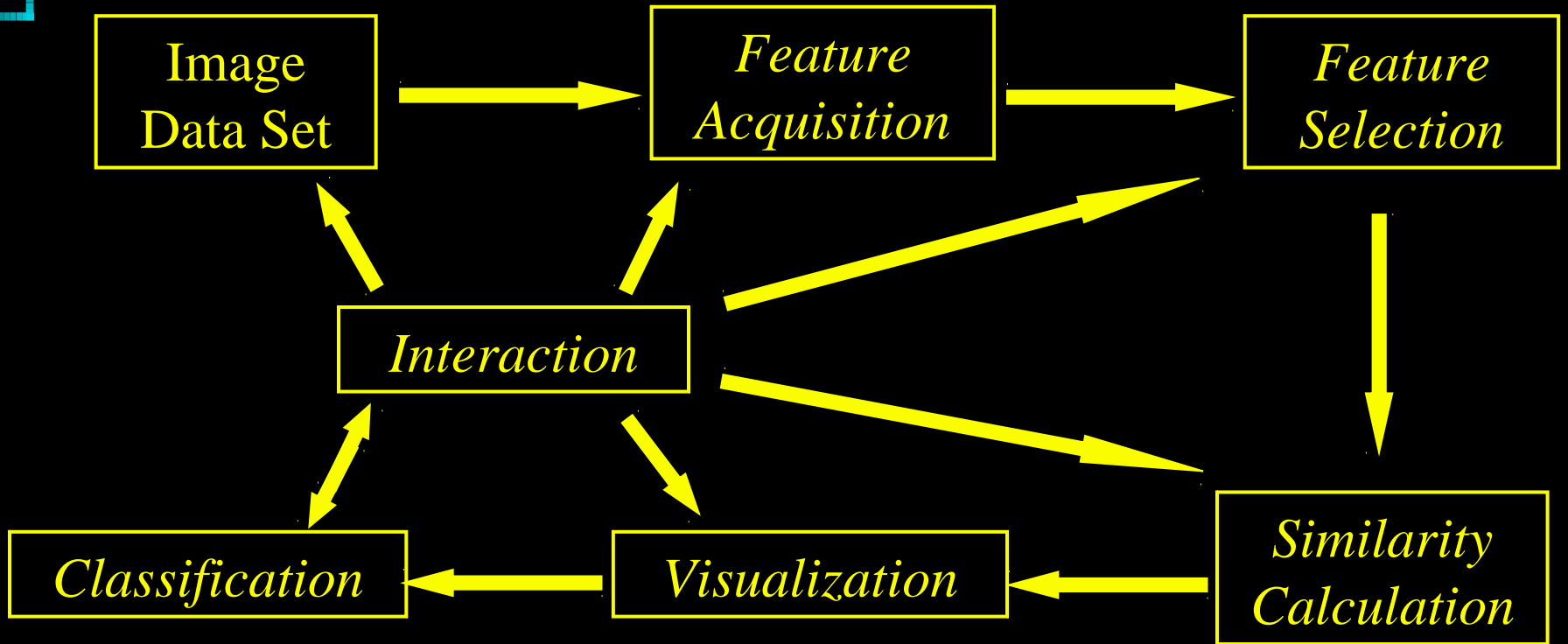


Instituto de Ciências Matemáticas e de  
Computação  
USP-São Carlos

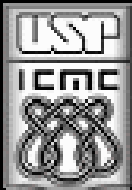
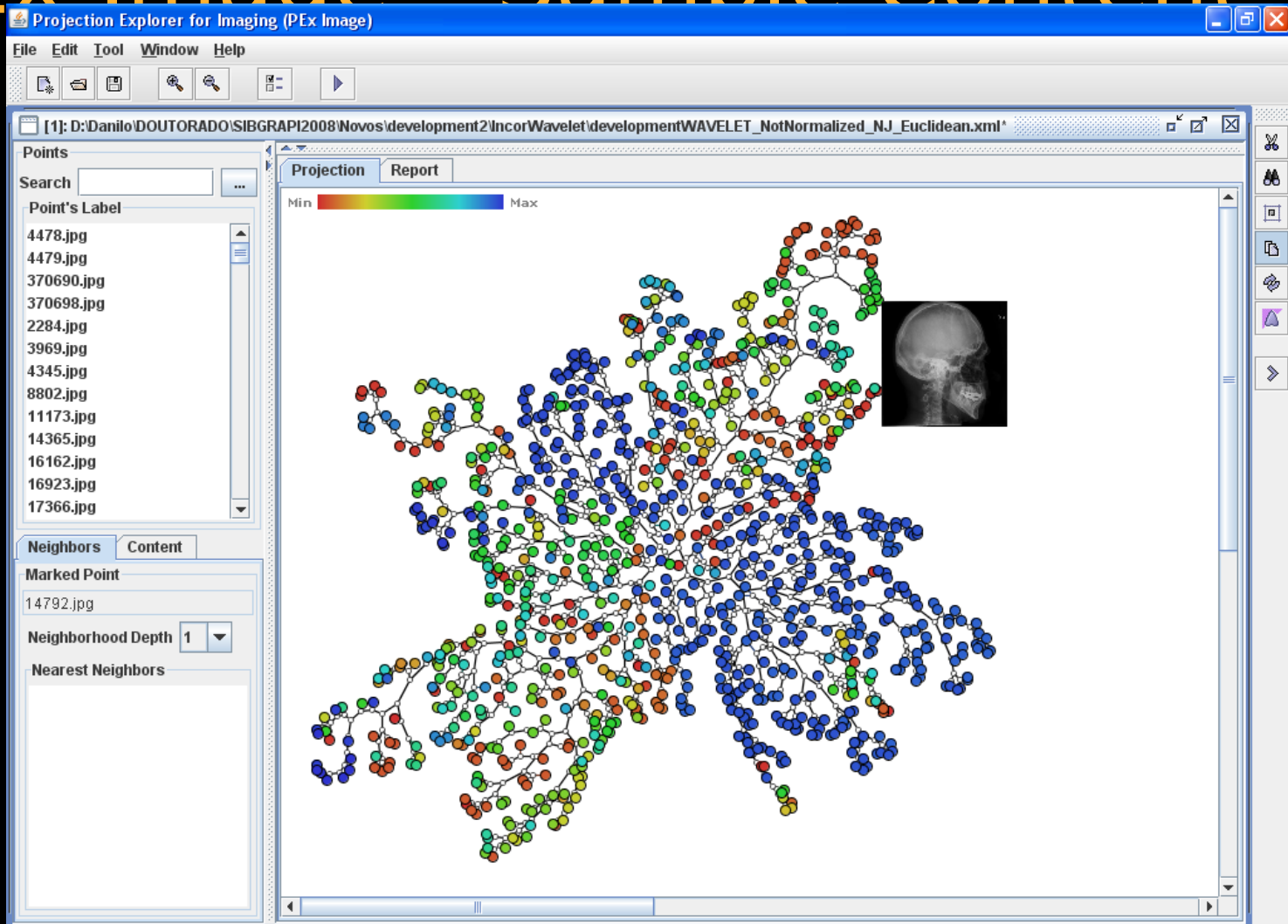
# Images?



