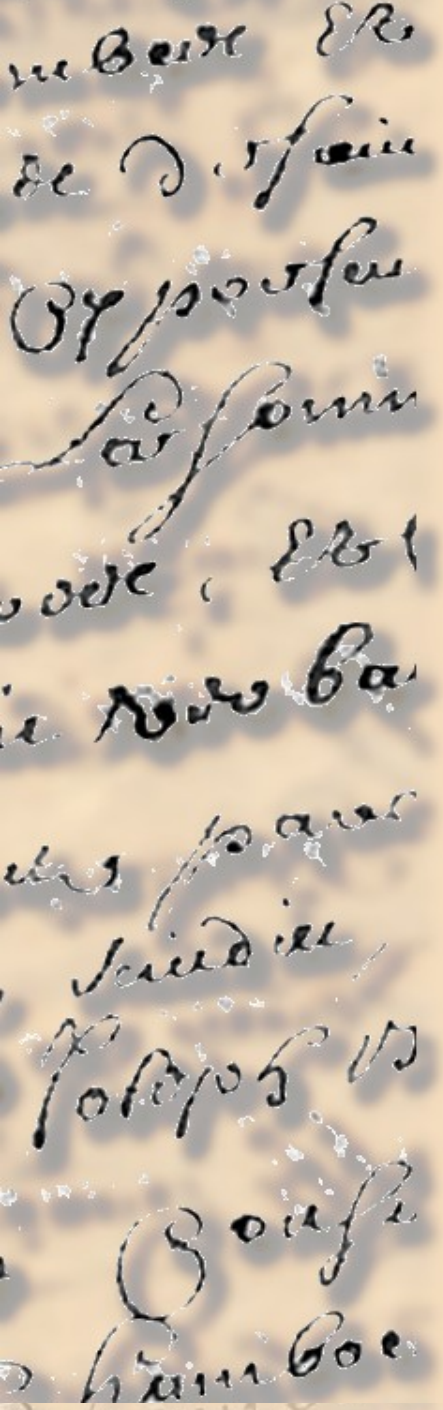

Graphem

Spatial Exploration Tools
in the Graphem Project

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Laboratoire d'Informatique Fondamentale d'Orléans

ANR AGENCE NATIONALE DE LA RECHERCHE

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LIFO LABORATOIRE D'INFORMATIQUE FONDAMENTALE D'ORLEANS

LIPADE Laboratoire d'Informatique PAris DEscartes

LIRIS

Overview


AVRANCHES, Bibl. mun. 103, fol. 9
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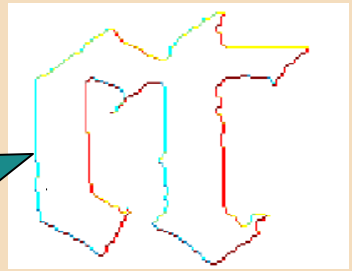
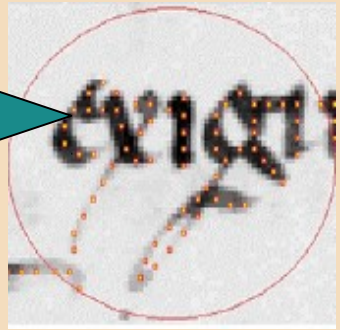
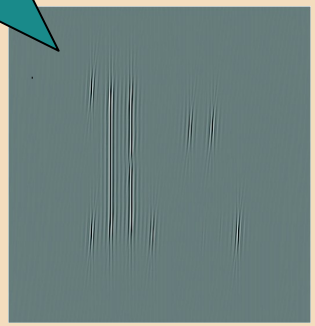
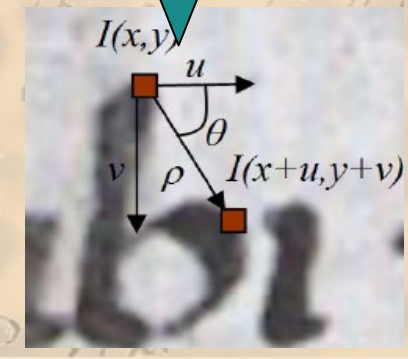
Overview









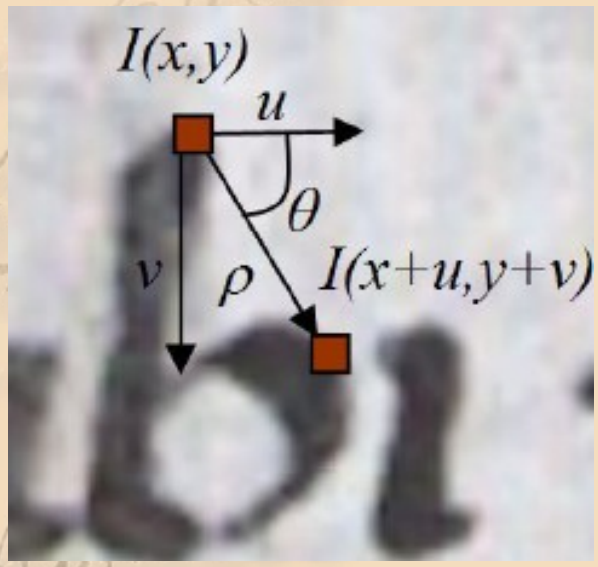
Co-occurrence matrix (LIRIS)

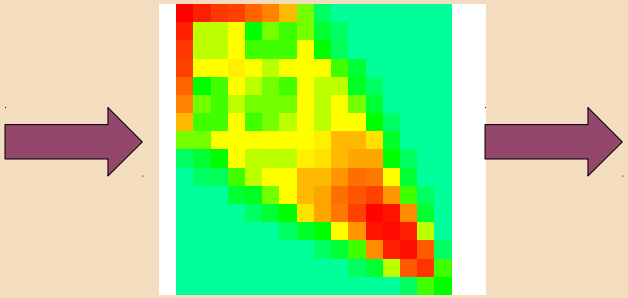
Describing the texture of a picture

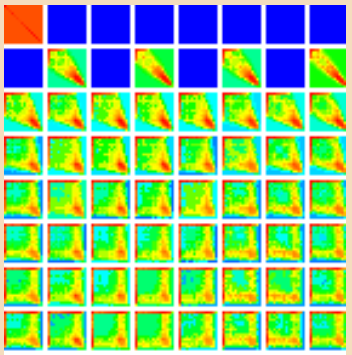
- How do pixels compare to their neighbors ?

At various scales

- Very close neighbors and not-so-close ones



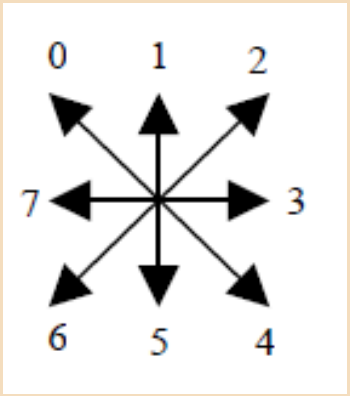


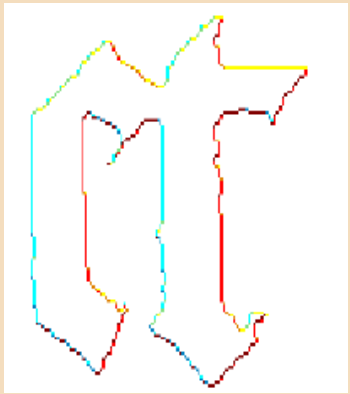


Contours and Freeman's codes (LIPADE)

How to describe the contour of a shape ?

- Starting from a given pixel
- How to go to the next one ? (8 directions)



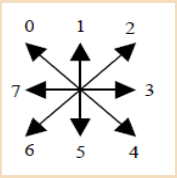


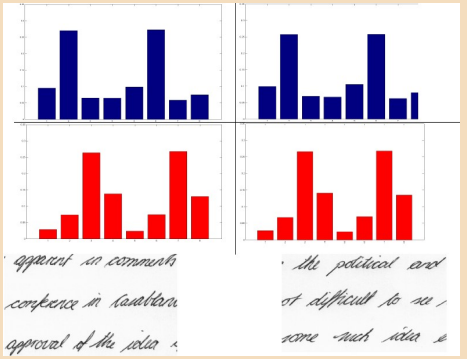
4	4	3	3	1	1	2	2

Using Freeman's codes

Samples must be described by features

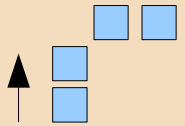
- Counting the percentage of each direction
- Counting the changes in direction





Is this enough ?

- More sophisticated features are needed
- Identifying and counting longer patterns
  - e.g. three of four successive pixels
  - How many and which ones are relevant ?

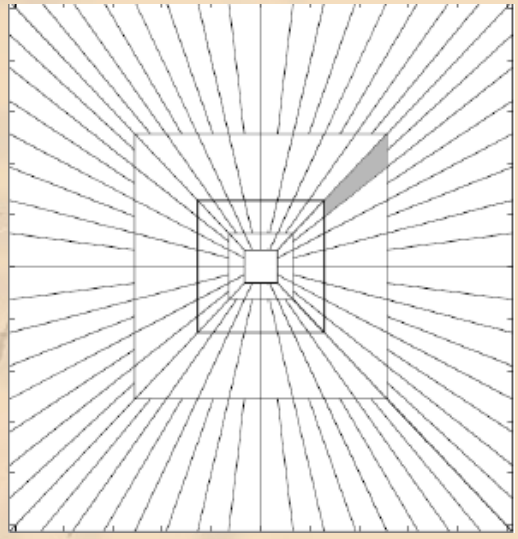


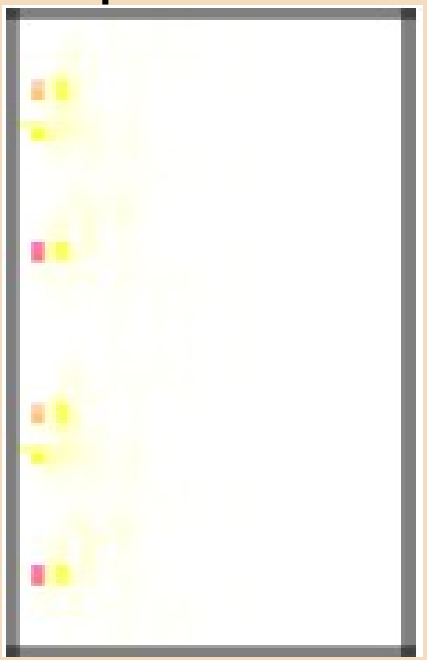
Curvelets in two words (LIRIS)

A picture can be seen as a set of signals

Curvelets are a (powerful) way to express these signals

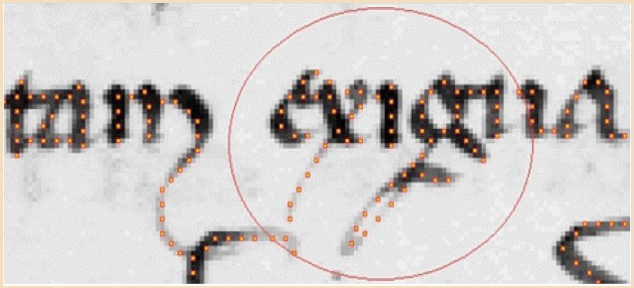
- Frequency, direction, place





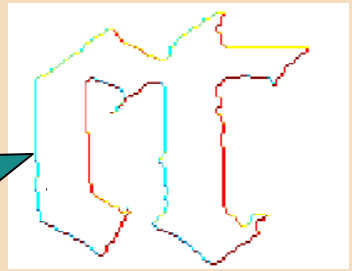
Strokes and median-axis (LIPADE / LIRIS)

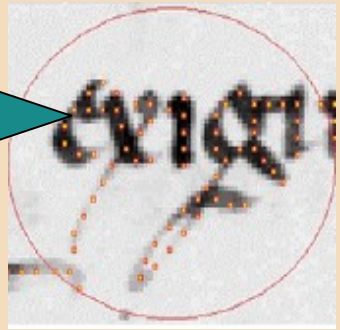
- Detecting and viewing strokes
  - Moving along the median axis
    - Skeletonizing vs. directional inertia

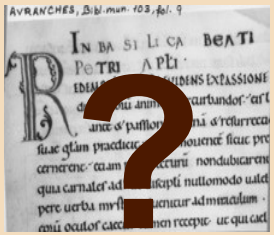


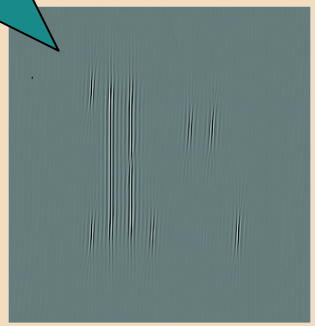
- Stroke-based comparison ?
  - Extracting features from the shape of strokes