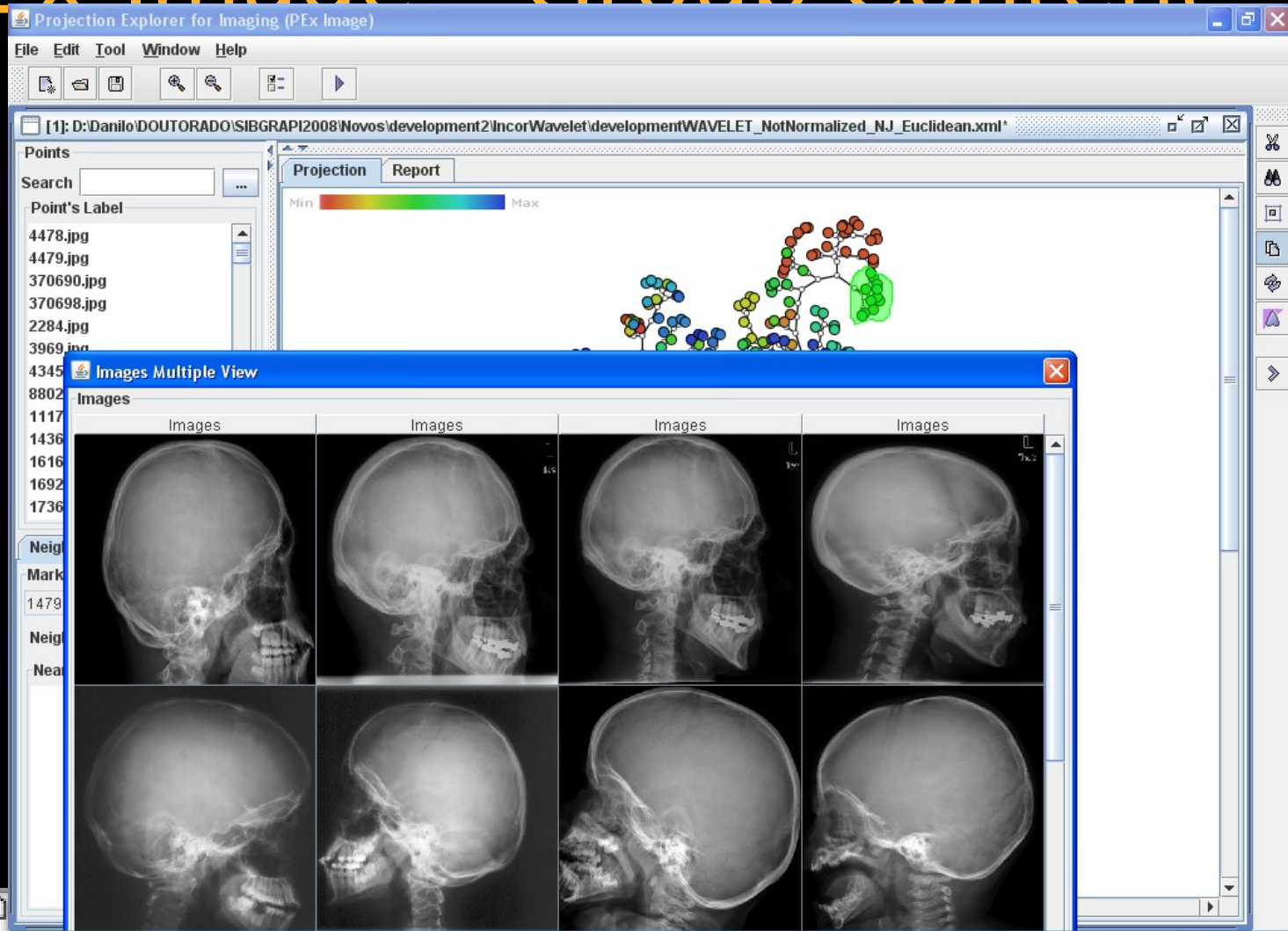
# Pipeline



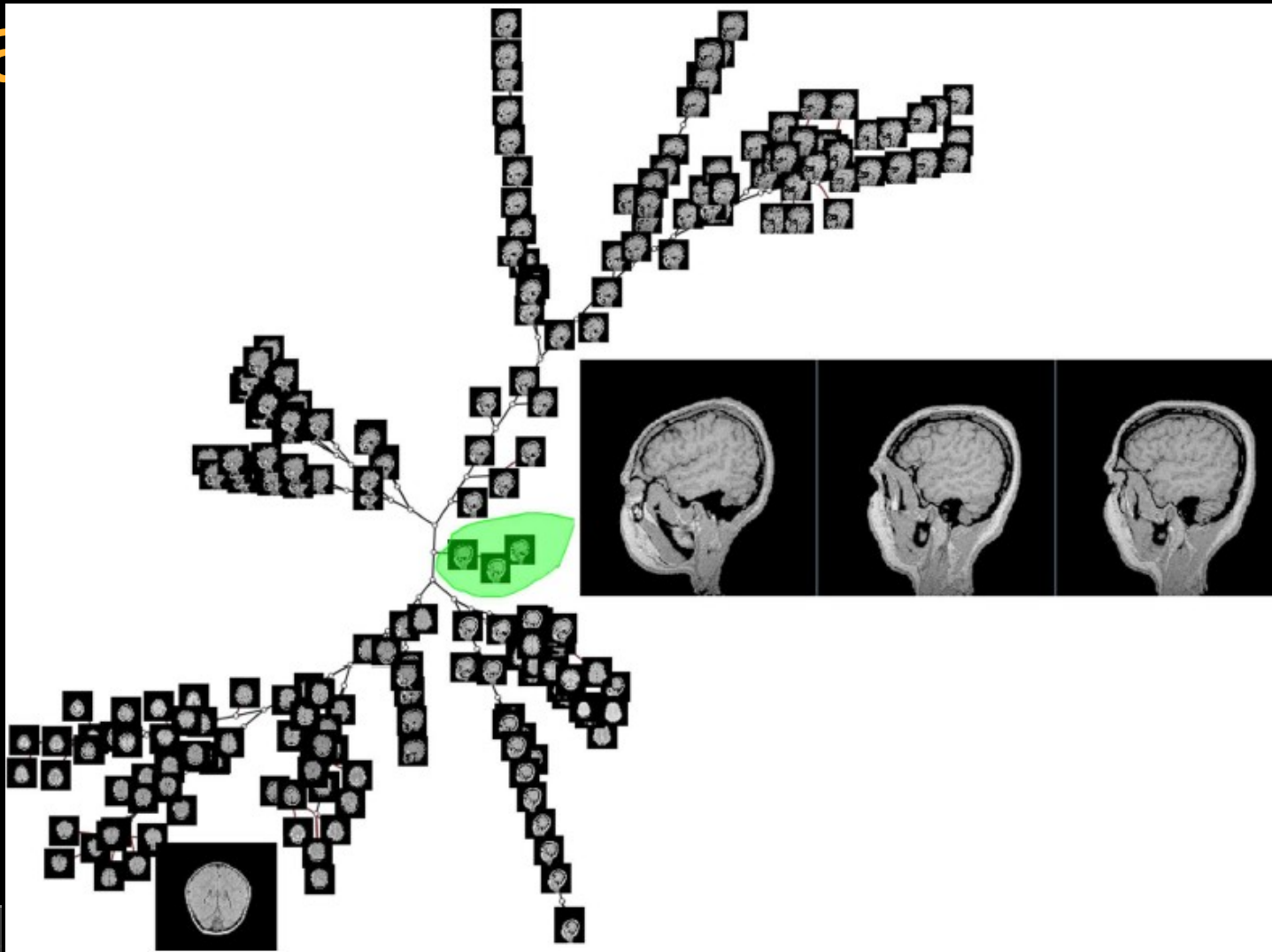
# PEx-Image - Sample Content



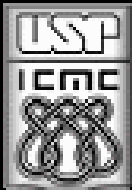
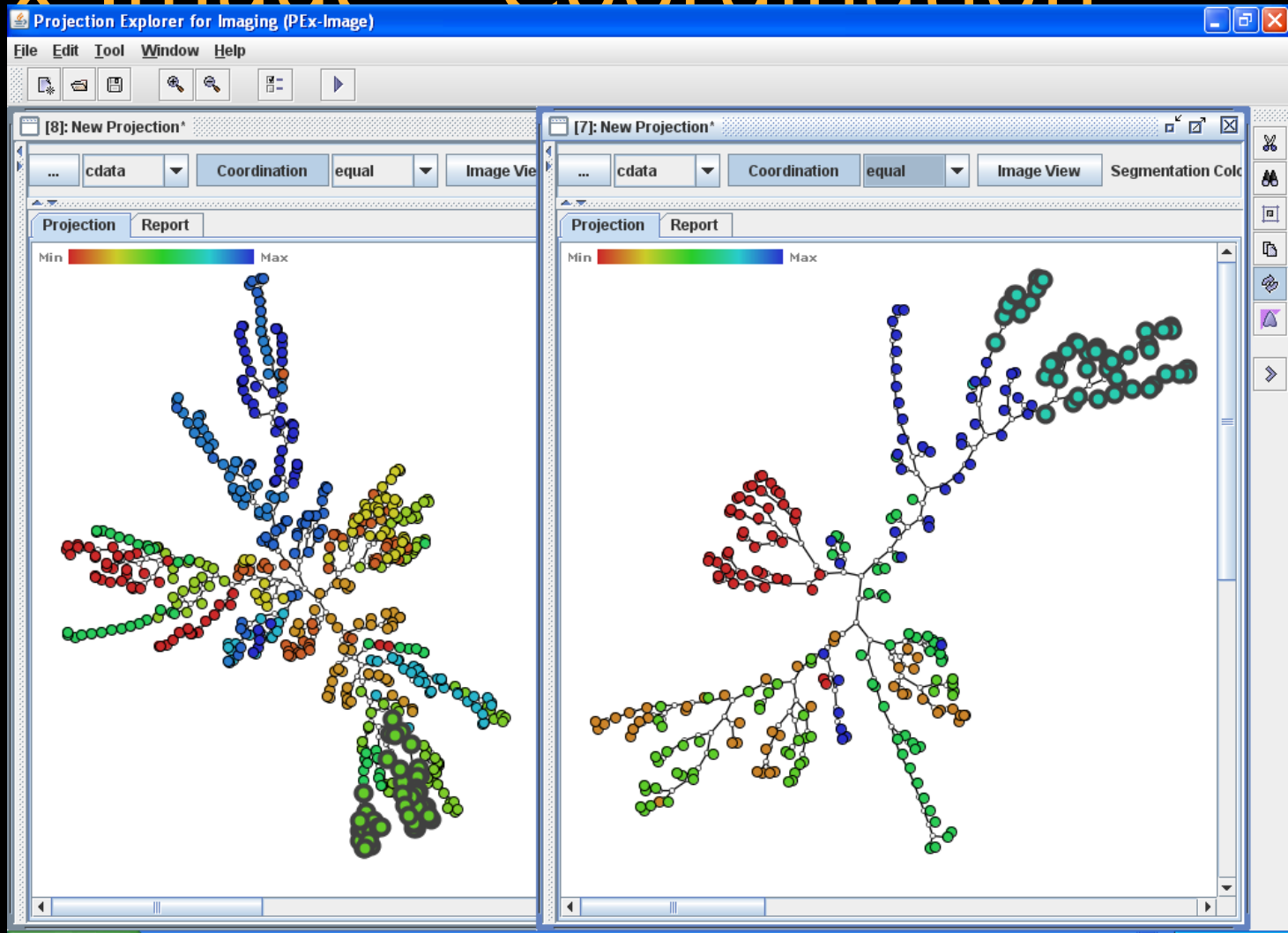
# PEx-Image - Group Content



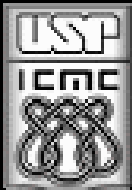
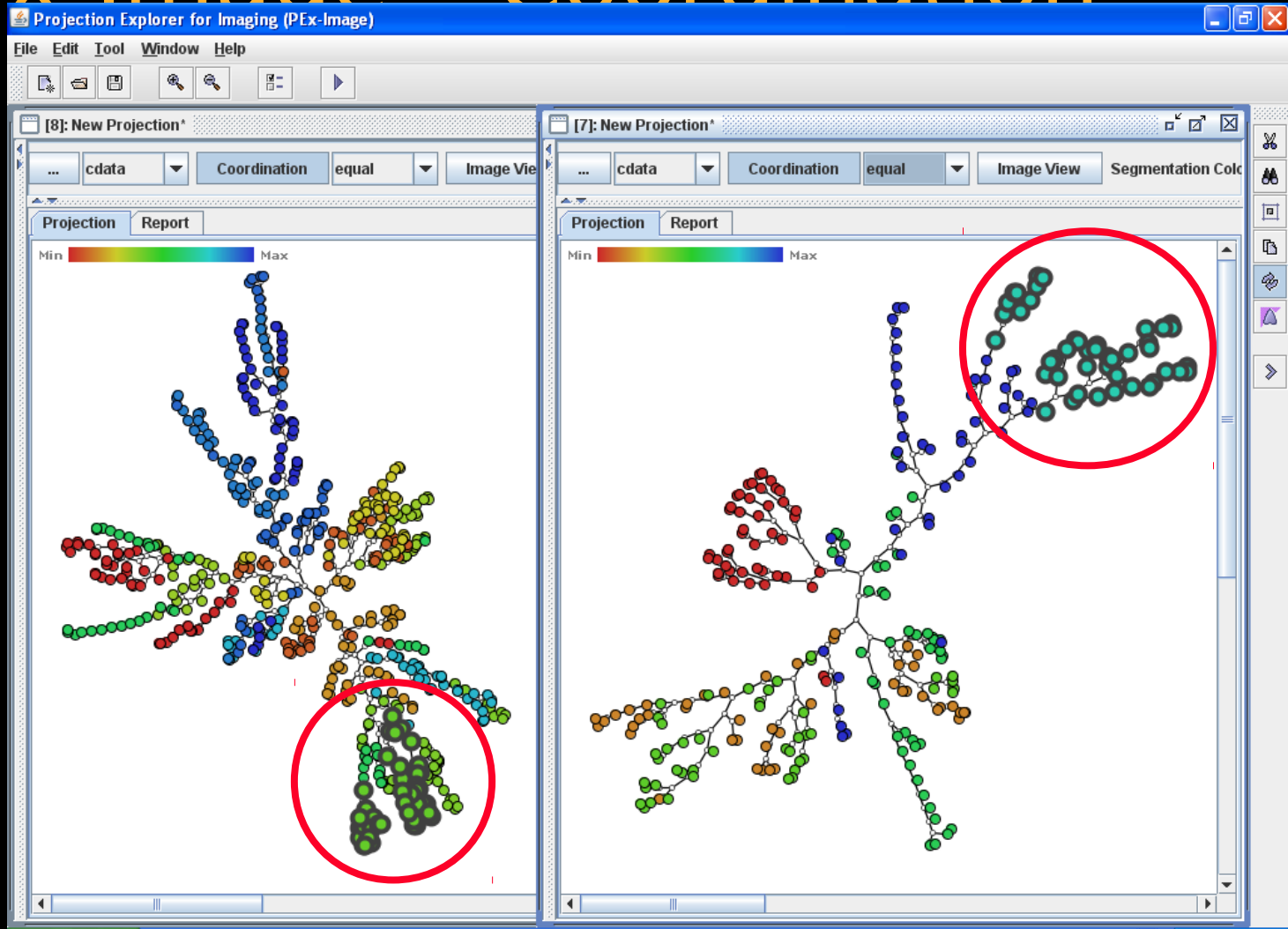
# PEx-Image - Image as Visual Ma



# PEx-Image - Coordination



# PEx-Image - Coordination



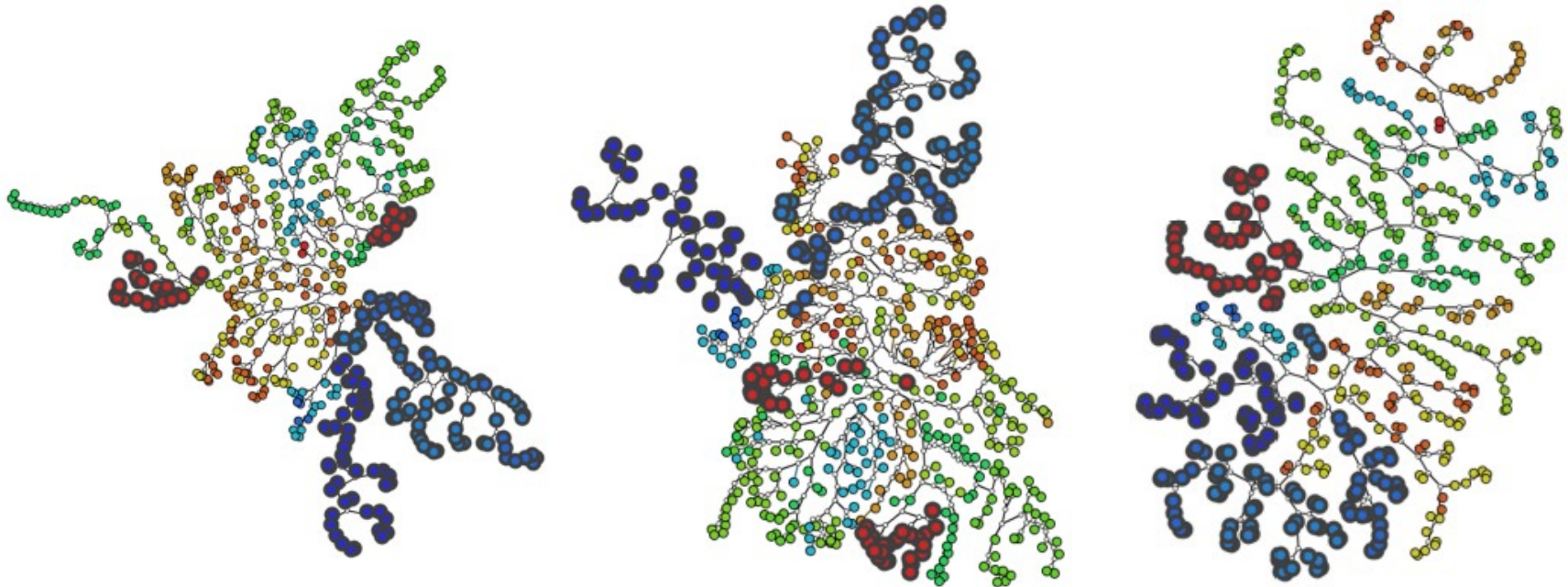


# Comparison of Distance Metrics

*Euclidean*

*City Block*

*Cosine*



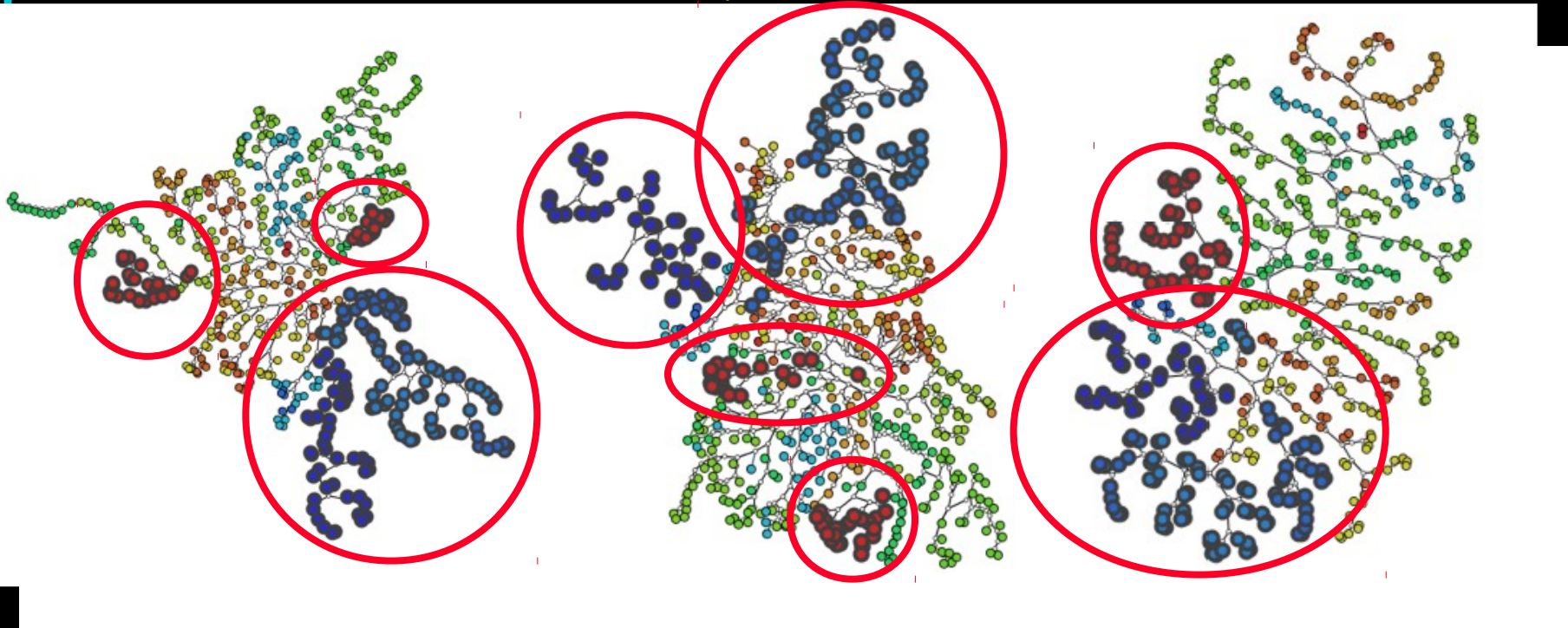
*512 MRI medical images*  
*12 classes*

# Comparison of Distance Metrics

*Euclidean*

*City Block*

*Cosine*



*512 MRI medical images*  
*12 classes*

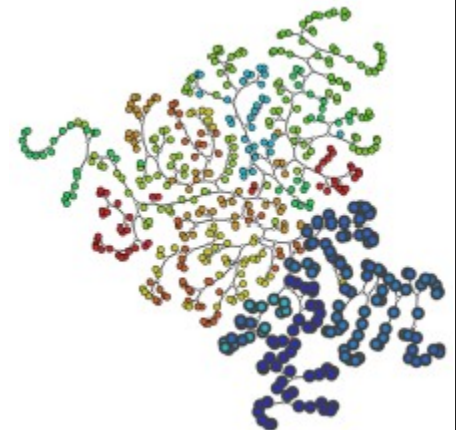
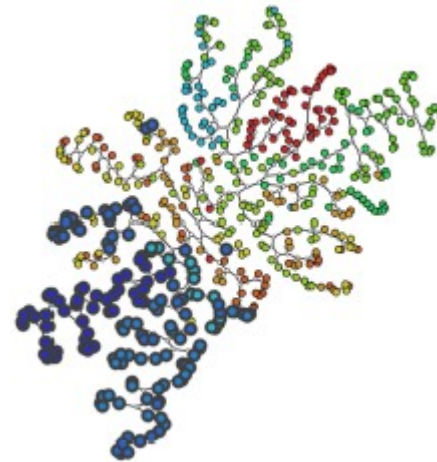
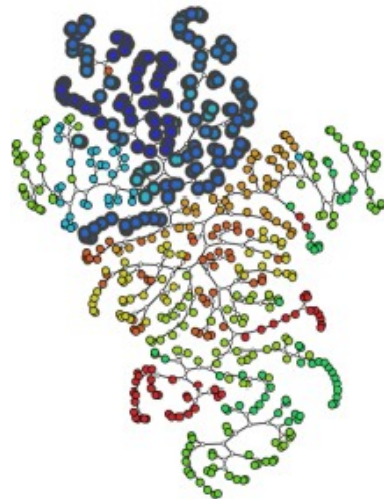
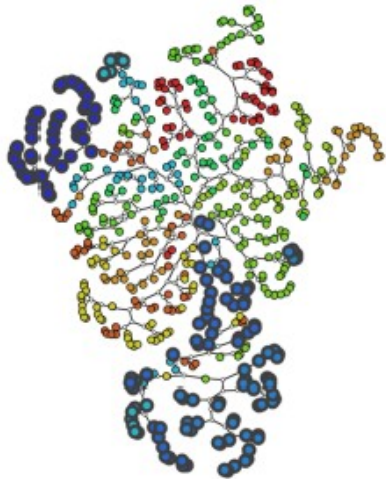
# Comparison of Feature Space (1)

*16 Gabor  
Filters*

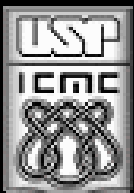
*Fourier, Mean  
and Deviation*

*72 co-ocurrence  
matrices*

*All combined*



*512 MRI medical images  
12 classes*



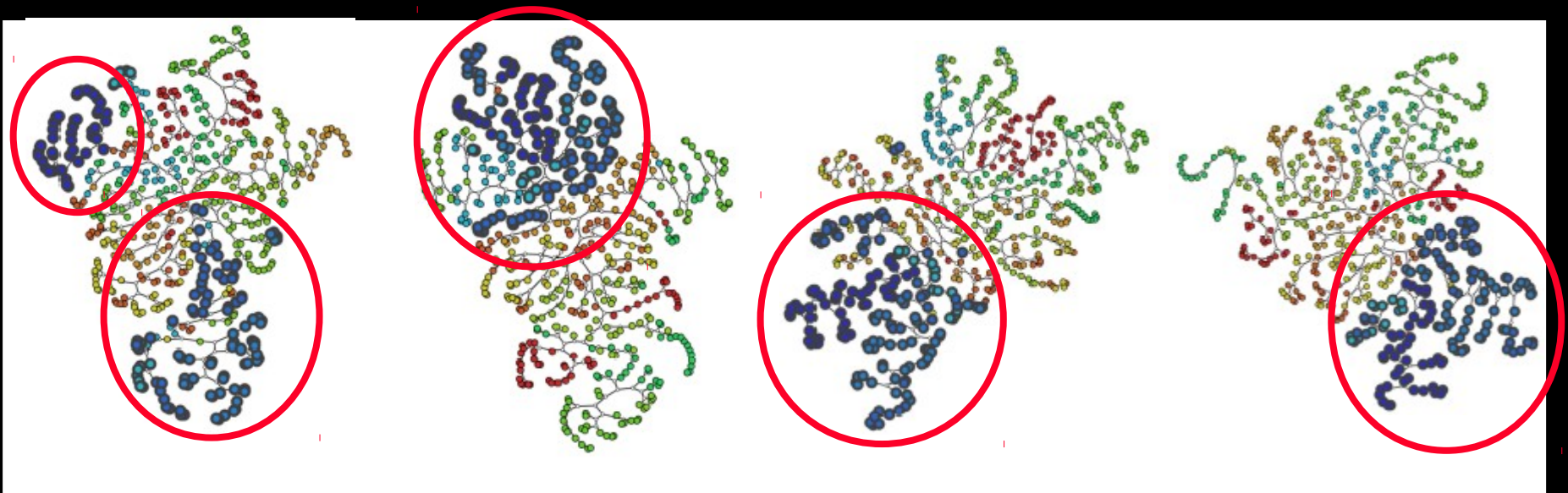
# Comparison of Feature Space (1)