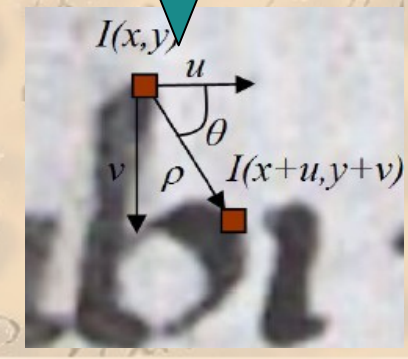
Overview











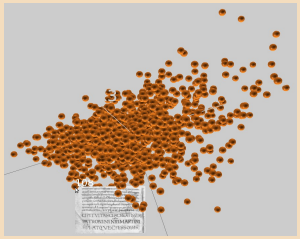
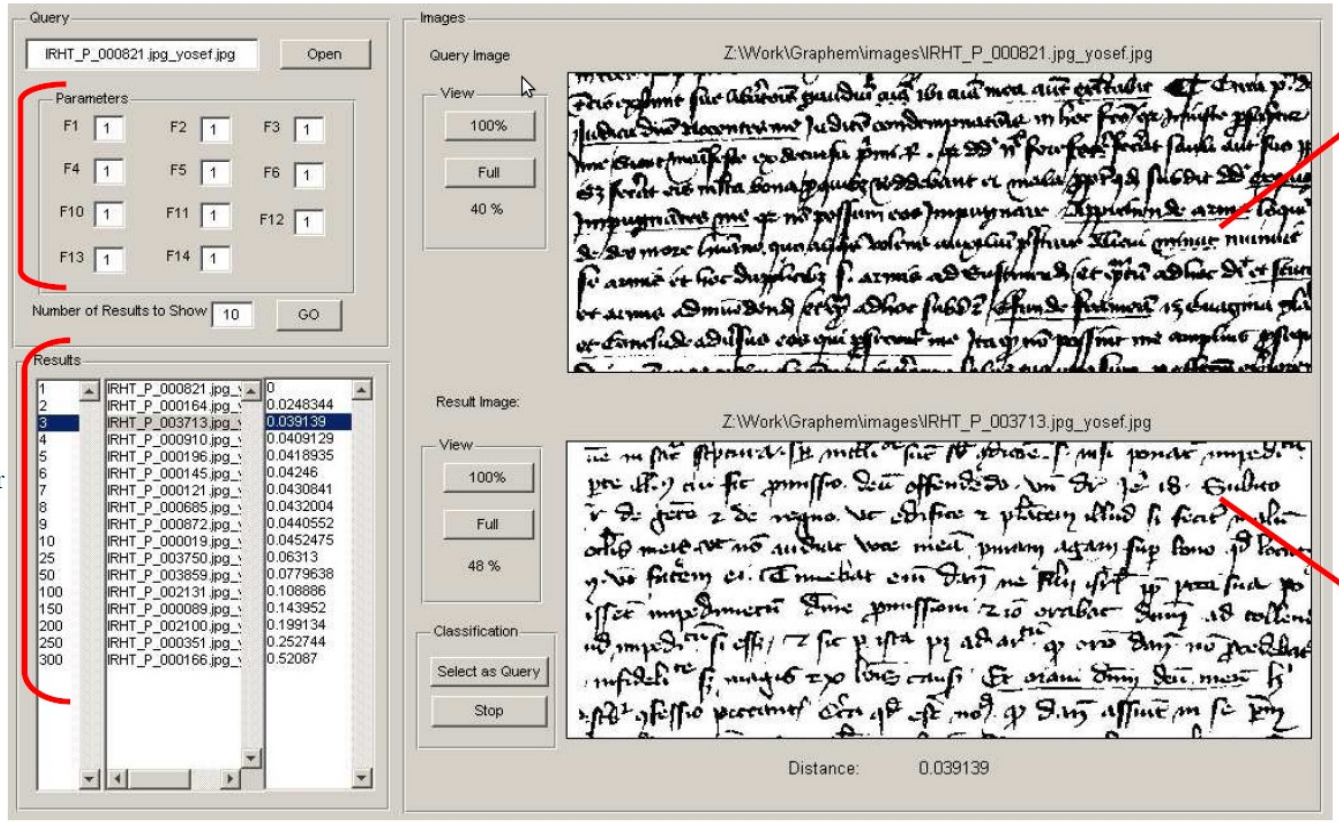


Image retrieval (LIPADE / LIRIS)

Weights for each of the features

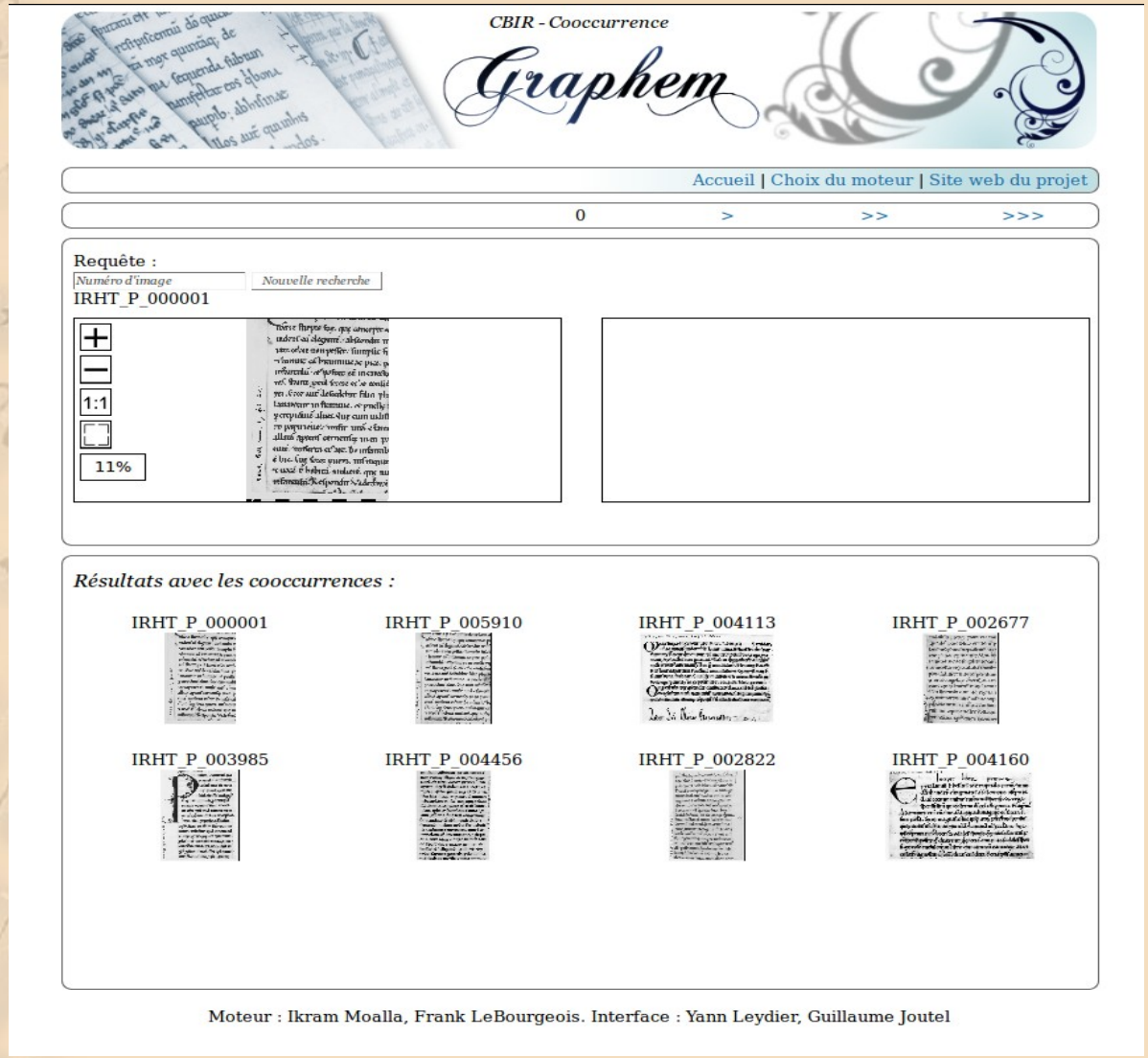
Retrieved list of similar images: Ranks, Image Names & Distances



Query Image

Image selected from the retrieved list

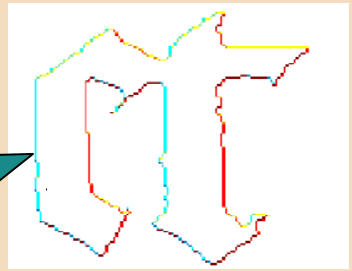
Online image retrieval

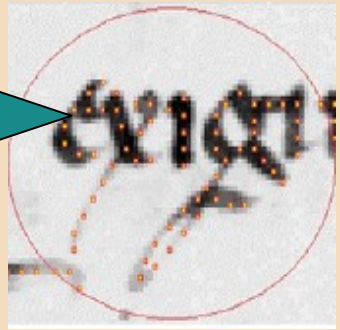


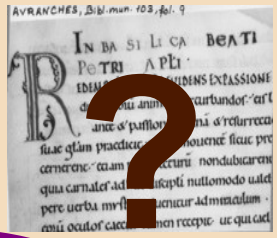
Results

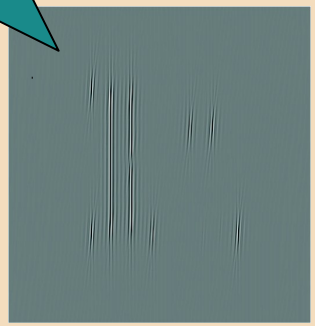
- Cooccurence matrices work at best
- Some more results with strokes awaited
- Parameterizing is neither always available, nor clearly explainable / connectable with paleographic elements

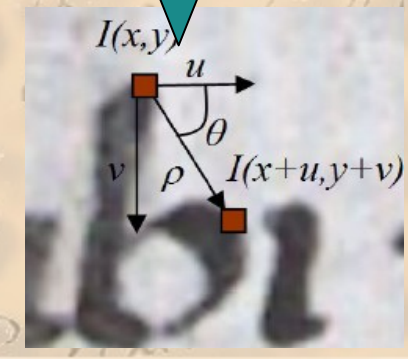
Overview





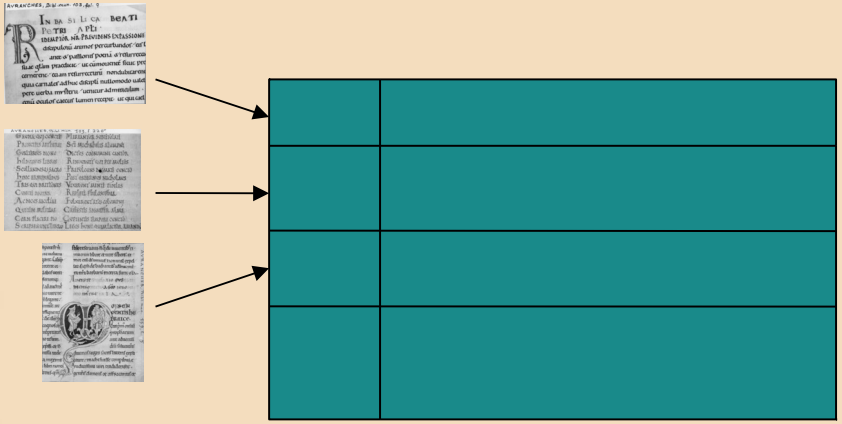




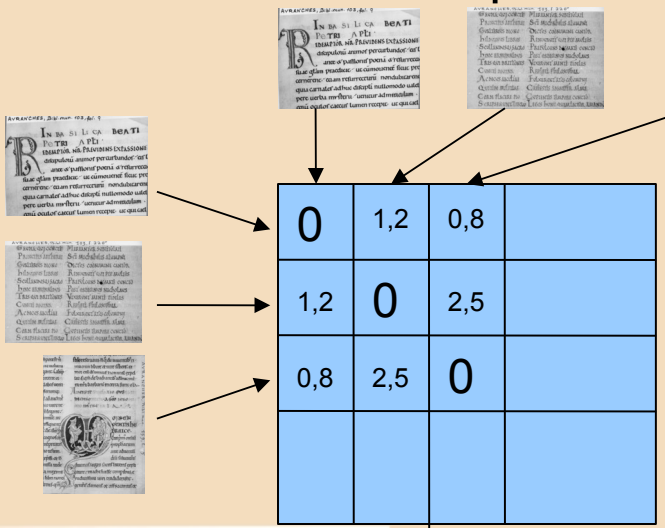


Data exploration (LIFO)

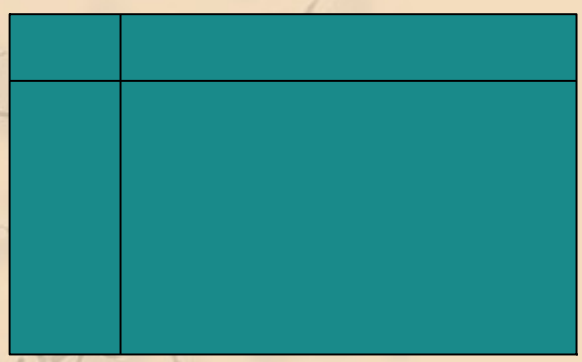
- Input : data in spreadsheets / tables
  - Numerical features

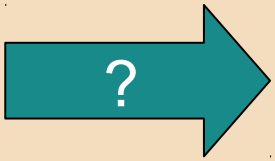


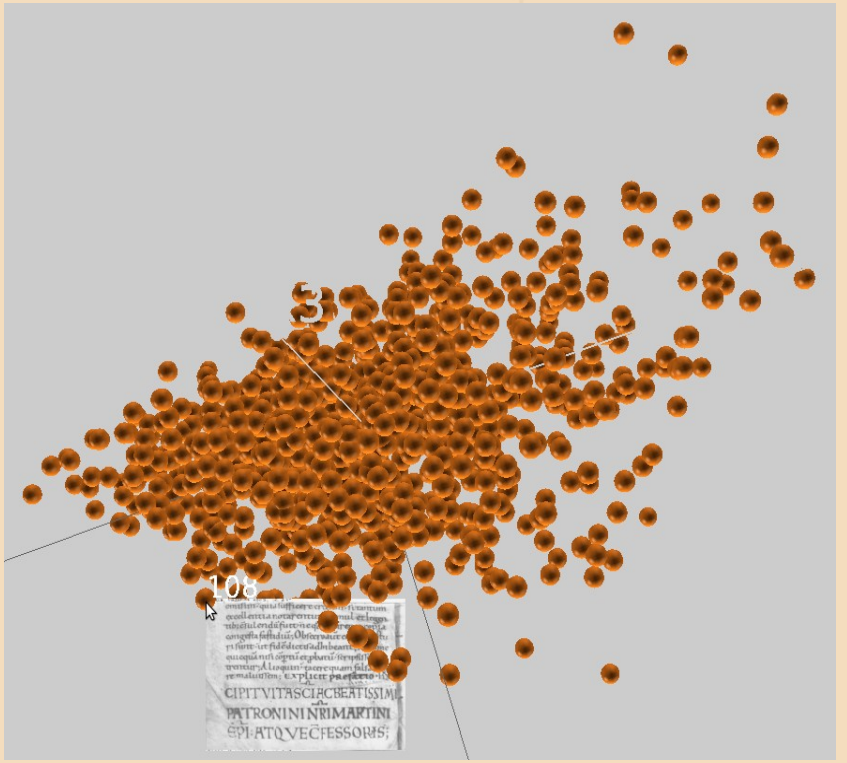
  - « Distance » between samples

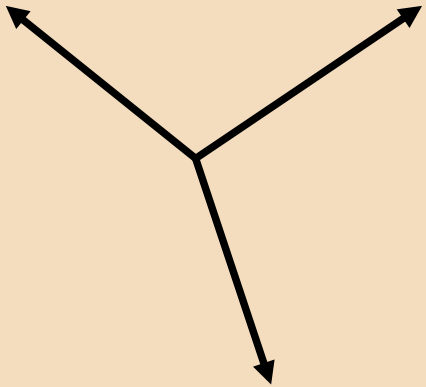


3D projection : Principle

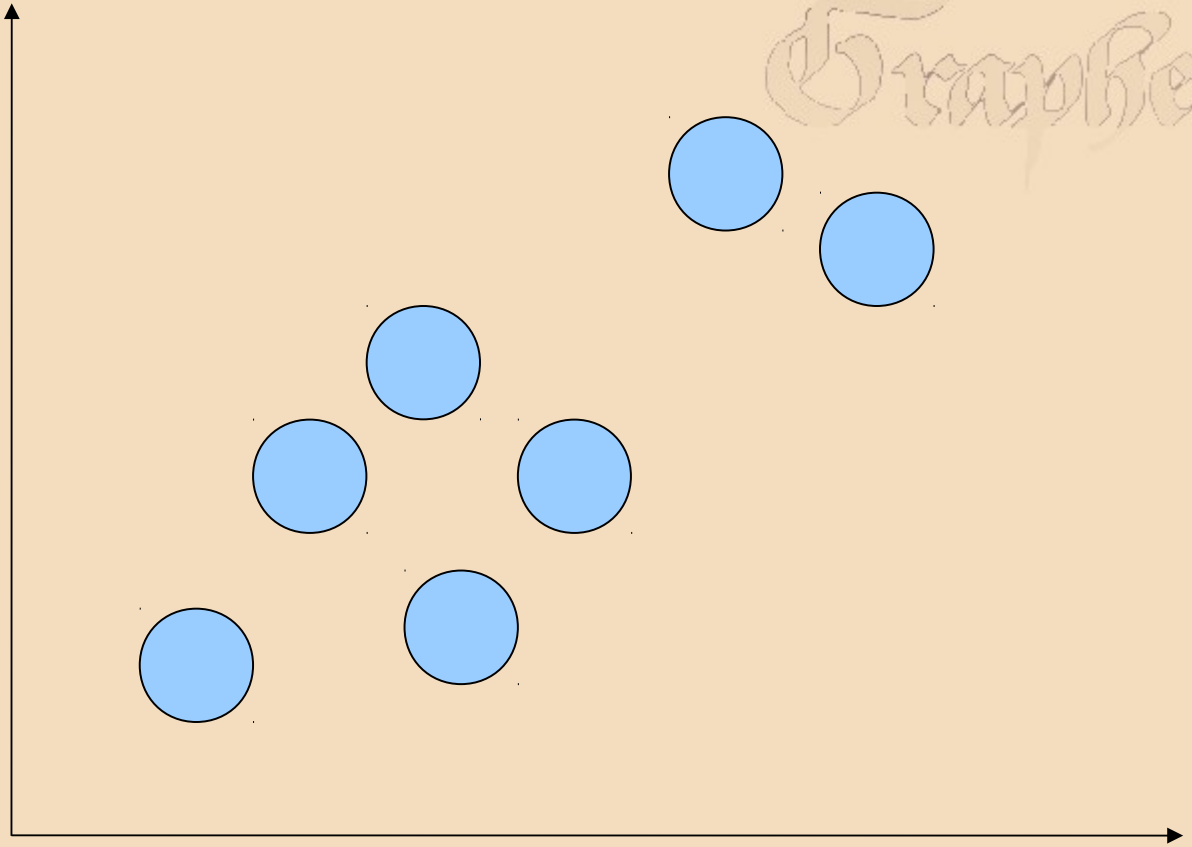






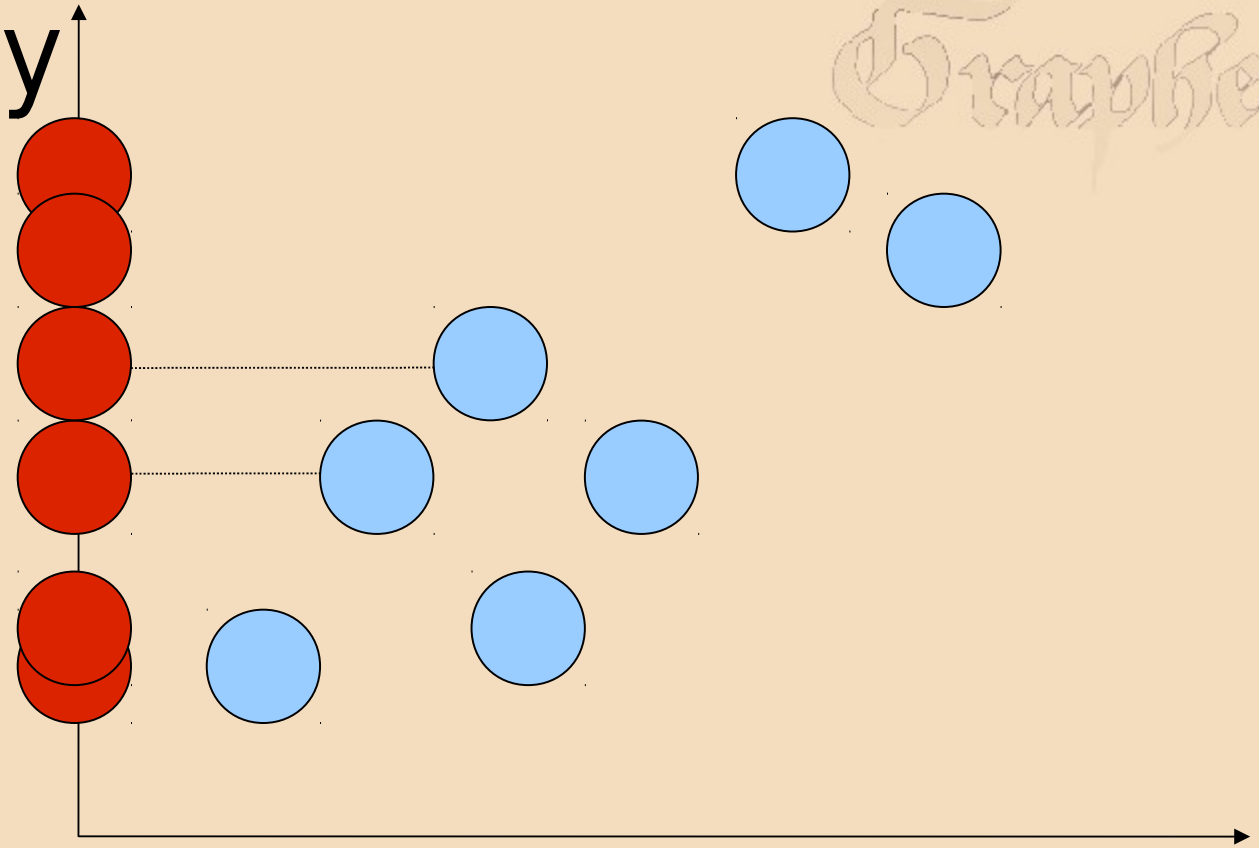


Intuitively



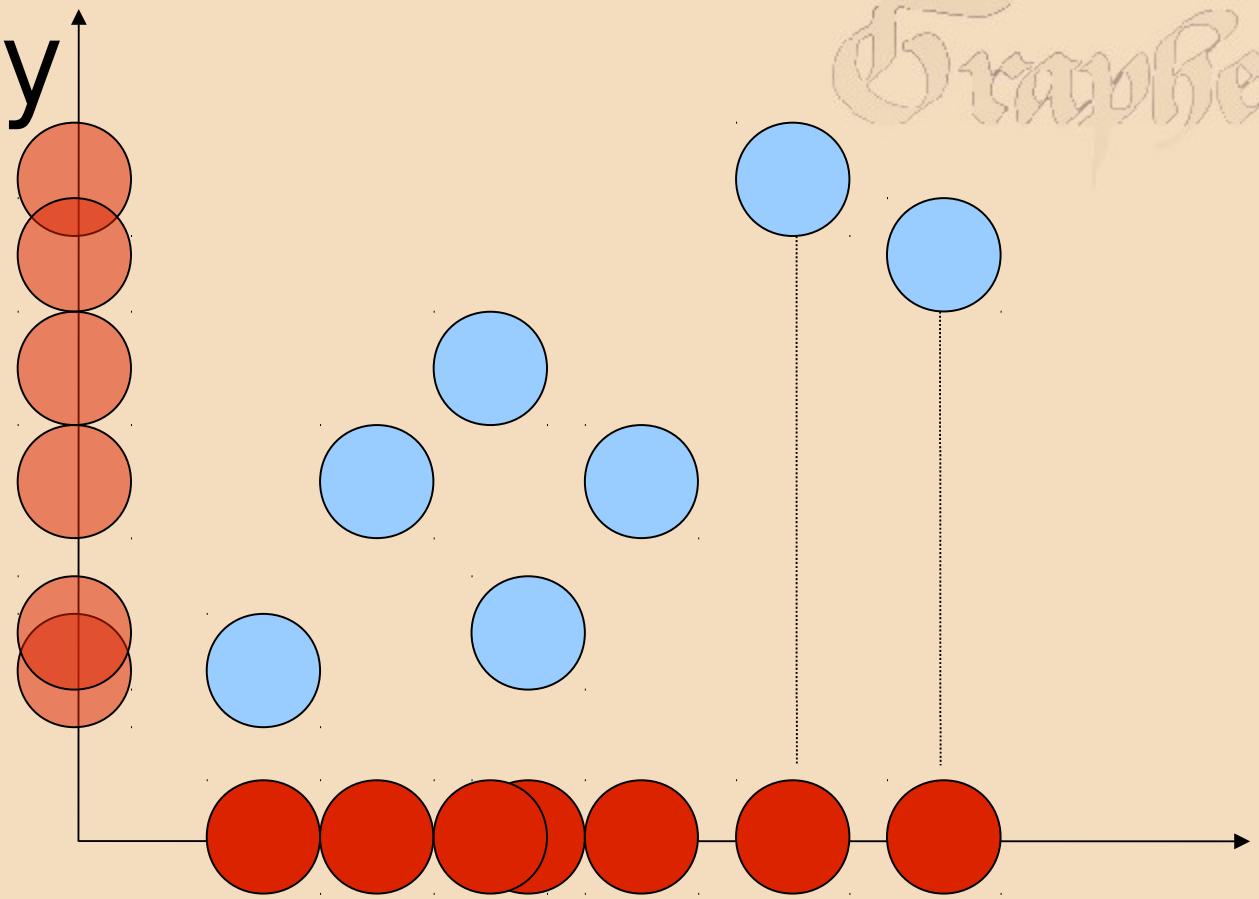
- Objects described by two (numerical) features
- How to « keep » a single dimension