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and Deviation*

*72 co-ocurrence  
matrices*

*All combined*

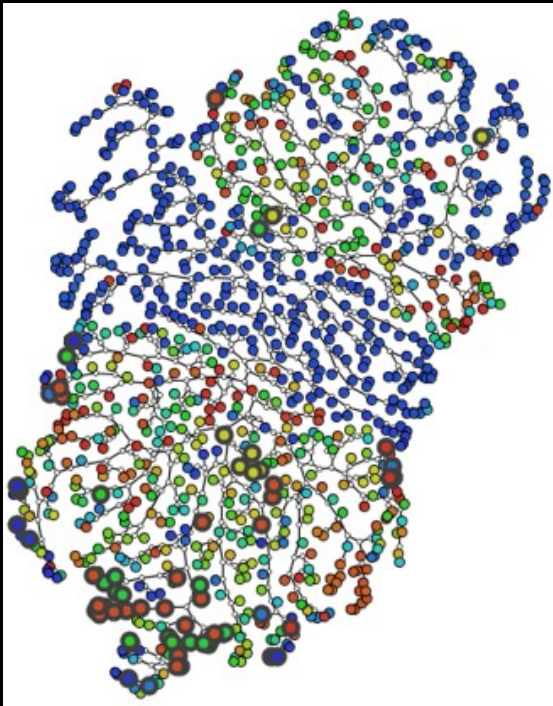


*512 MRI medical images  
12 classes*

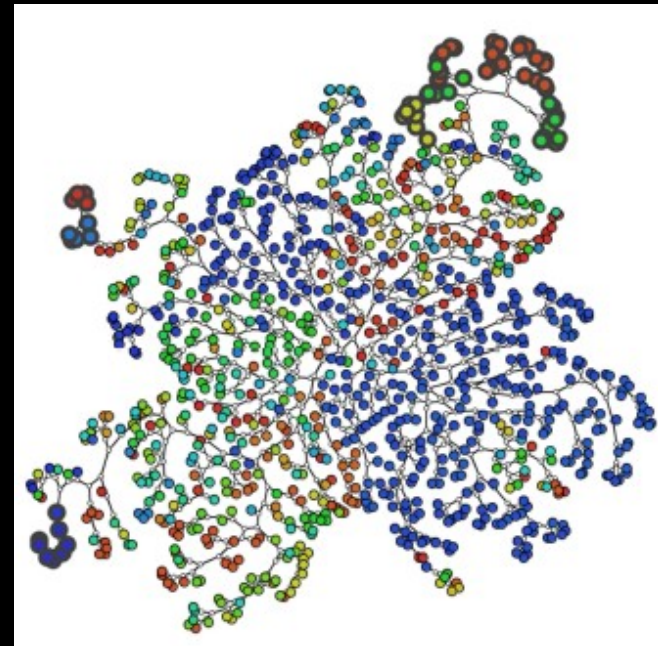


# Comparison of Feature Space (2)

*All combined*



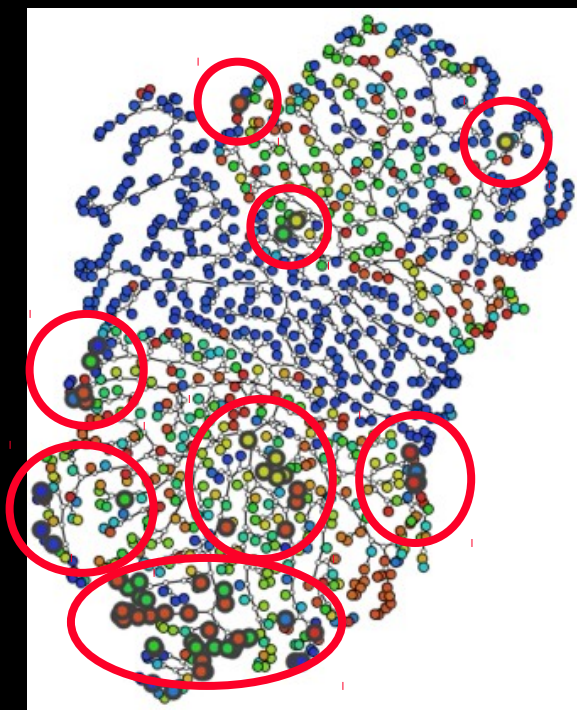
*1024 Wavelet Features*



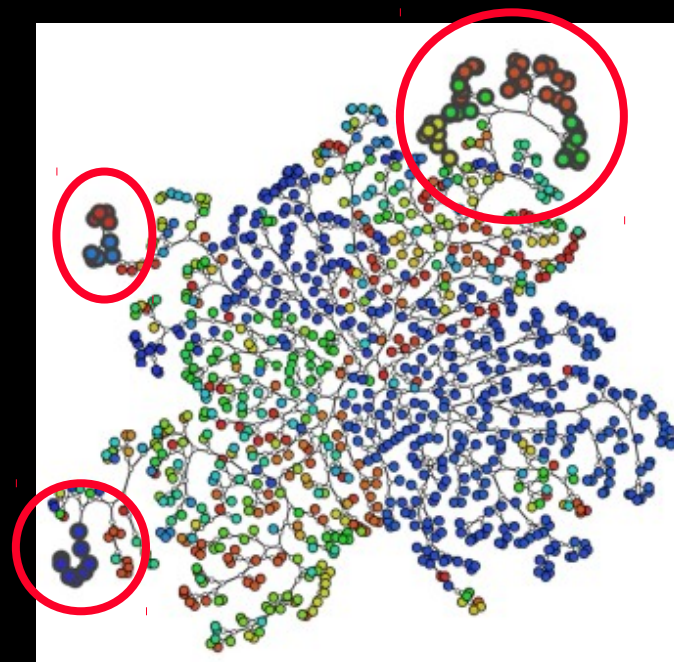
*1000 X-Ray images from  
ImageCLEF  
116 classes*

# Comparison of Feature Space (2)

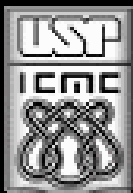
*All combined*



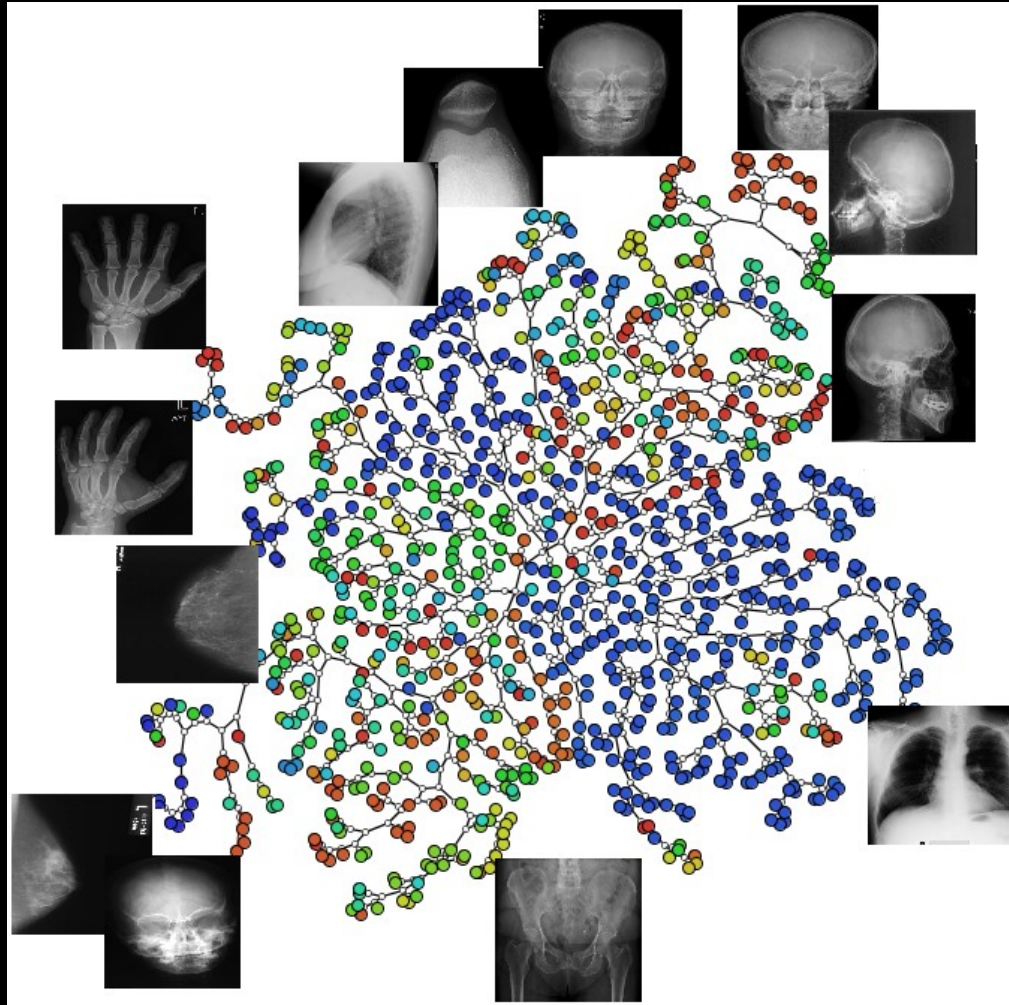
*1024 Wavelet Features*



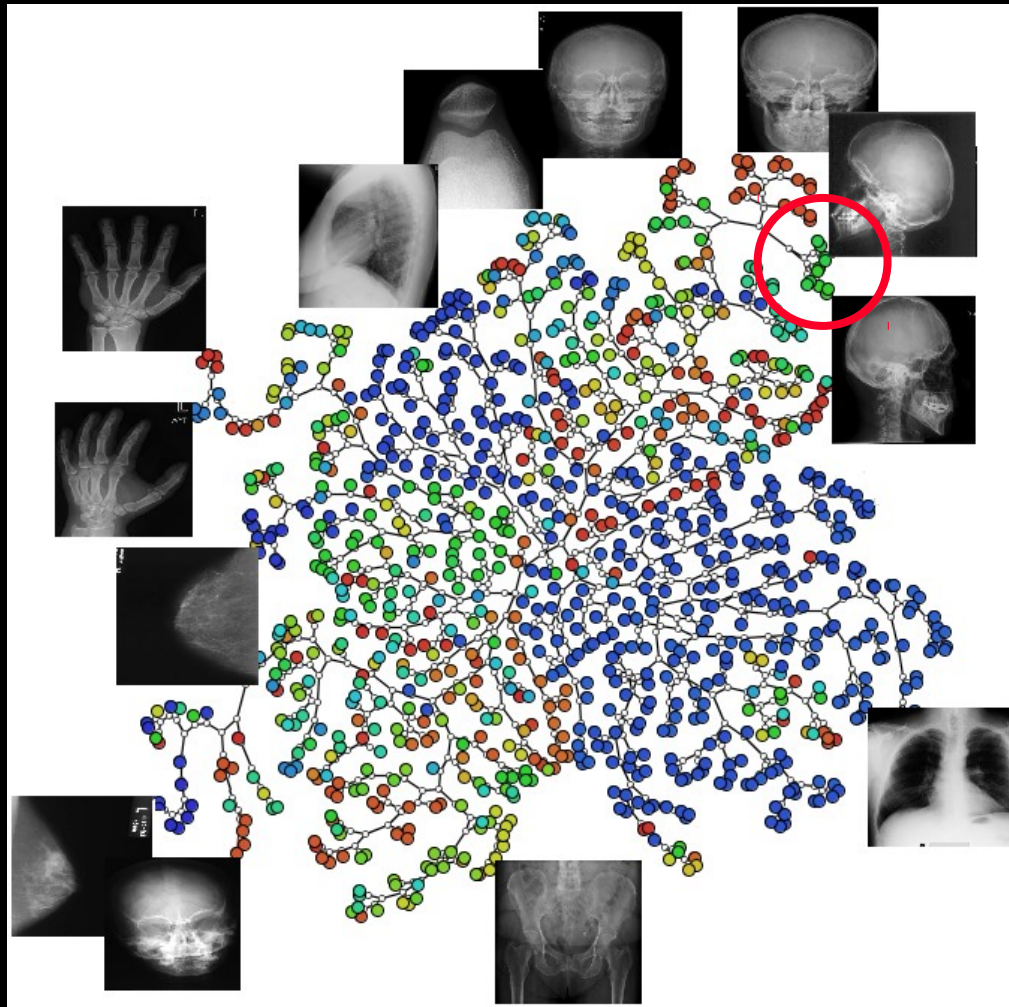
*1000 X-Ray images from  
ImageCLEF  
116 classes*