Intuitively



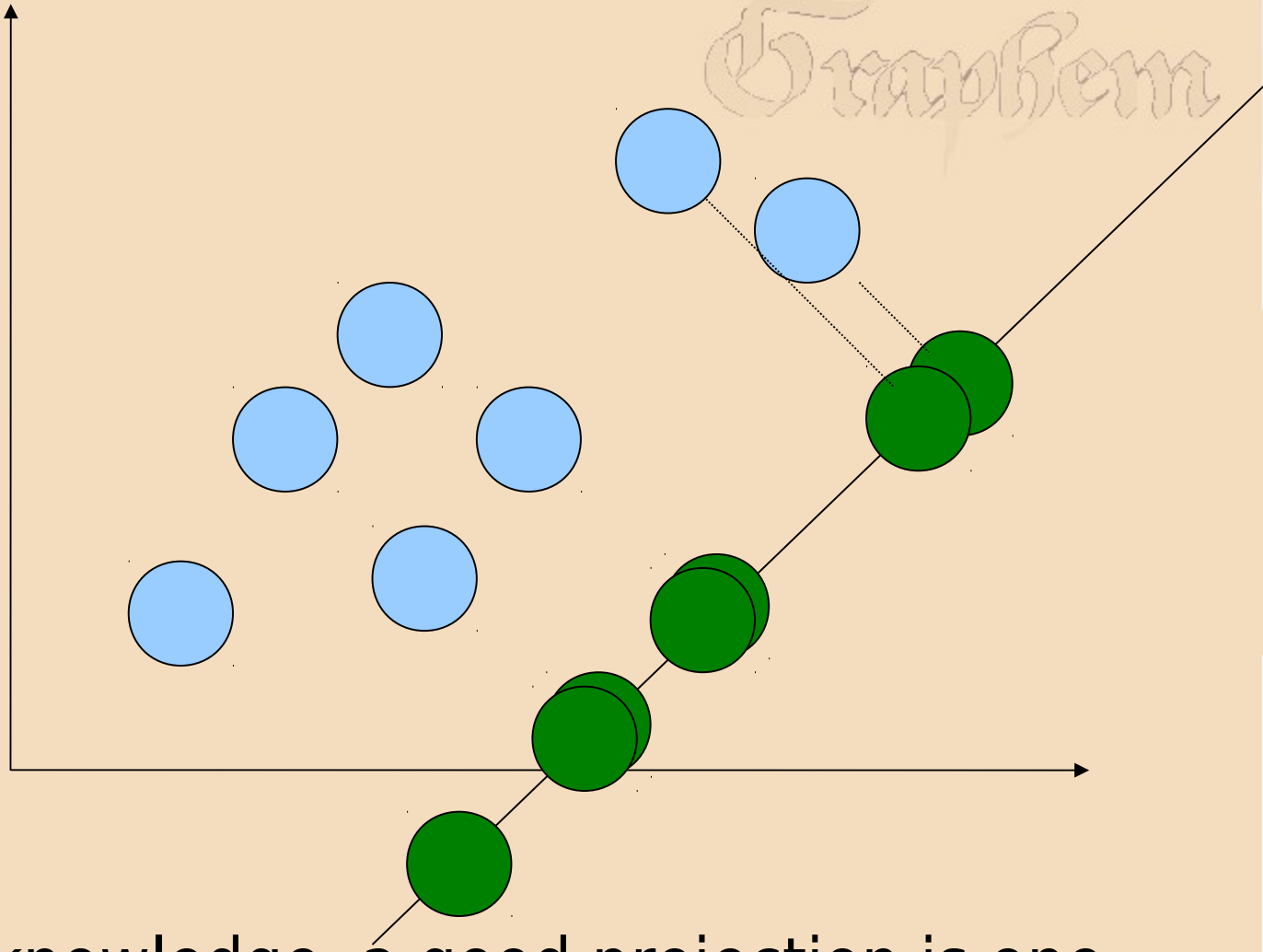
- choosing a subset of features
  - *feature selection*

Intuitively



- Feature selection might not fit
- What are we looking for ?

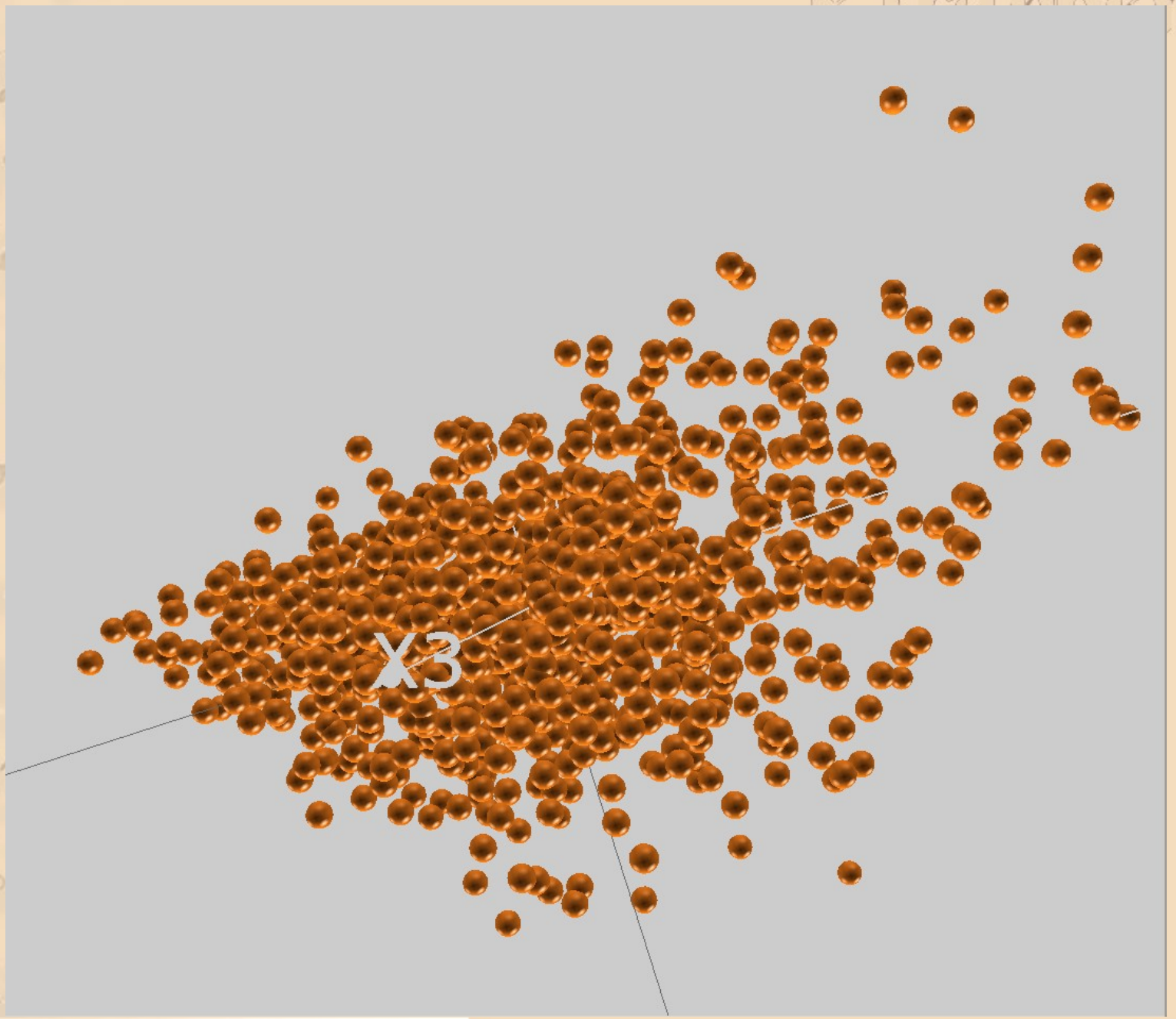
Intuitively



With no extra knowledge, a good projection is one that preserves scattering / variance at most

Principle Component Analysis (and it's relatives)

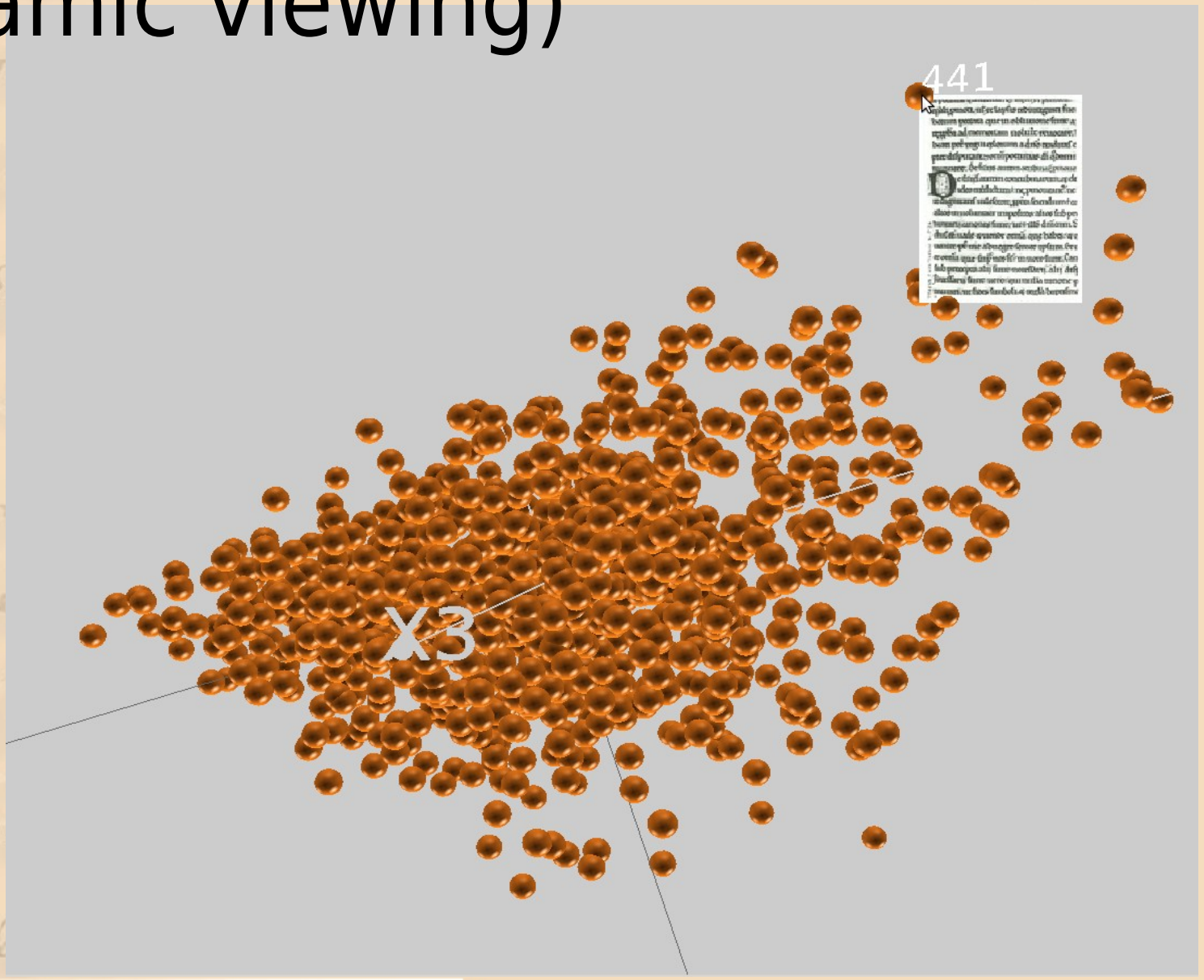
Results



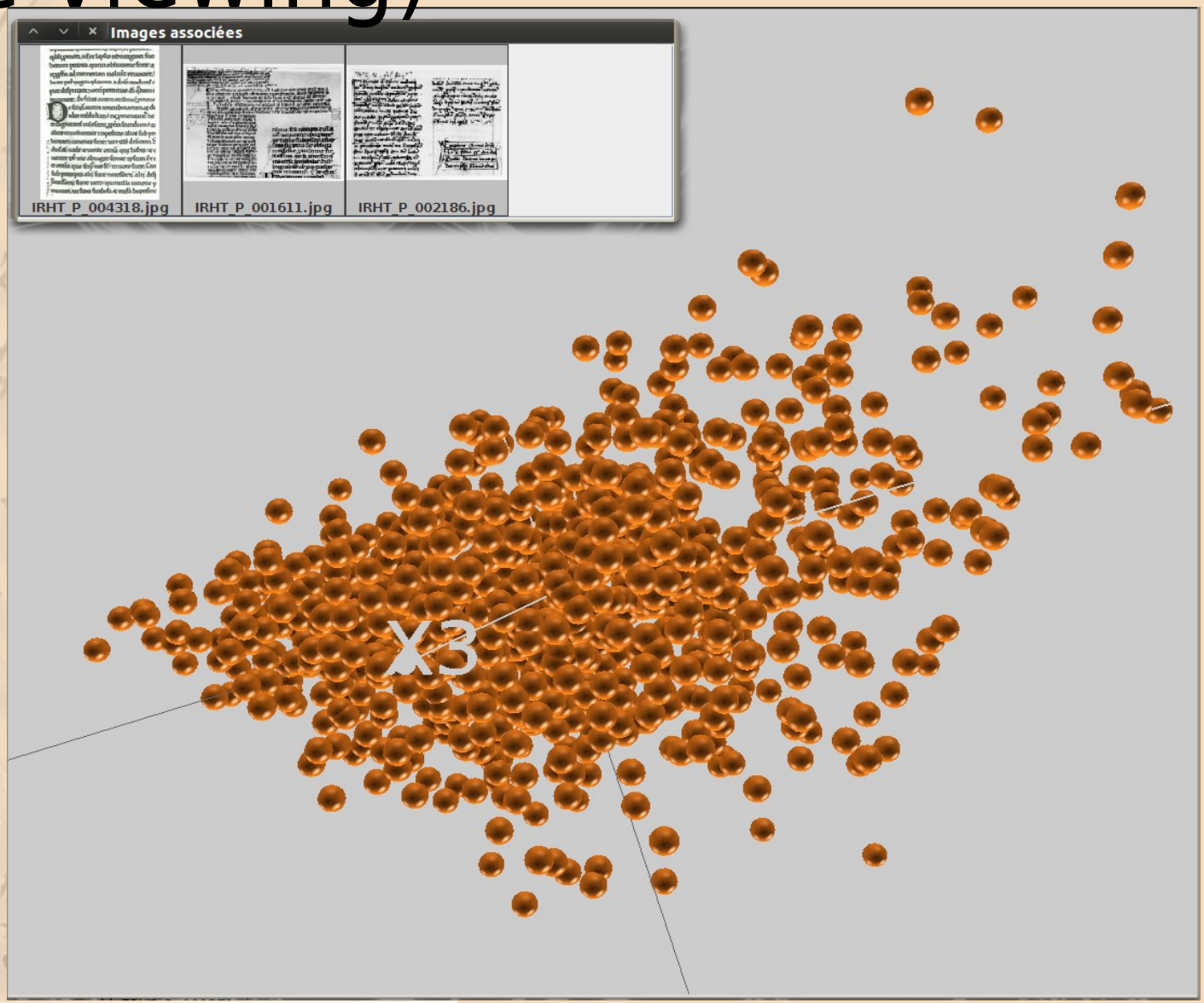
Results

- ✓ **A global overview**
  - ✓ **Macro-structure**
- ✗ **Readability ?**
  - ✗ **Density**
  - ✗ **Associated data ?**
  - ✗ **Meaning of a global view ?**
- ➢ **Additional tools**