# Detailed Inspection

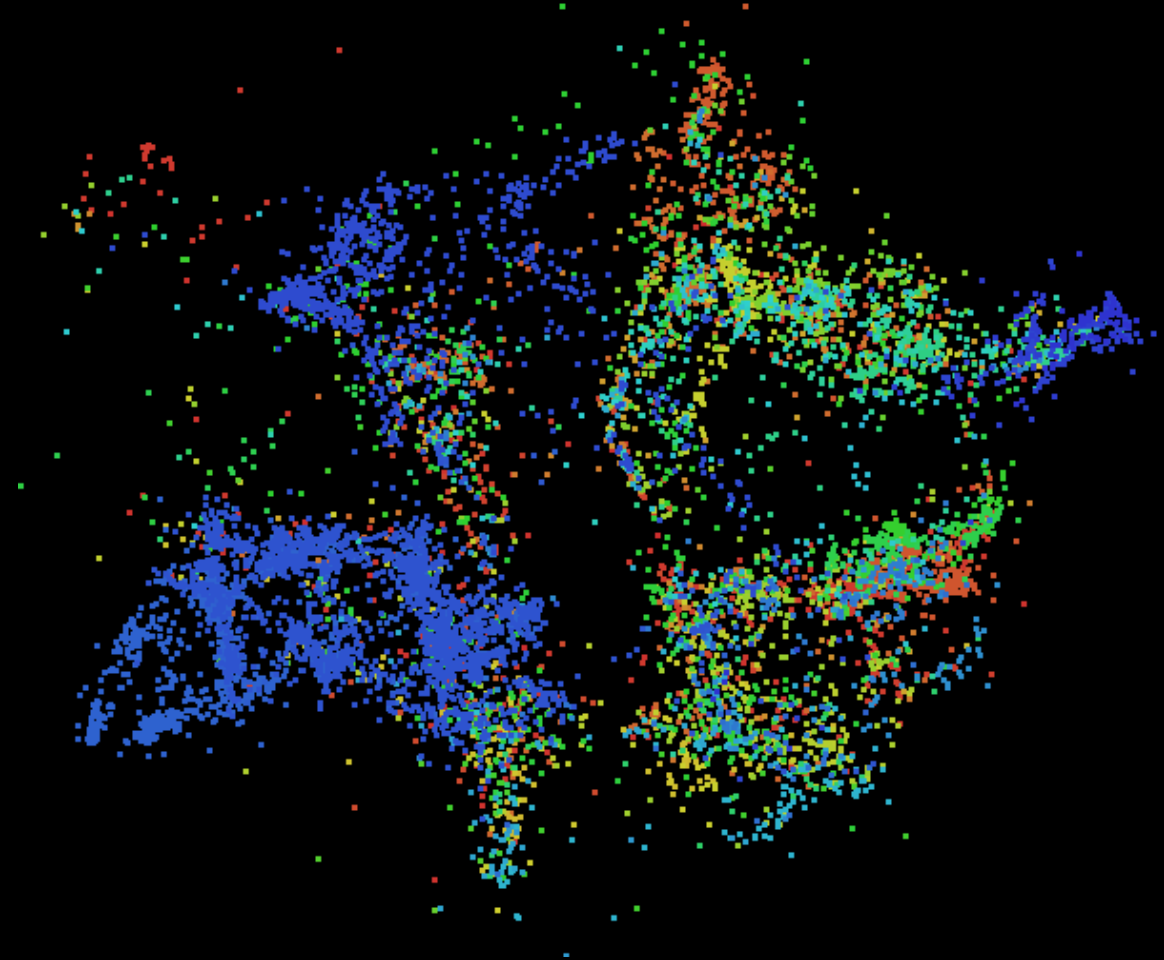


# Detailed Inspection

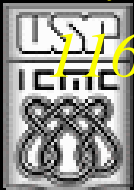




# ImageCLEF Training Data Set (1)



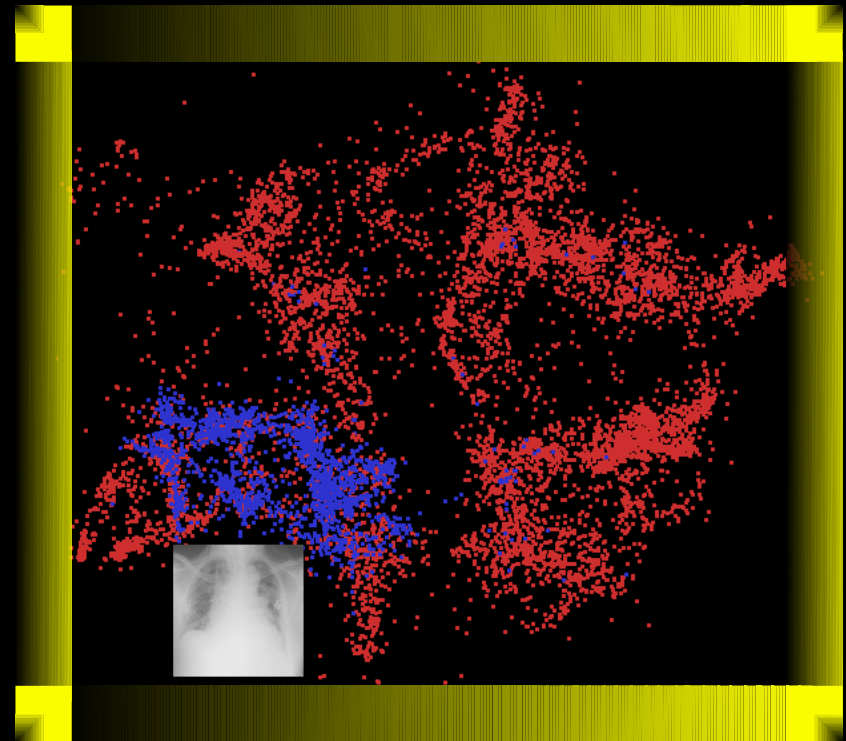
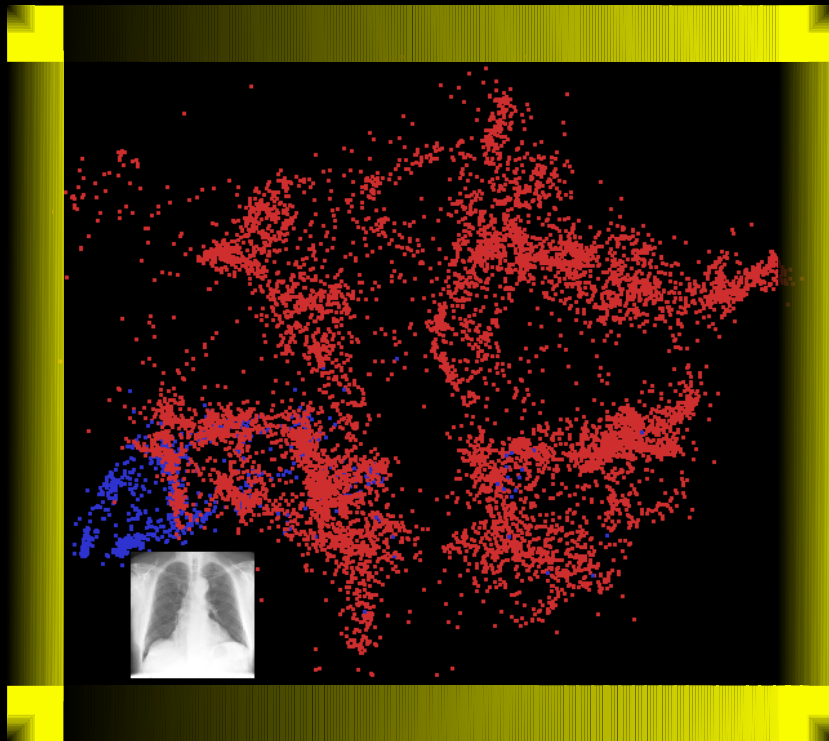
*9000 X-Ray  
images  
116 classes*



# ImageCLEF Training Data Set (2)

*Class 108*

*Class 111*

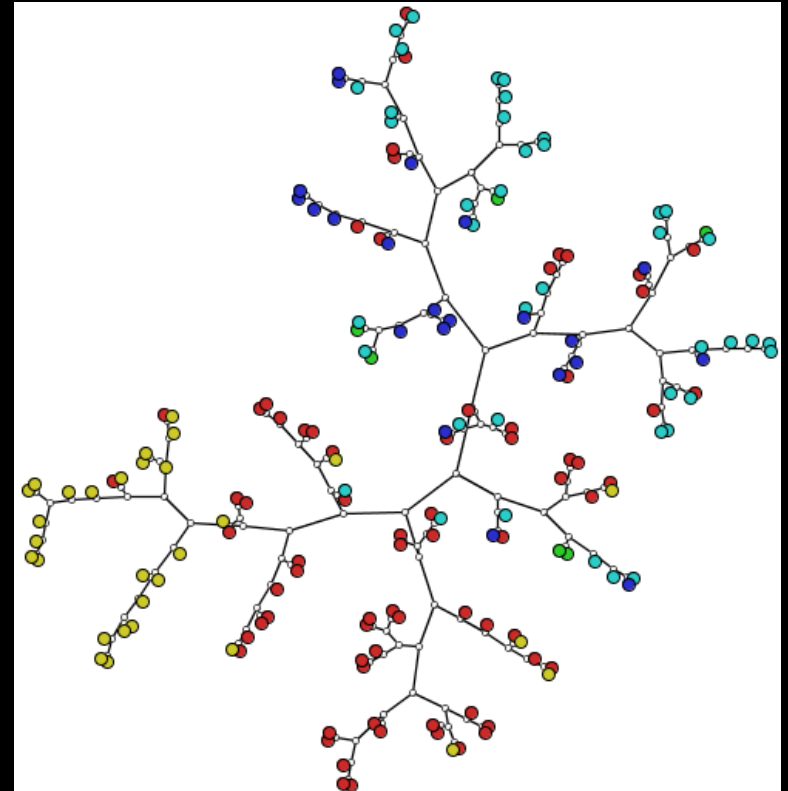
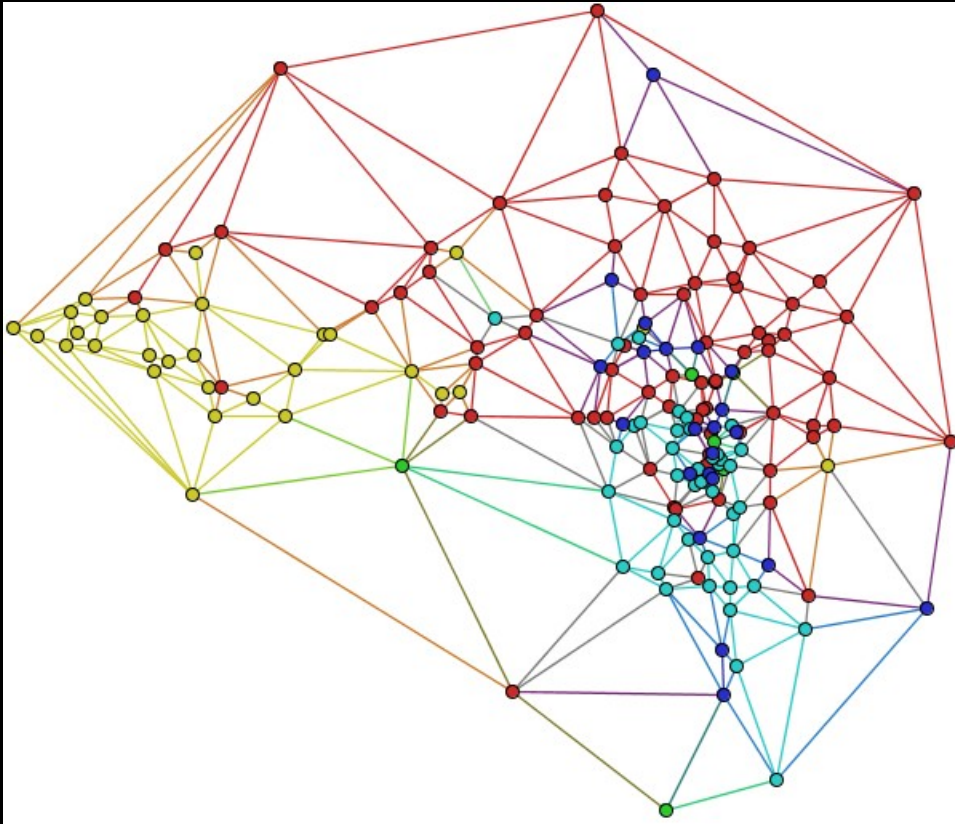


# Further Examples on Text

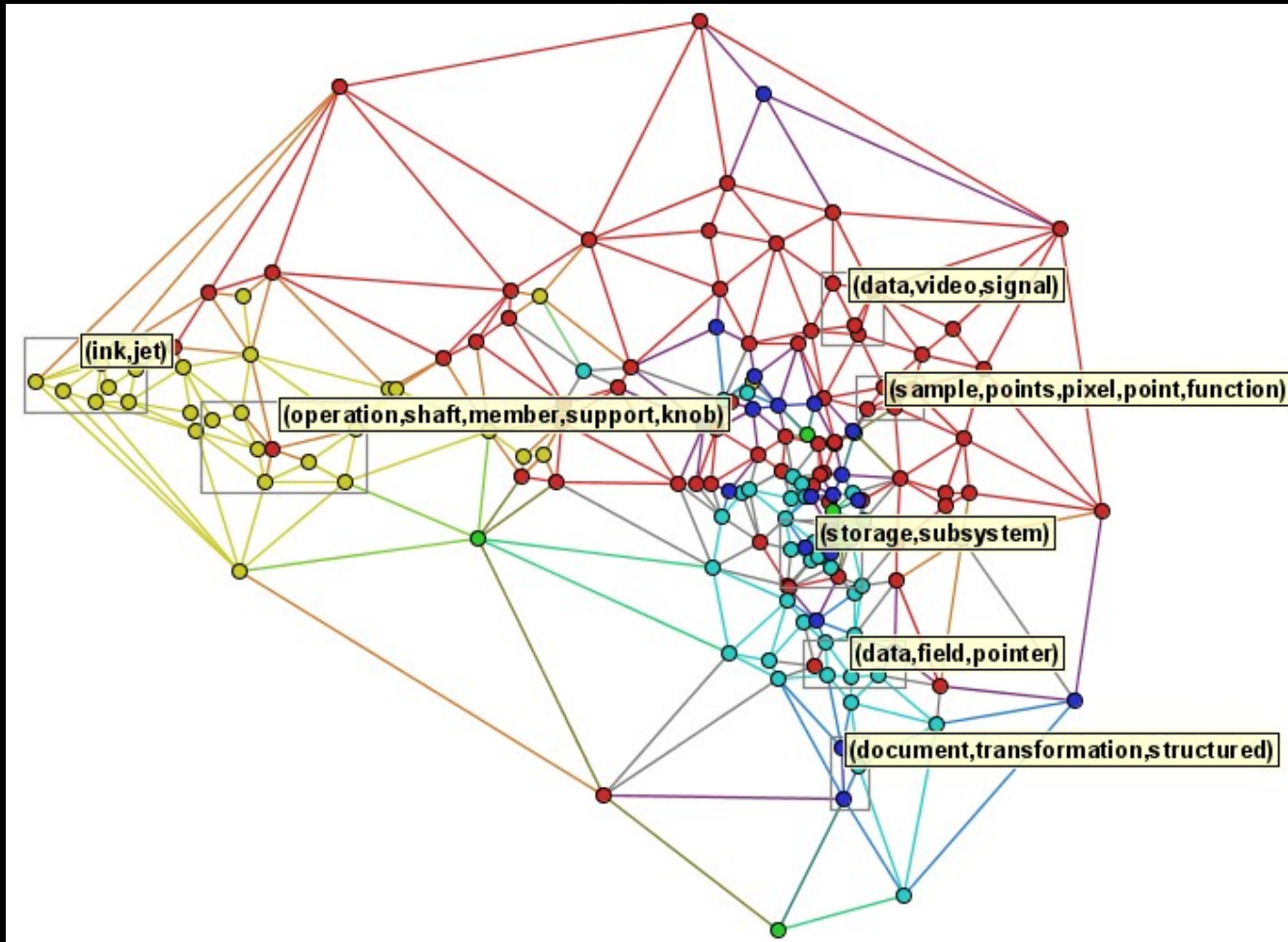
- RSS Patent Data, recovered from the Web  
<http://www.freepatentsonline.com/>
- Case 1:
  - 170 files
  - Graphics processing, printer, database, document, ai



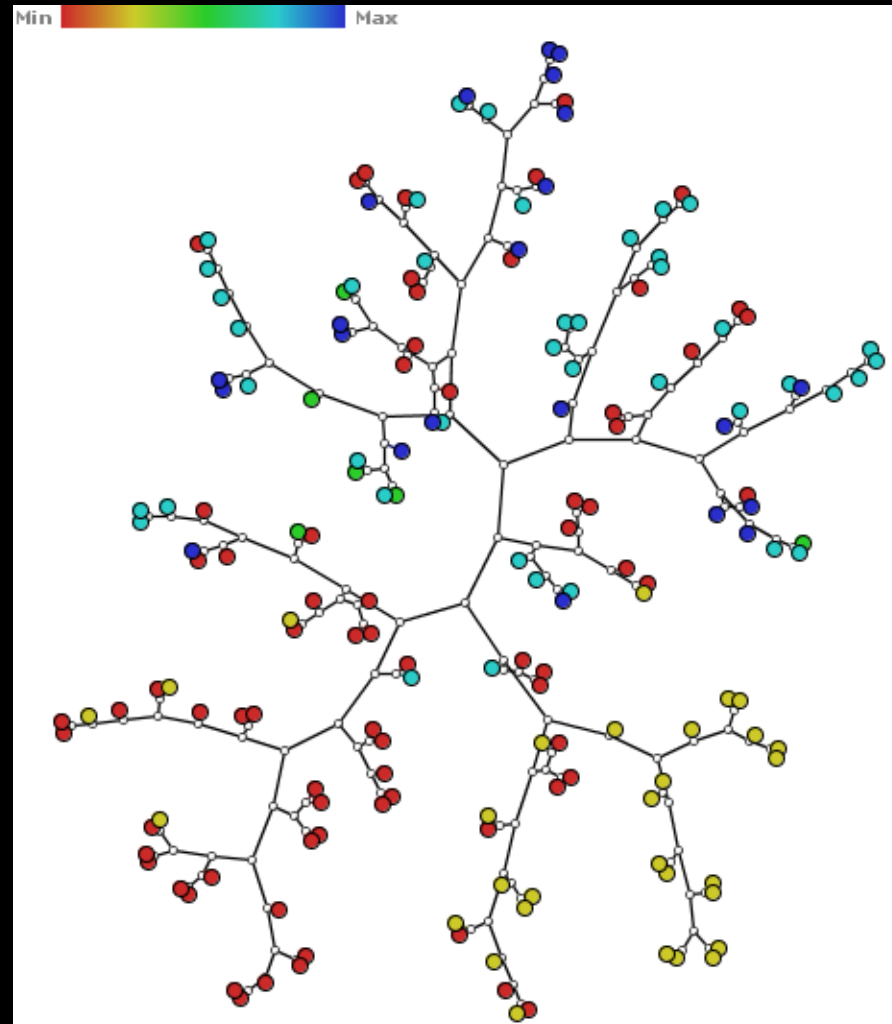
# Further Examples

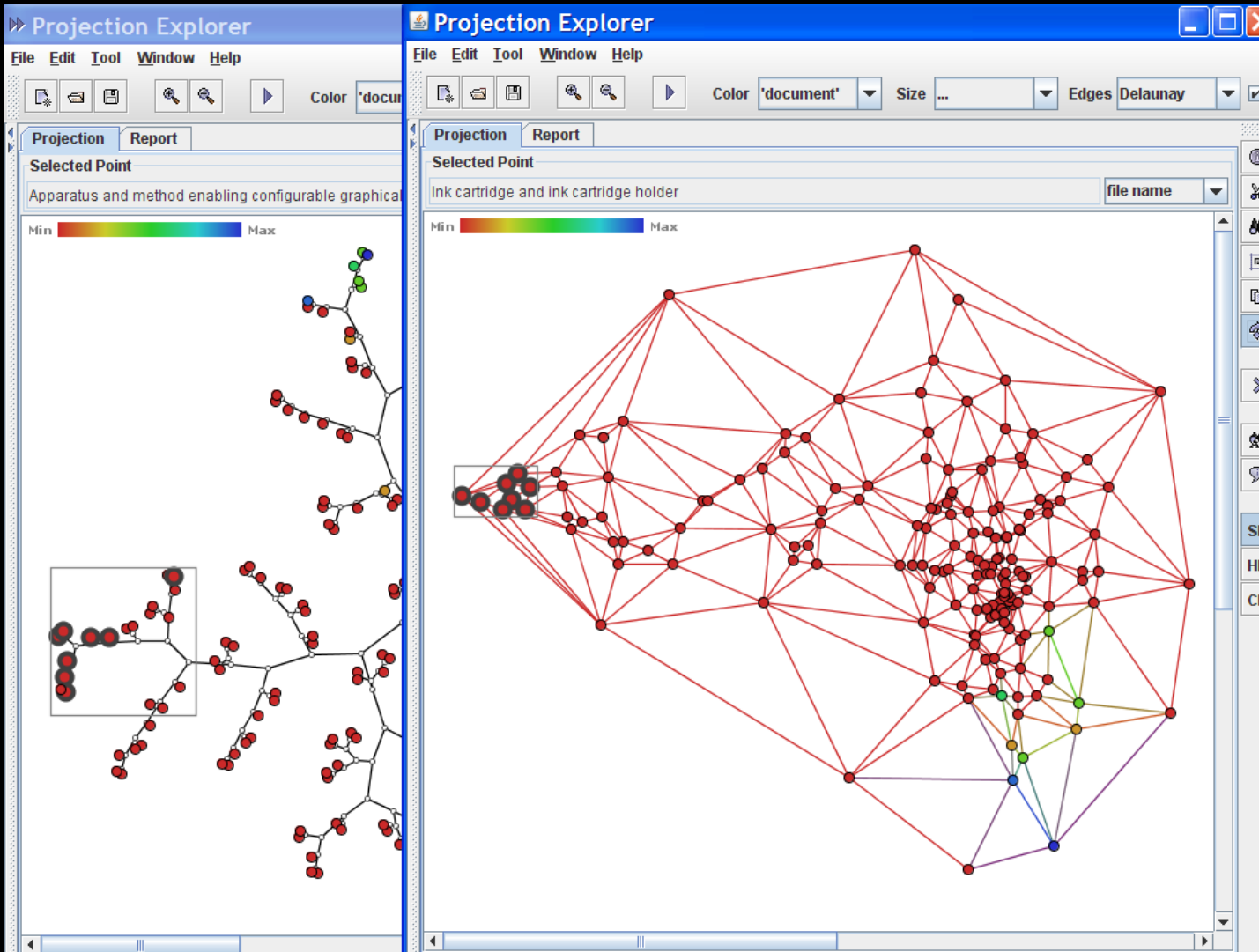


# Further Examples

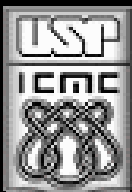


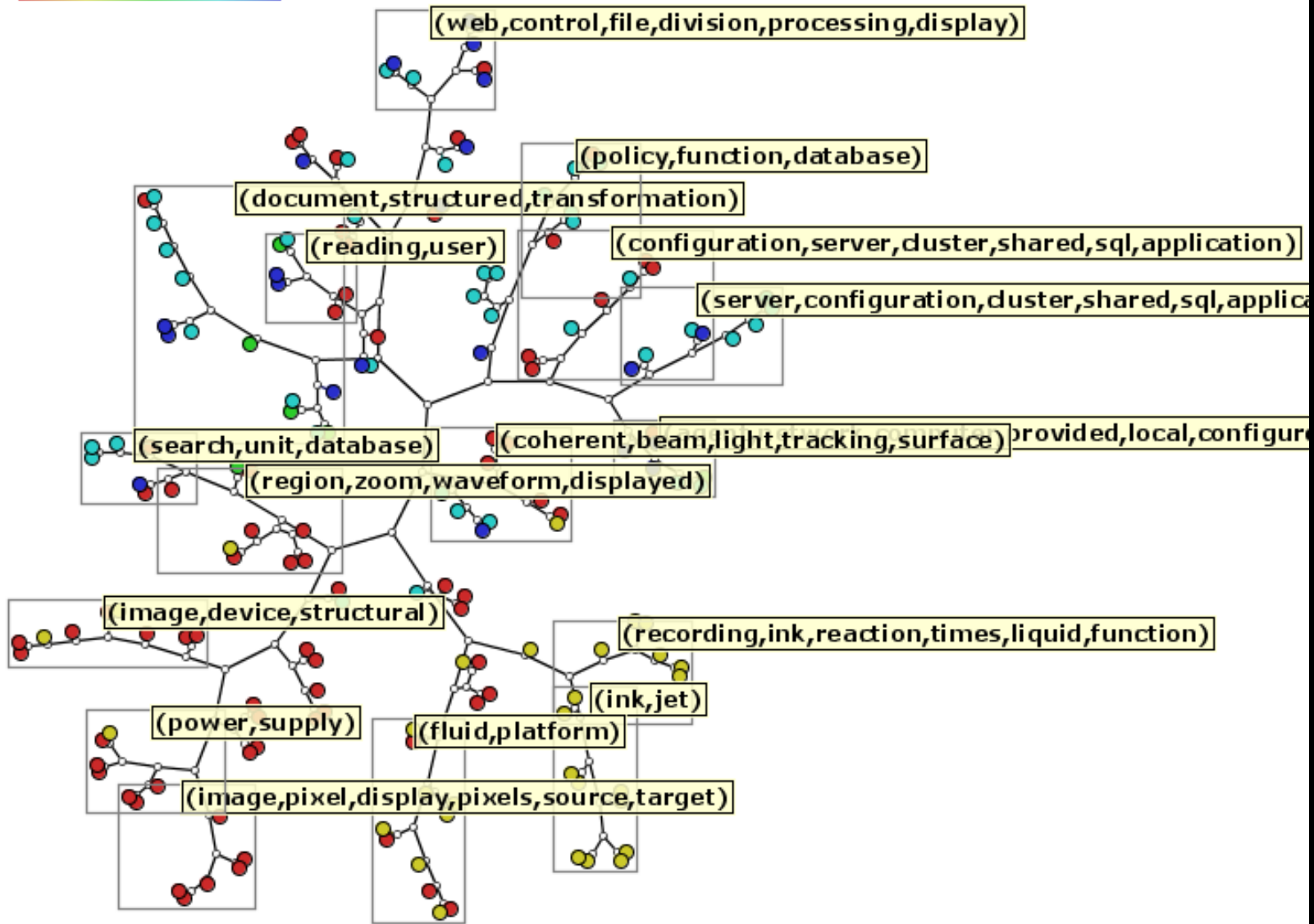
# Further Examples



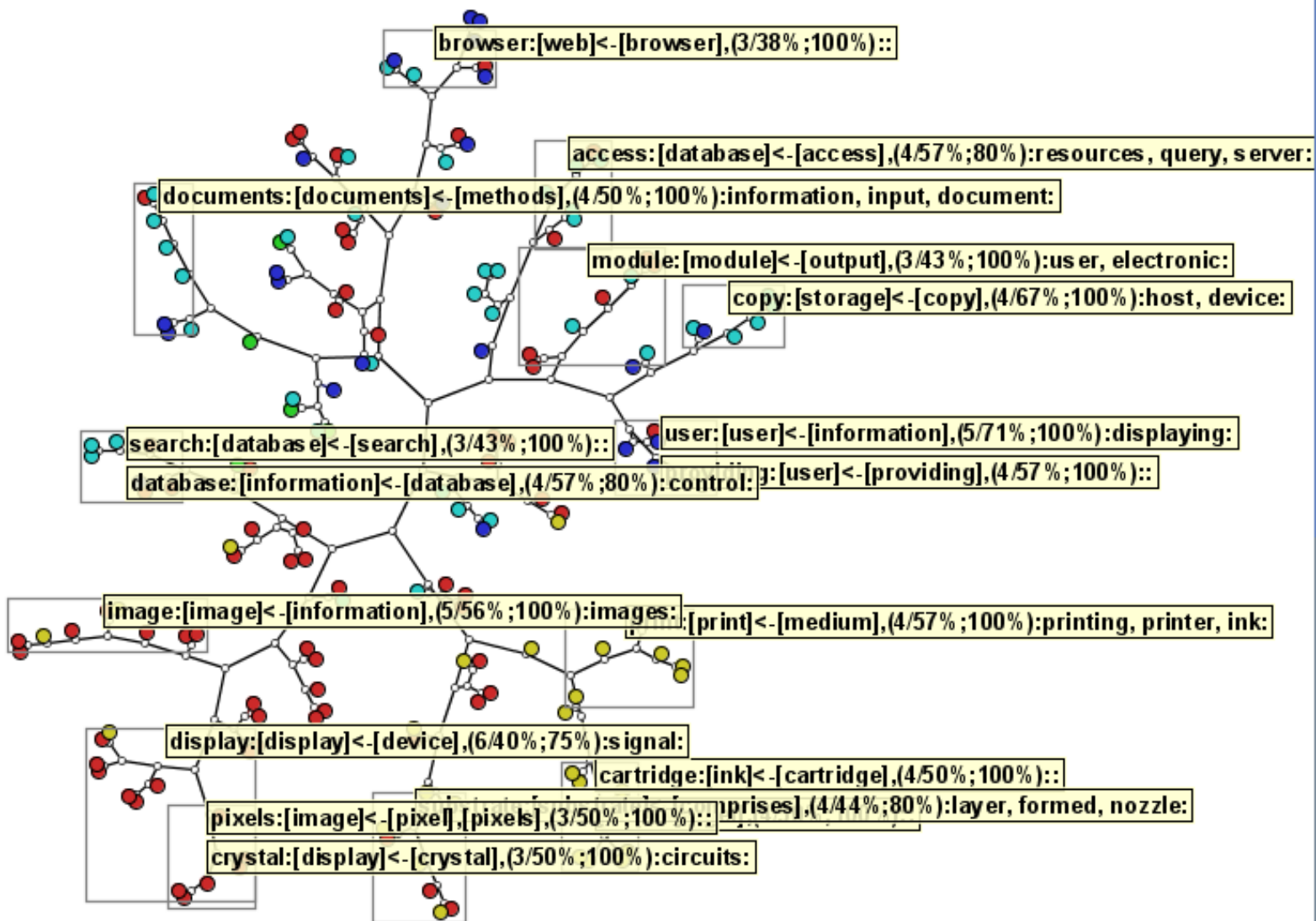