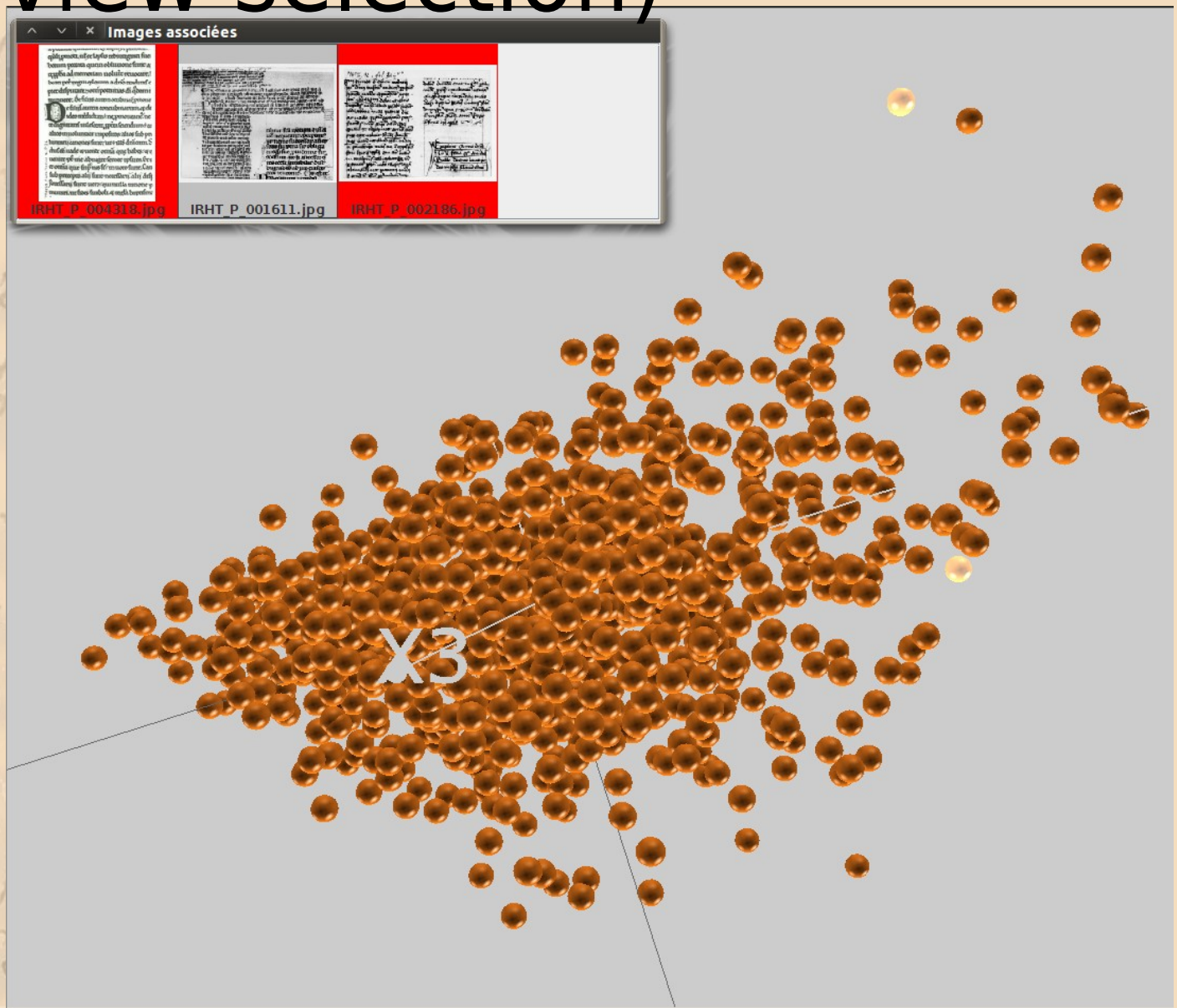
Corresponding picture (dynamic viewing)



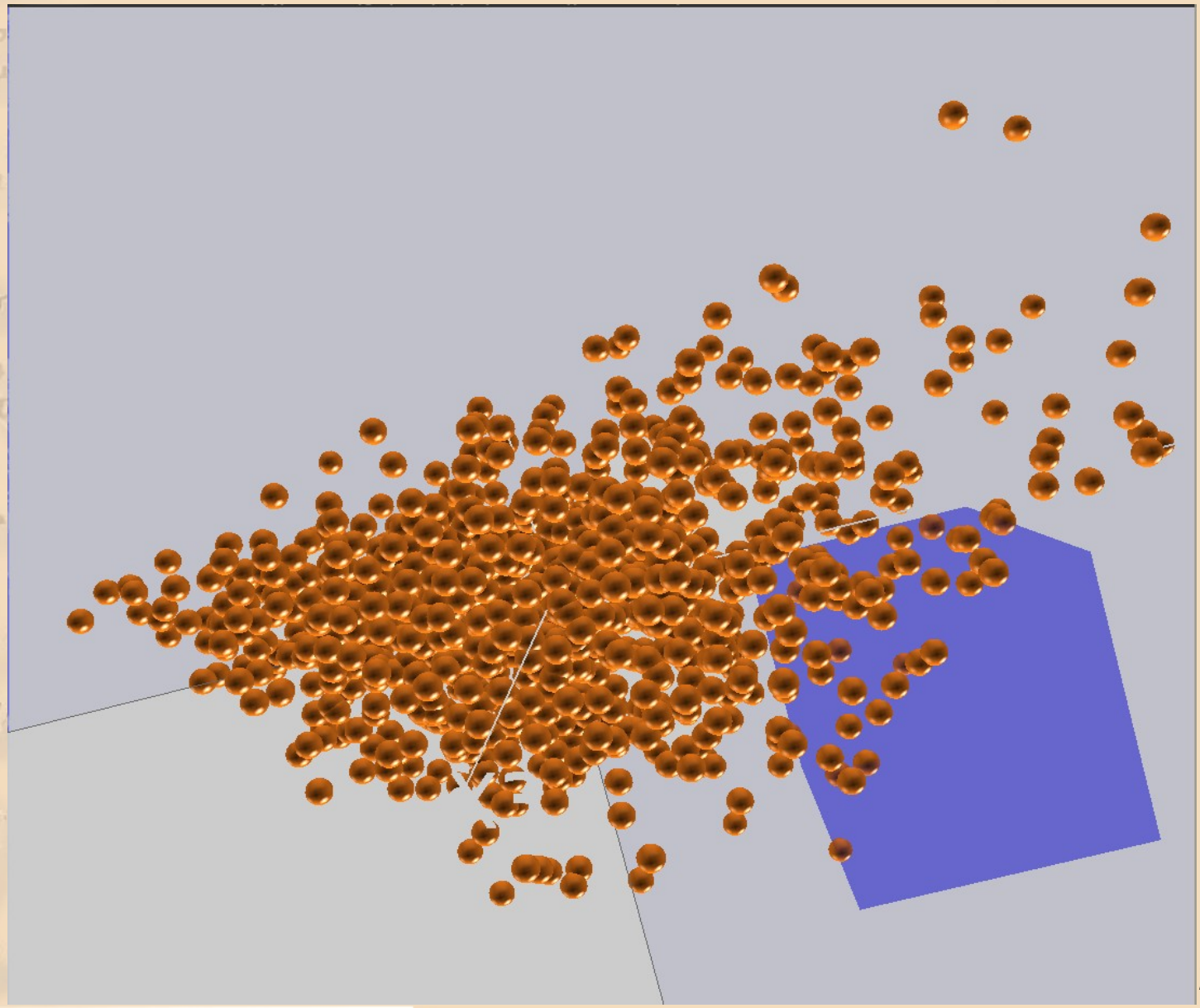
Corresponding picture (static viewing)



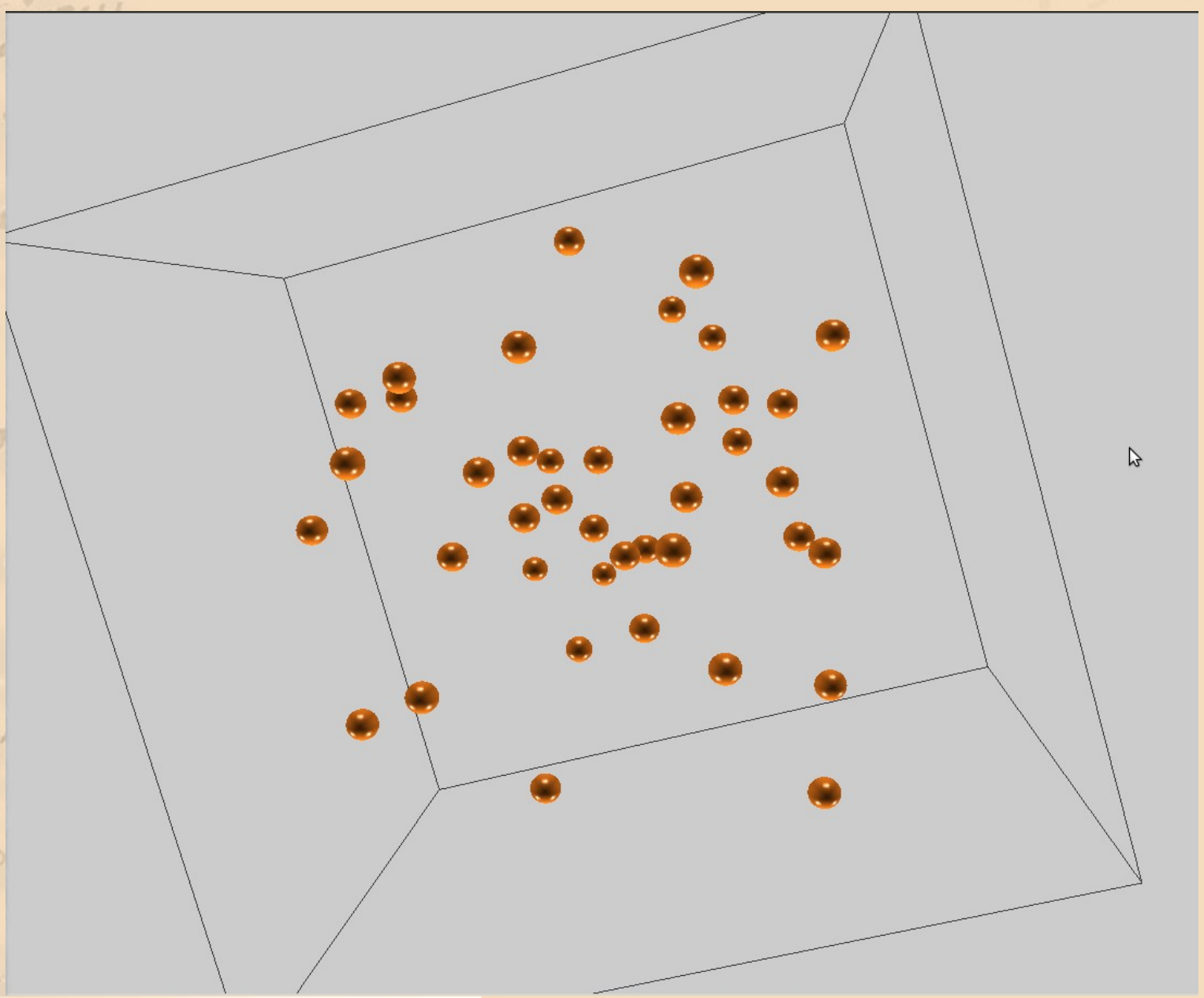
Corresponding picture (multiview selection)