(ink jet,  
document)







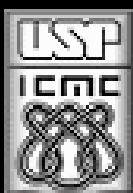
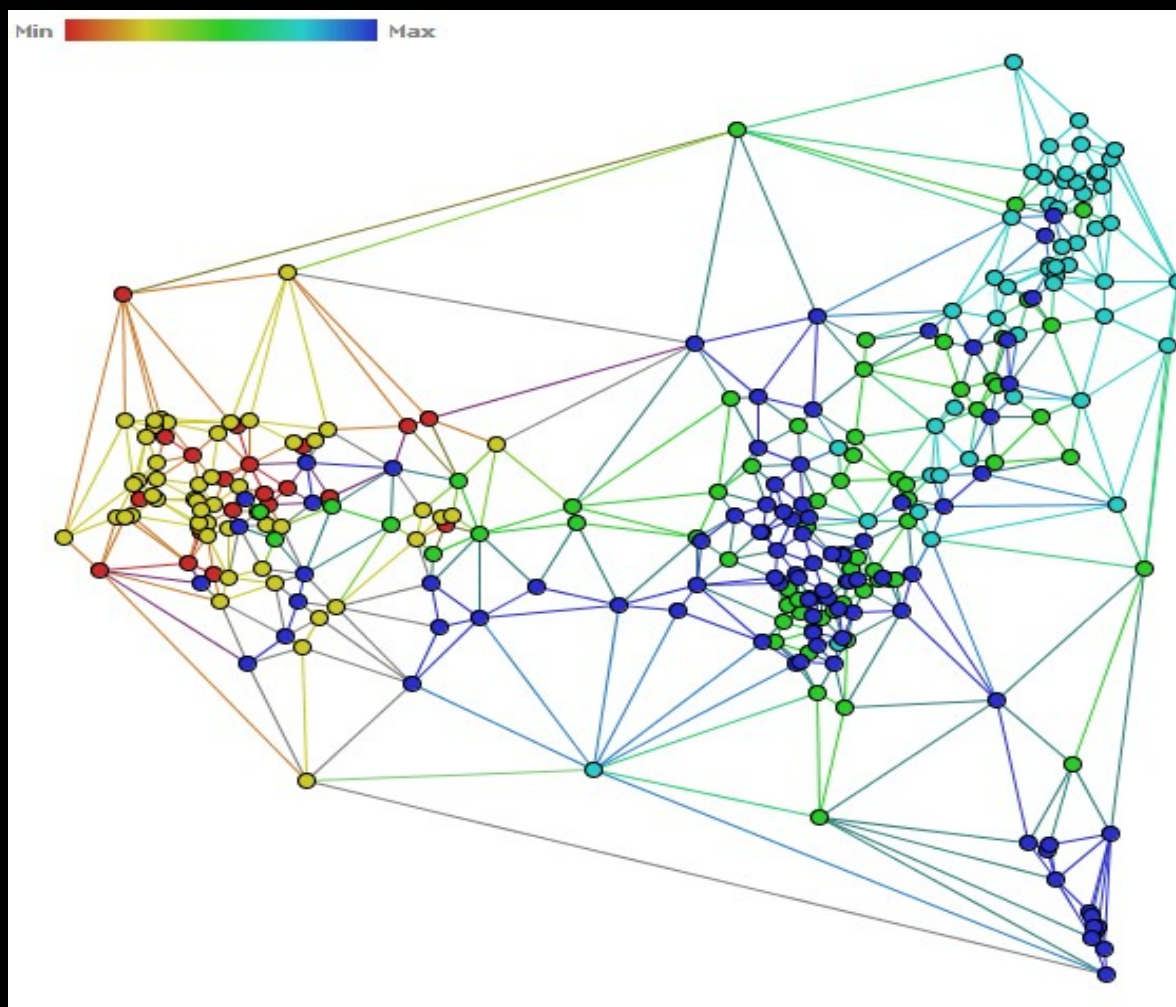


# Patents - case 2

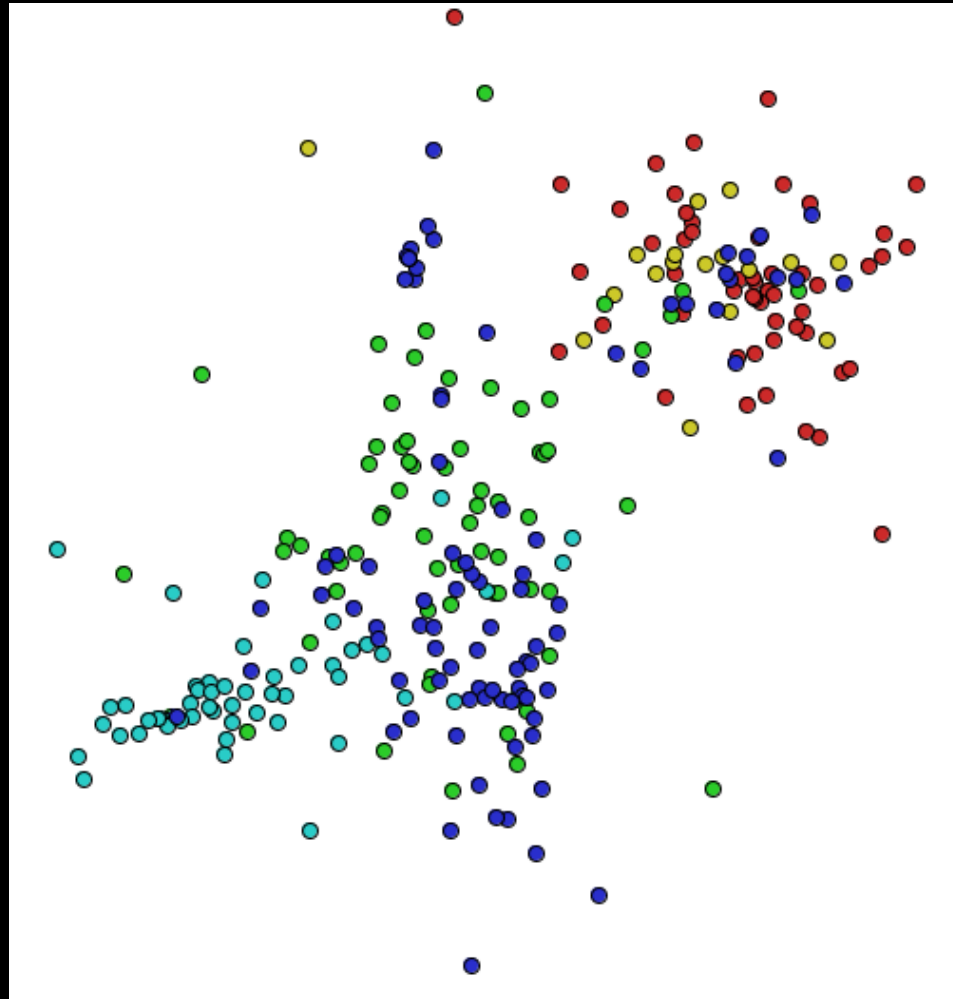
- <http://www.freepatentsonline.com/>
- 172 files
- surgery (2), drugs(2), molecular biology