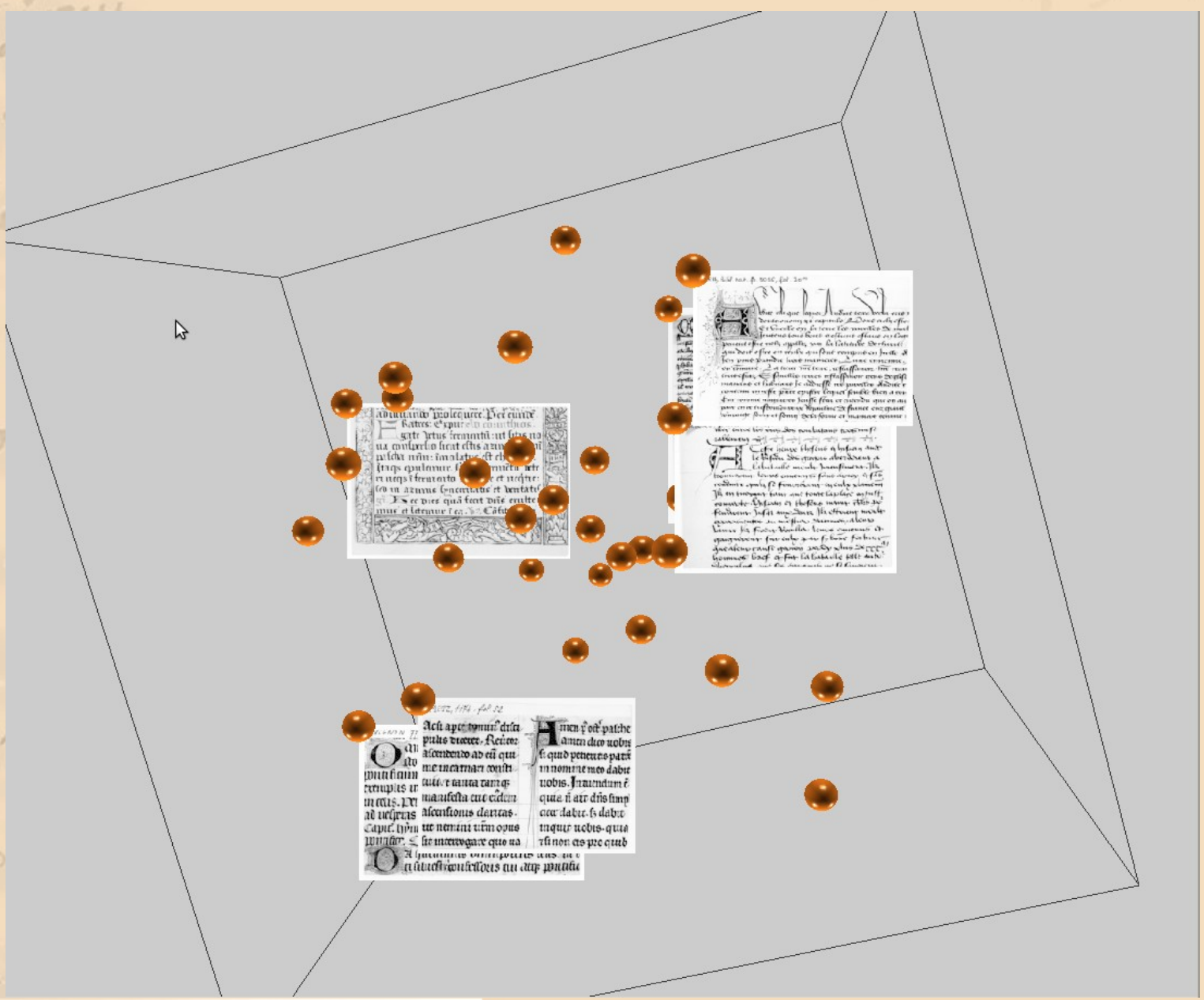
Local subprojection (zoom)



Local subprojection (zoom)

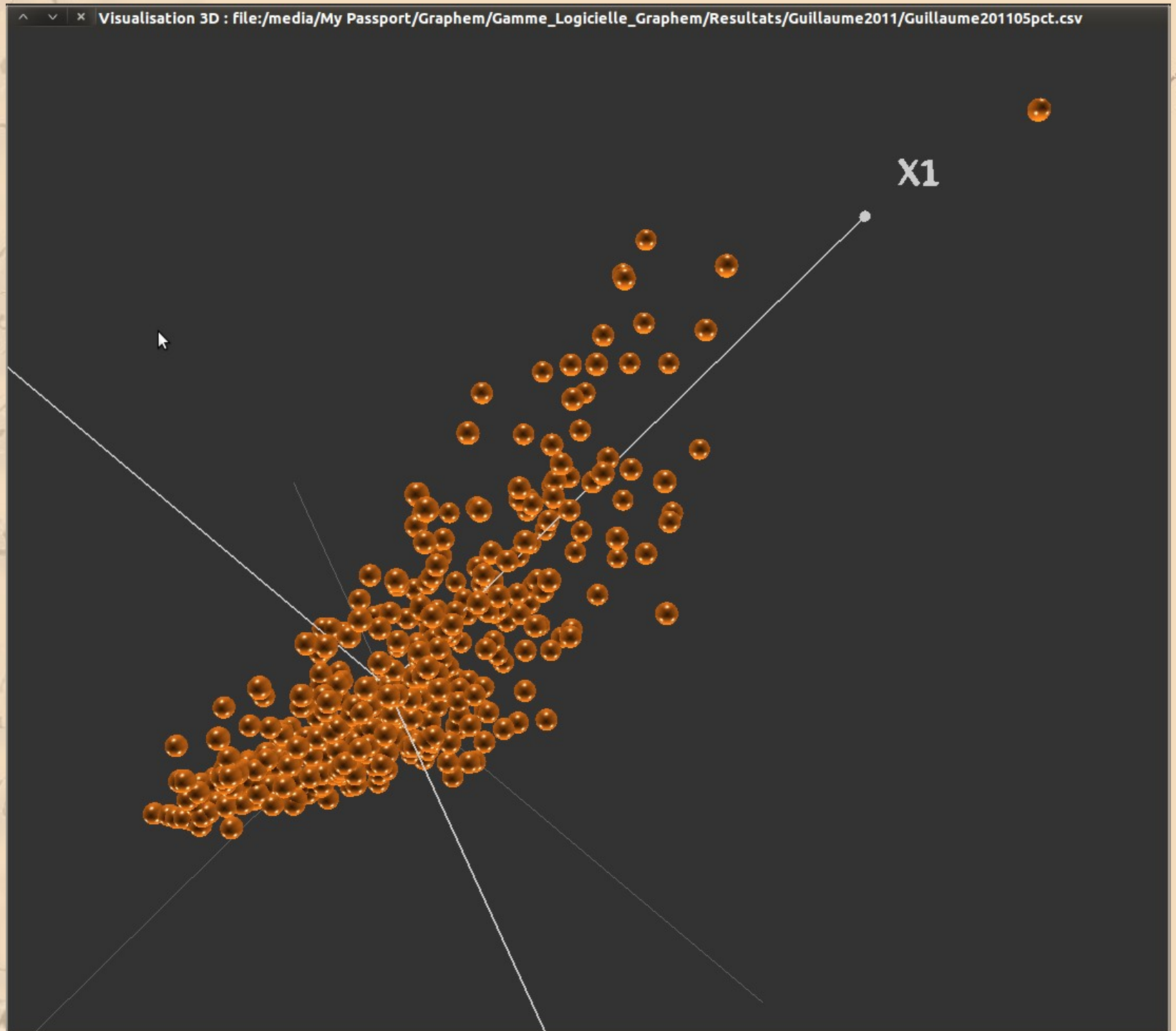


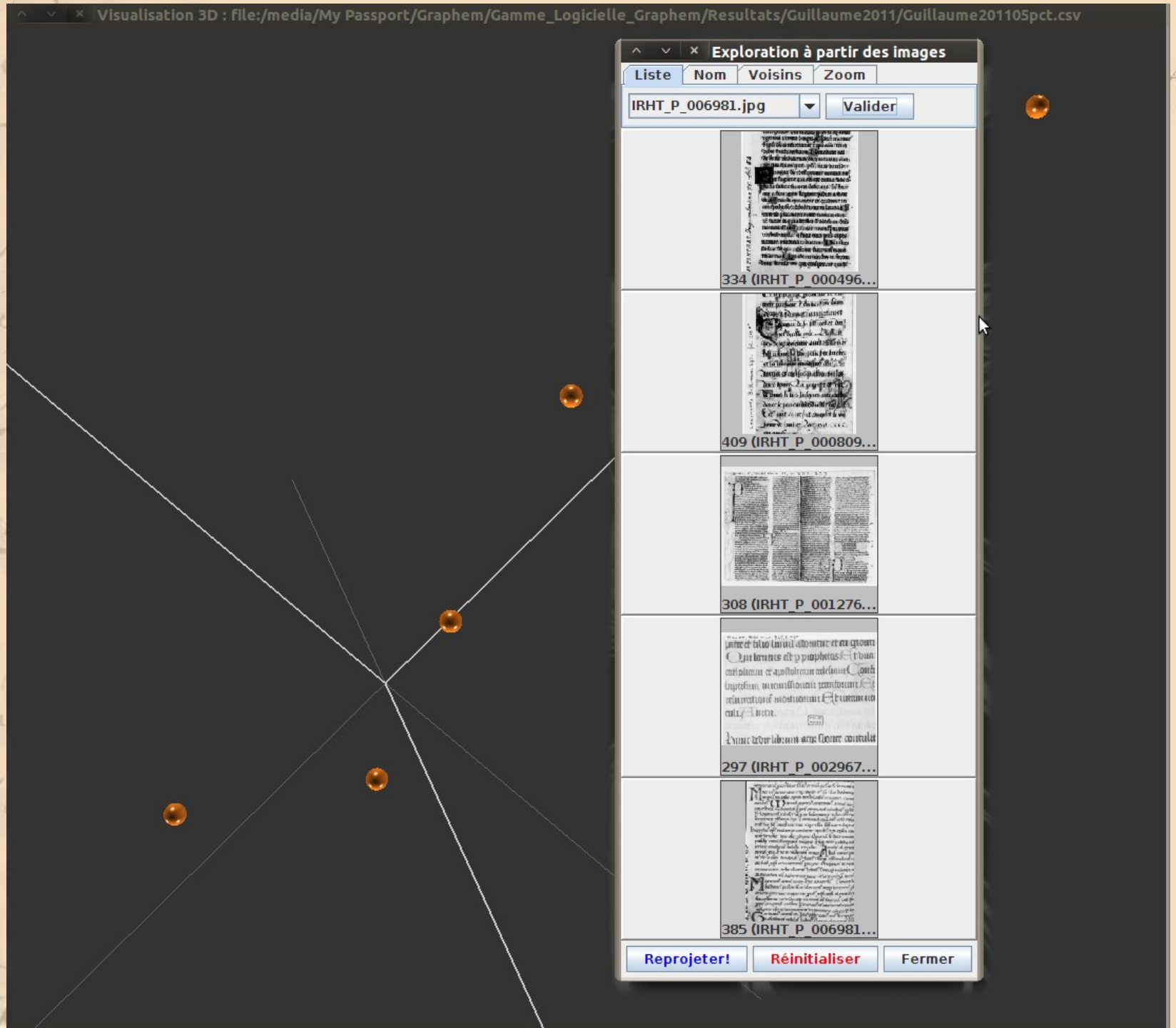
Local subprojection (zoom)