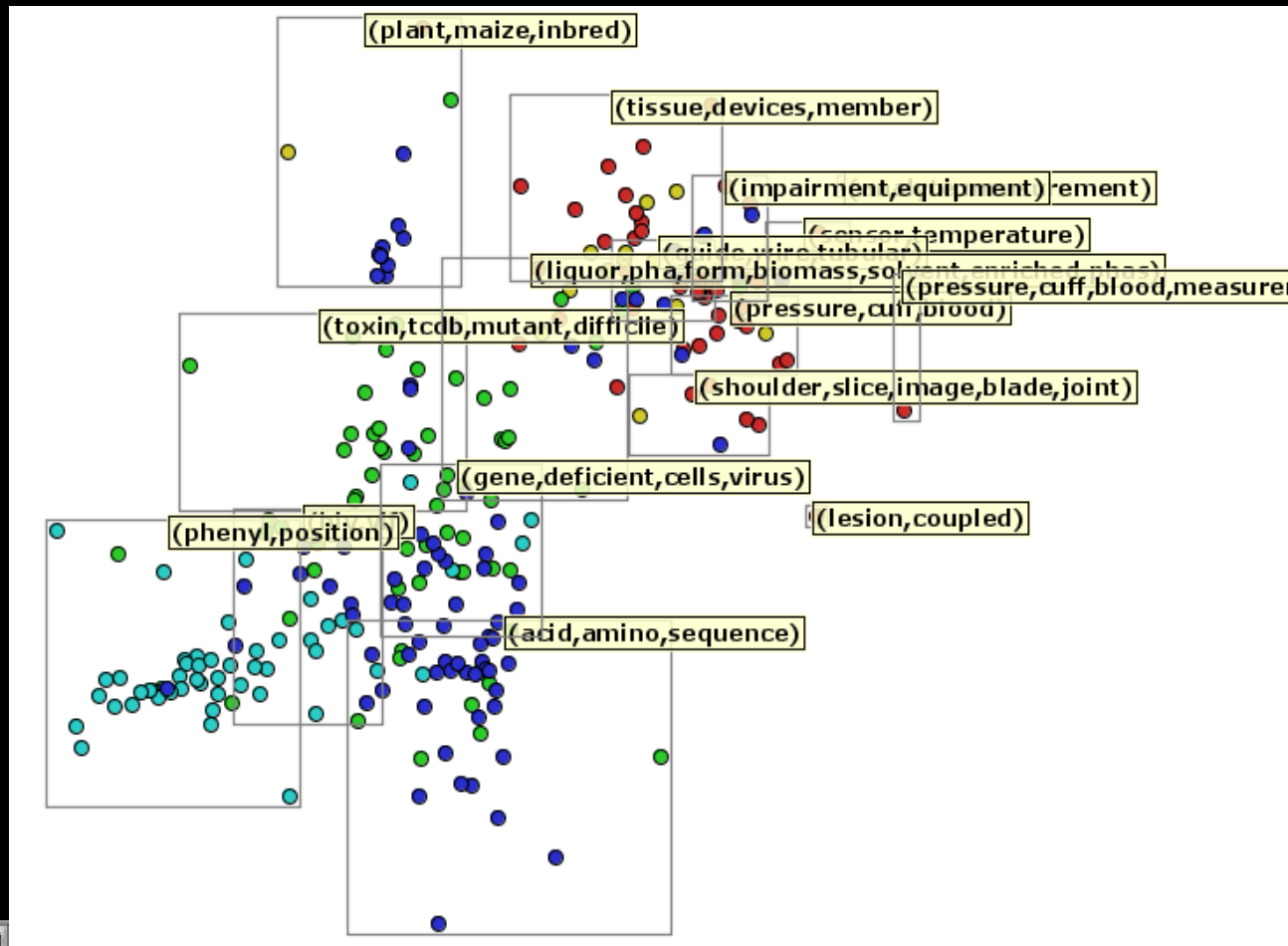
# Patents surgery, drugs, molecular bio



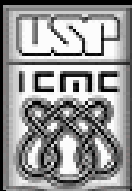
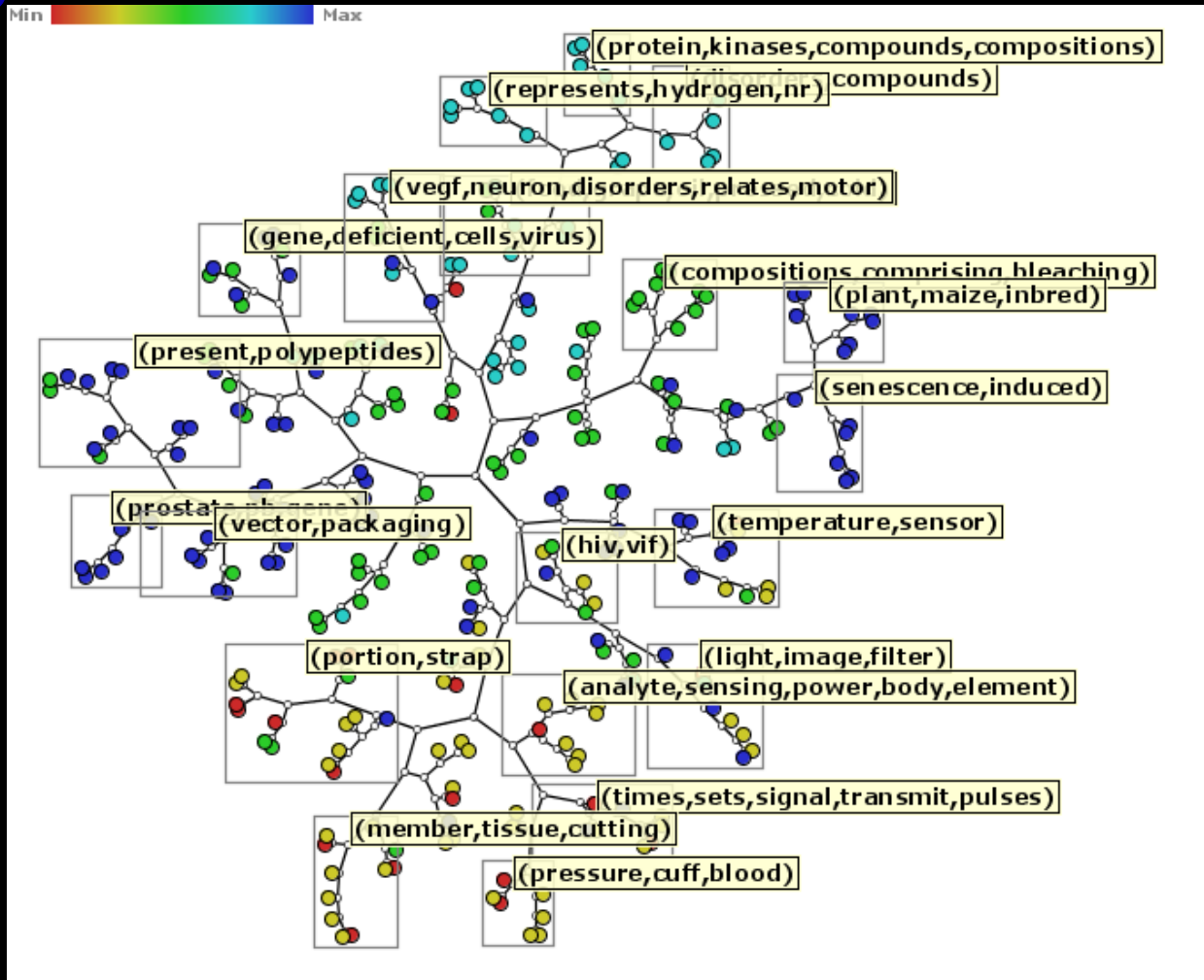
# Patents surgery, drugs, molecular bio stopwords selection



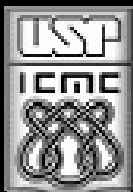
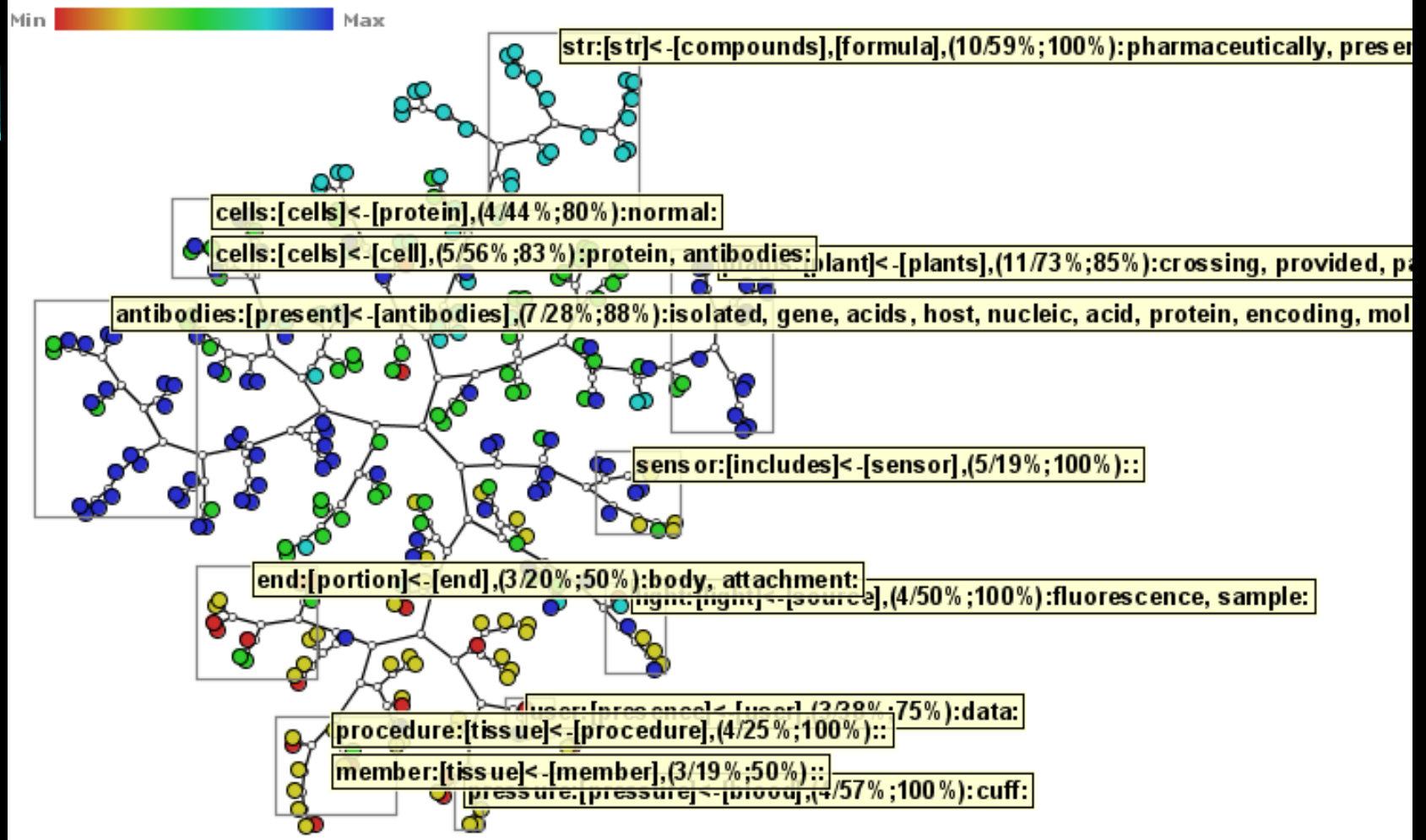
# Patents surgery, drugs, molecular bio topics



# Patents surgery, drugs, molecular bio

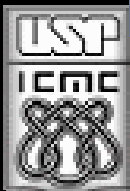


# Patents surgery, drugs, molecular bio



# Projection Explorer (PEX)

The screenshot shows the Projection Explorer (PEX) application window. The main display area contains a scatter plot of green points. Several text labels are overlaid on the plot, including: (growth,sales,reuters,forecast,earnings), (flu,bird), (murder,hospital,police,nurse), (mosque,baghdad,suicide), (details,full,story,read,latest), (masters,augusta), (details,story,full,latest,read), and (pipeline,alaska,spill,co). A 'File Multiple View' dialog box is open in the foreground, showing a list of files and the content of the selected file, 'Six Palestinians Killed in Israeli Strike'. The dialog box also shows the file label and the file content, which includes the text 'Six Palestinians Killed in Israeli Strike' and 'Six Palestinians Killed in Israeli Strike'. The 'Highlight' field is set to 'strike'.



<http://infoserver.lcad.icmc.usp.br/>



# People



Mineração de Textos

Alneu de Andrade Lopes

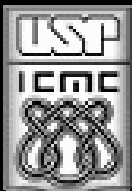
alneu@

Algoritmos

Guilherme Pimentel

Telles / SSC

away



# Visualization Group



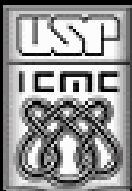
Maria Cristina F. Oliveira  
cristina@



Rosane Minghim



Luis Gustavo  
Nonato / SME  
gnonato@



# *Doutorandos*

Danilo Medeiros Eler

*Visualização/Coordenação/  
Imagens*



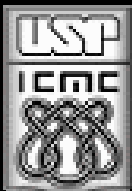
Fernando Vieira Paulovich

*Visualização/Projeções*



Roberto Pinho

*VTM/Extração de  
Tópicos*



# *Some partnerships*

Sérgio Furuie – INCOR – USP

Haim Levkowitz Umass Lowell – USA

Charl Botha – TU Delft – Holanda

Anton Heijs – Treparel Inc. – Holanda



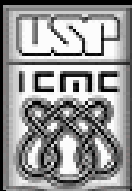
# Link

- [infoserver.lcad.icmc.usp.br](http://infoserver.lcad.icmc.usp.br) (Pex, Pex-WEB, Pex-Temporal, Pex-Image).



# Referências

- Cuadros, A. M, Paulovich, F. V., Minghim, R., Telles, G. P - Point Placement by Phylogenetic Trees and its Application to Visual Analysis of Document Collections IEEE VAST 2007, Sacramento, CA, USA, IEEE CS Press, pp.99-106.
- Paulovich, F. V., Oliveira, M.C.F., Minghim, R. - The Projection Explorer: A Flexible Tool for Projection-based Multidimensional Visualization, IEEE Sibgrapi 2007, IEEE CS Press, Belo Horizonte, Brazil, pp. 27-34.
- Lopes, A. A., Minghim, R., Melo, V., Paulovich, F.V.; Mapping texts through dimensionality reduction and visualization techniques for interactive exploration of document collections, **SPIE Conference on Visualization and Data Analysis**, San Jose, CA, USA Jan. 2006, 6060T-11.
- Minghim, R., Paulovich, F.V., Lopes, A. A.; Content-based text mapping using multidimensional projections for exploration of document collections, **SPIE Conference on Visualization and Data Analysis**, San Jose, CA, USA Jan. 2006, 6060T-11.



# Referências

- Pinho, R. D. ; Oliveira, M. C. F. ; Minghim, R. ; Andrade, M. G. . Voromap: A Voronoi-based Tool for Visual Exploration of Multidimensional Data. In: **10th International Conference on Information Visualization, 2006**, Londres. Proceedings of Information Visualisation 2006, 2006. v. 1. p. 39-44
- Paulovich, F. V. ; Minghim, R. . Text Map Explorer: a Tool to Create and Explore Document Maps. In: Information Visualisation 2006 (IV06) **10th International Conference on Information Visualisation, 2006**, Londres. Proceedings of Information Visualisation 2006, 2006. v. 1. p. 245-251.
- Paulovich, F. V. ; Nonato, L. G. ; MINGHIM, R. ; Levkowitz, H. . Least Square Projection: a fast high precision multidimensional projection technique and its application to document mapping. IEEE Transactions on Visualization and Computer Graphics, 2008.
- Minghim, R. ; Levkowitz, H. ; Nonato, L. G. ; Watanabe, L. S. ; Salvador, V. C. L. ; Lopes, H. ; Pesco, S. ; Tavares, G. . Spider Cursor: A simple versatile interaction tool for data visualization and exploration. In: **ACM GRAPHITE'05 - 3rd International Conference on Computer Graphics and Interactive Techniques in Australasia and Southeast Asia, 2005**, Dunedin. Proceedings of Graphite 2005, 2005. p. 307-314.