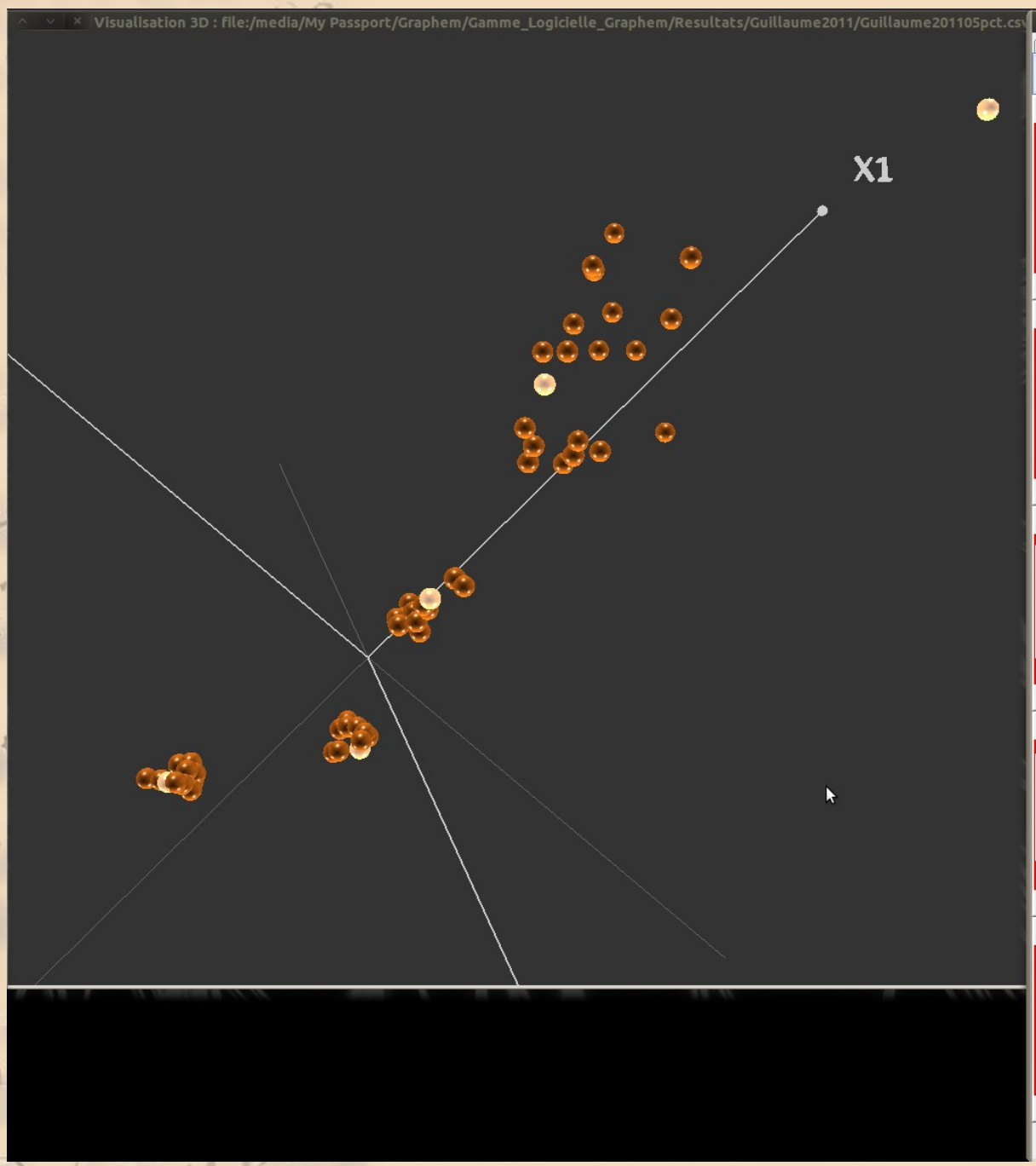


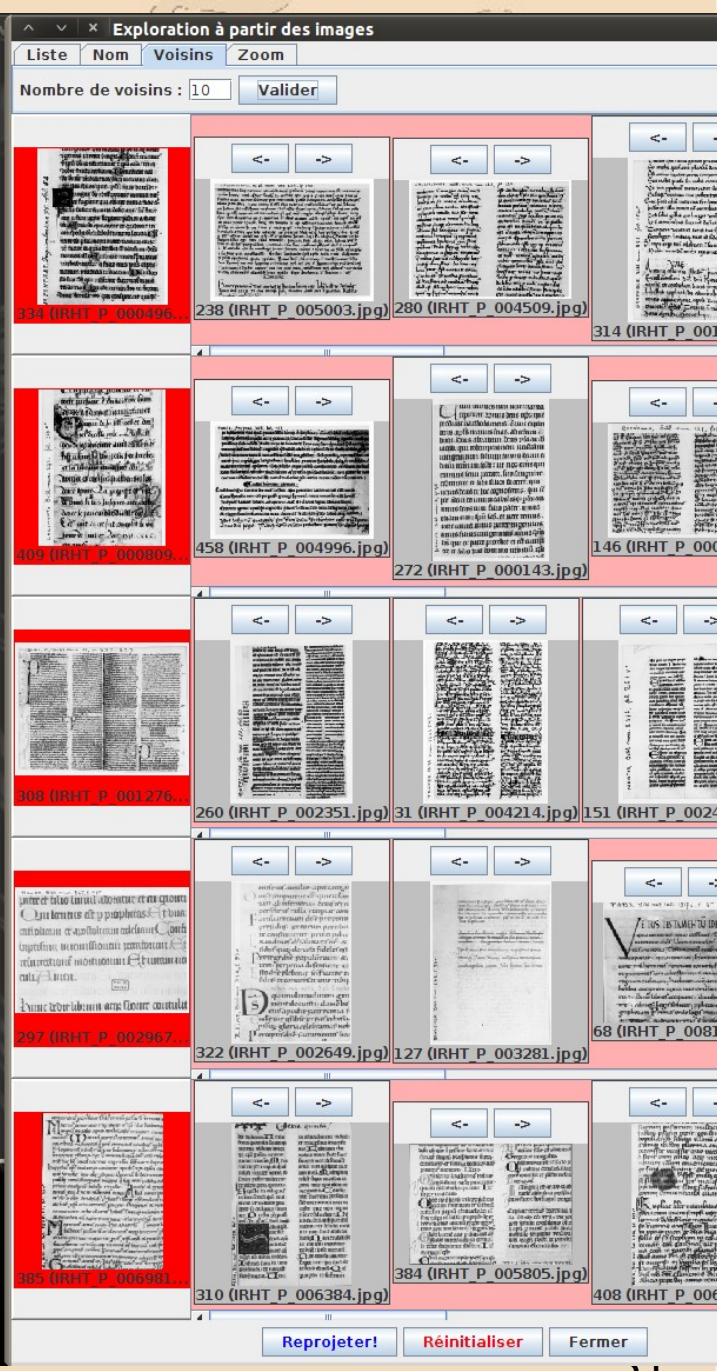
Exploring from pictures

- Starting point
  - Global view is too dense
  - Local zoom is disconnected from global view
- Proposal
  - Show a selected subset of objects
  - Have a mean to select these (e.g. list)
  - Show their neighbors
  - View the corresponding pictures


Visualisation 3D : file:/media/My Passport/Graphem/Gamme_Logicielle_Graphem/Resultats/Guillaume2011/Guillaume201105pct.csv
X1

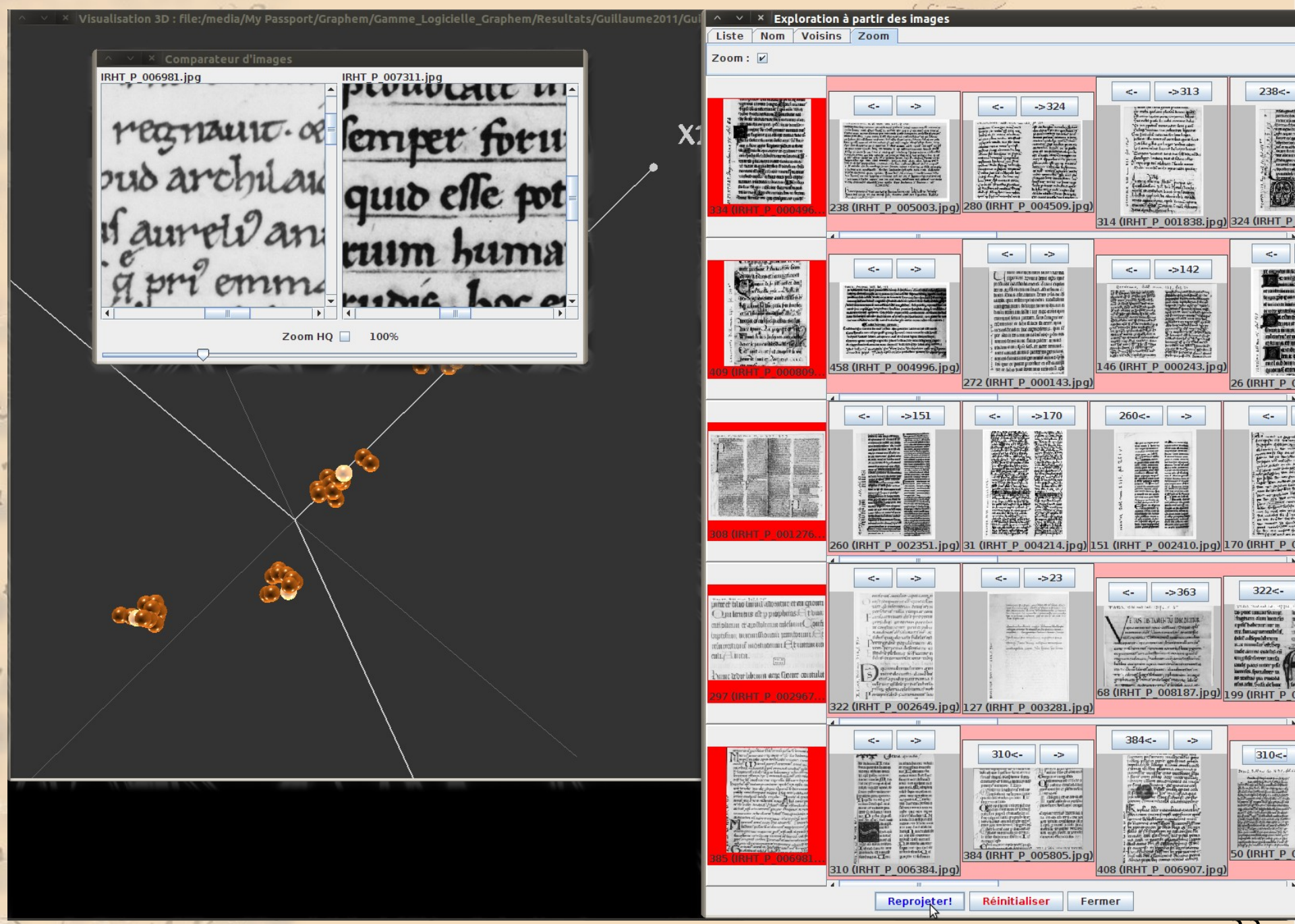

Visualisation 3D : file:/media/My Passport/Graphem/Gamme_Logicielle_Graphem/Resultats/Guillaume2011/Guillaume201105pct.csv
Exploration à partir des images
Liste
Nom
Voisins
Zoom
IRHT_P_006981.jpg
Valider
334 (IRHT_P_000496...
409 (IRHT_P_000809...
308 (IRHT_P_001276...
297 (IRHT_P_002967...
385 (IRHT_P_006981...
Reprojeter!
Réinitialiser
Fermer

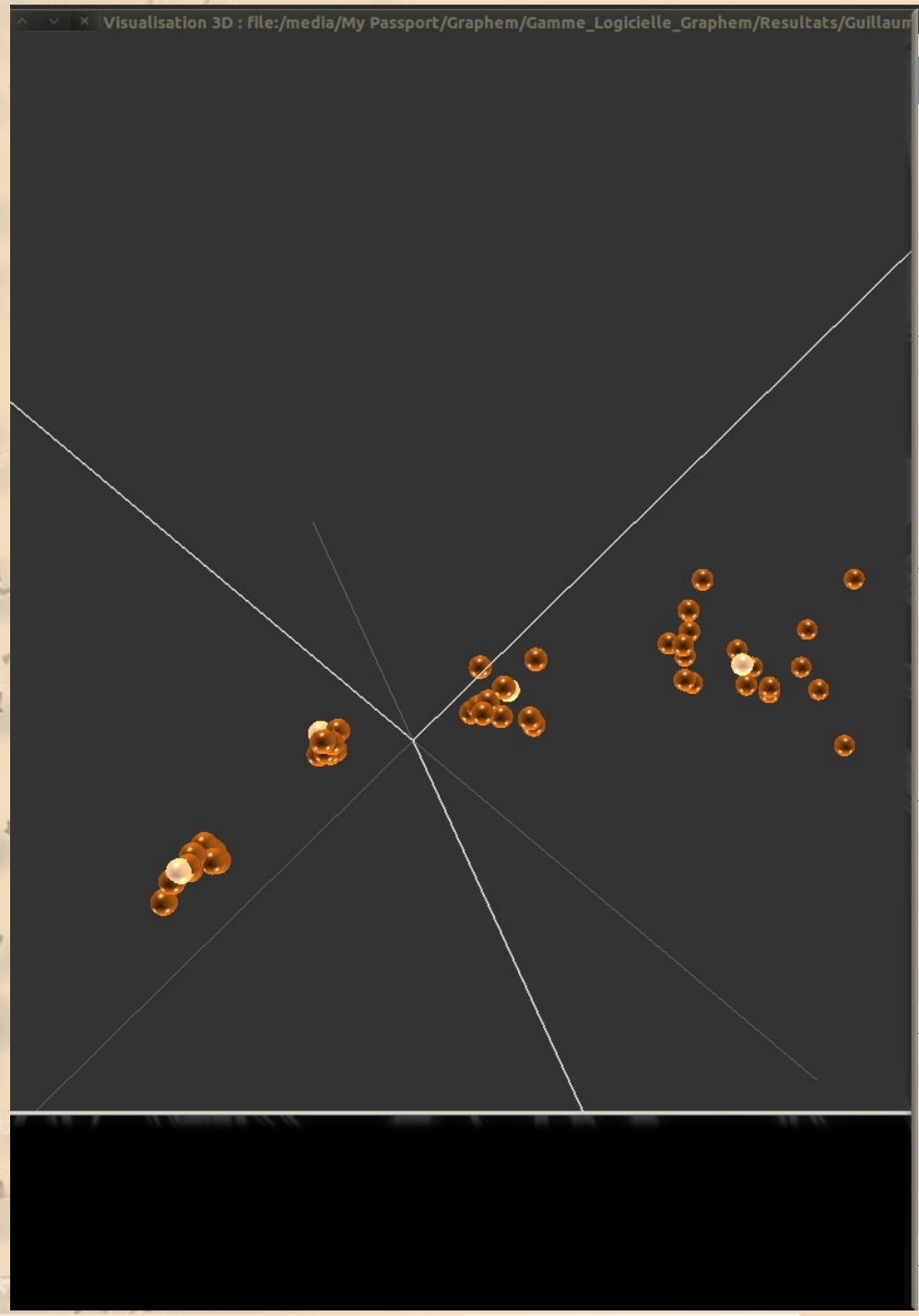

Visualisation 3D : file:/media/My Passport/Graphem/Gamme_Logicielle_Graphem/Resultats/Guillaume2011/Guillaume201105pct.csv
X1


Exploration à partir des images
Liste
Nom
Voisins
Zoom
Nombre de voisins : 10
Valider
334 (IRHT_P_000496...
238 (IRHT_P_005003.jpg)
280 (IRHT_P_004509.jpg)
314 (IRHT_P_001
409 (IRHT_P_000809...
458 (IRHT_P_004996.jpg)
272 (IRHT_P_000143.jpg)
146 (IRHT_P_000
308 (IRHT_P_001276...
260 (IRHT_P_002351.jpg)
31 (IRHT_P_004214.jpg)
151 (IRHT_P_0024
297 (IRHT_P_002967...
322 (IRHT_P_002649.jpg)
127 (IRHT_P_003281.jpg)
68 (IRHT_P_0081
385 (IRHT_P_006981...
310 (IRHT_P_006384.jpg)
384 (IRHT_P_005805.jpg)
408 (IRHT_P_006
Reprojeter!
Réinitialiser
Fermer

Semi-supervised projection

- Two ways to use projection :
  - Looking at the scattering of writings
    - Are features relevant ?
  - A low dimension description
    - a fast and « clean » similarity measure
- If projection seems to be poor ?
  - Search for new features
  - Adapt projection


Visualisation 3D : file:/media/My Passport/Graphem/Gamme_Logicielle_Graphem/Resultats/Guillaume2011/Gui
Comparateur d'images
IRHT_P_006981.jpg
IRHT_P_007311.jpg
Zoom HQ
100%
Exploration à partir des images
Liste
Nom
Voisins
Zoom
Zoom :
238 (IRHT_P_005003.jpg)
280 (IRHT_P_004509.jpg)
314 (IRHT_P_001838.jpg)
458 (IRHT_P_004996.jpg)
272 (IRHT_P_000143.jpg)
146 (IRHT_P_000243.jpg)
260 (IRHT_P_002351.jpg)
31 (IRHT_P_004214.jpg)
151 (IRHT_P_002410.jpg)
322 (IRHT_P_002649.jpg)
127 (IRHT_P_003281.jpg)
68 (IRHT_P_008187.jpg)
310 (IRHT_P_006384.jpg)
384 (IRHT_P_005805.jpg)
408 (IRHT_P_006907.jpg)
Reprojeter!
Réinitialiser
Fermer



Exploration à partir des images

Liste | Nom | Voisins | Zoom

Zoom :

334 (IRHT_P_000496..)	314 (IRHT_P_001838.jpg)	238 (IRHT_P_005003.jpg)	280 (IRHT_P_004509.jpg)
409 (IRHT_P_000809..)	272 (IRHT_P_000143.jpg)	463 (IRHT_P_000873.jpg)	26 (IRHT_P_004564.jpg)
308 (IRHT_P_001276..)	260 (IRHT_P_002351.jpg)	31 (IRHT_P_004214.jpg)	394 (IRHT_P_000639.jpg)
297 (IRHT_P_002967..)	322 (IRHT_P_002649.jpg)	127 (IRHT_P_003281.jpg)	68 (IRHT_P_008187.jpg)
385 (IRHT_P_006981..)	343 (IRHT_P_007340.jpg)	229 (IRHT_P_007297.jpg)	44 (IRHT_P_009720.jpg)

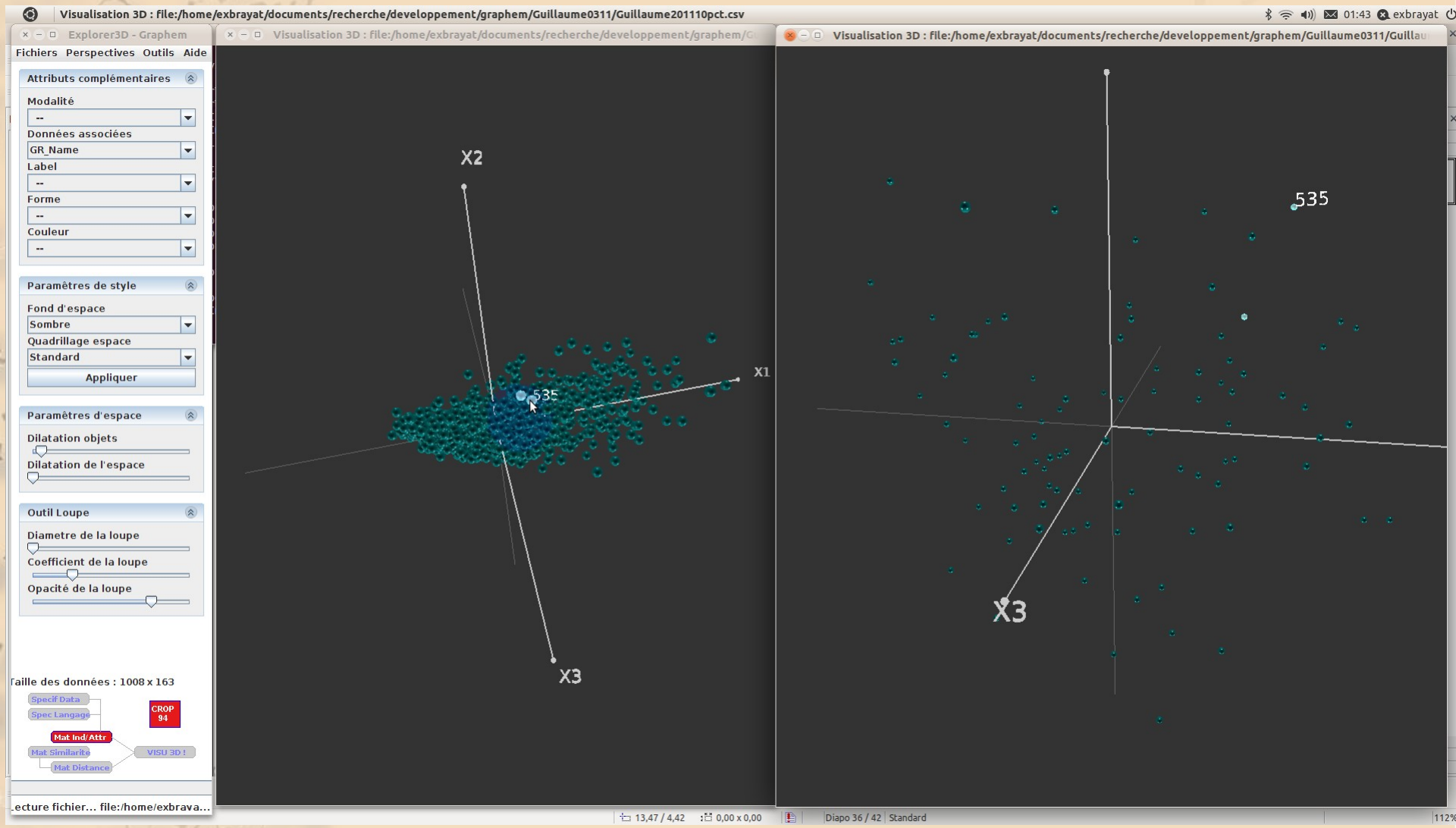
Reprojeter! | Réinitialiser | Fermer

Underlying method

- Consider projection as a balanced mix of
  - Global scattering
  - Specific constraints
- Available constraints
  - Get a pair of objects closer / away
  - Modify the distance ratio of a triple
  - Move an object to a new neighborhood

MultiView visualization

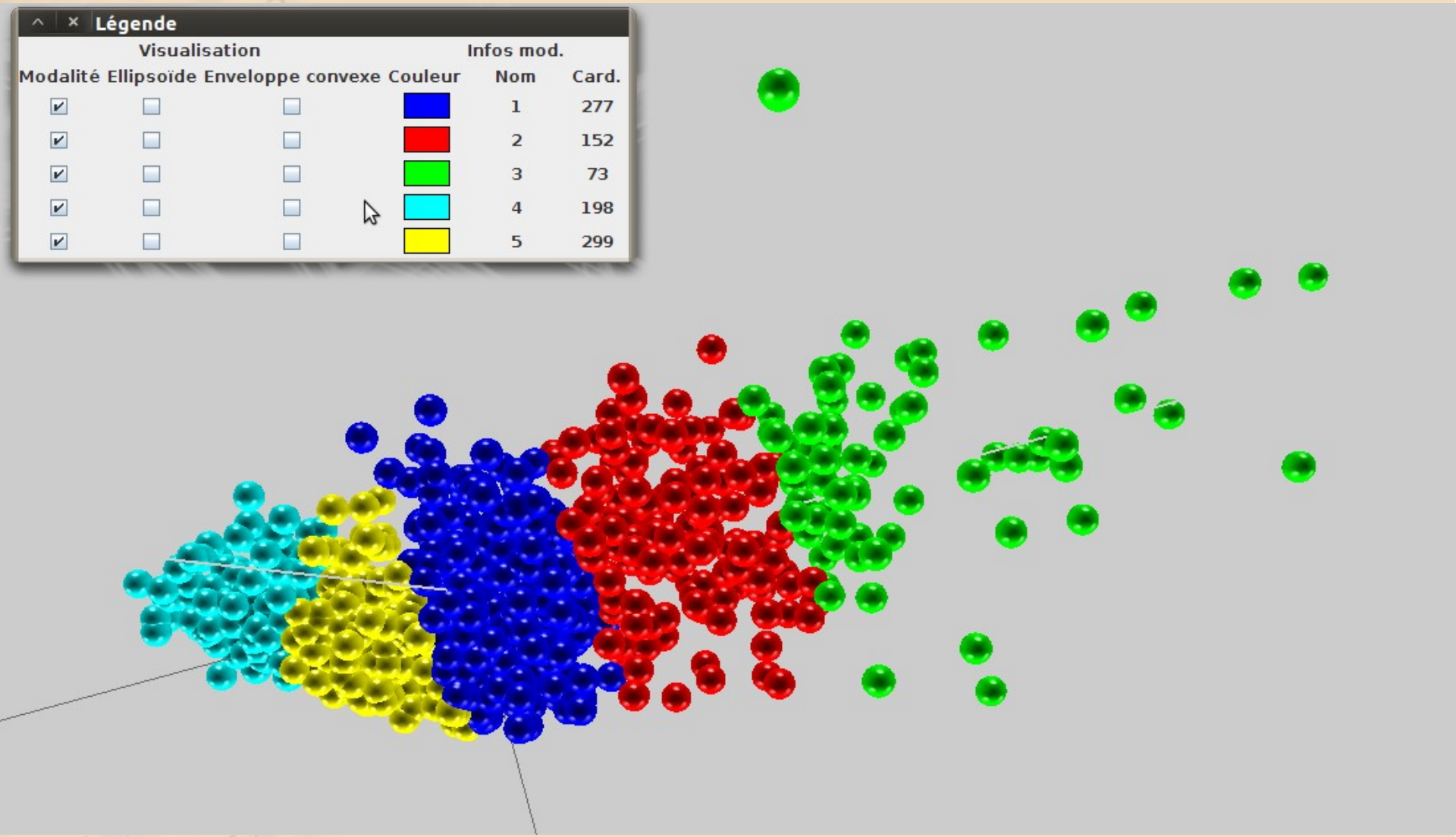
- Until now, we consider only one set of features each time
- What about comparing them ?
  - From a image retrieval point of view
    - Online tools
  - From a visualization point of view
    - Multiple sources
- This leads to multiple views

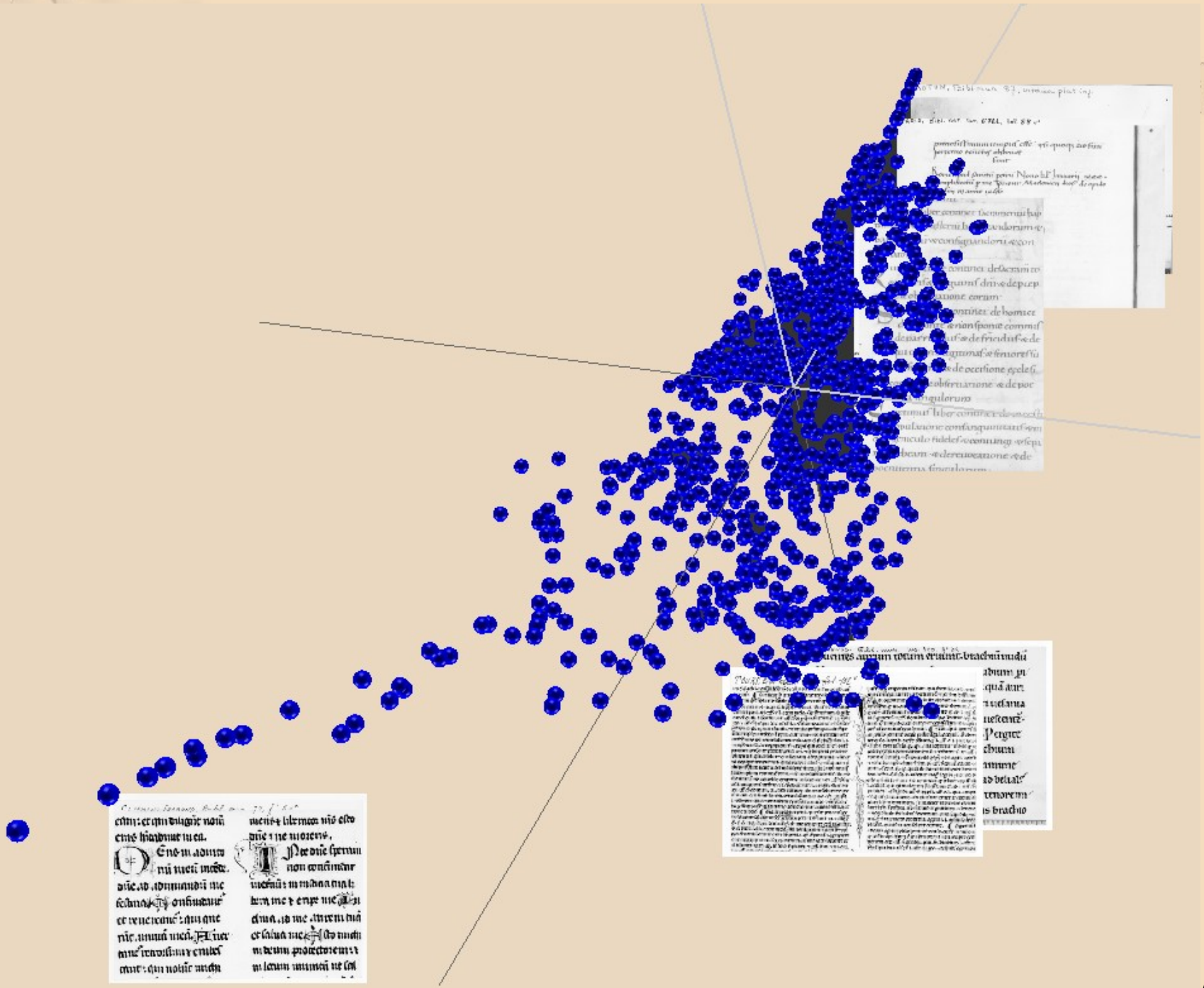

Visualisation 3D : file:/home/exbrayat/documents/recherche/developpement/graphem/Guillaume0311/Guillaume201110pct.csv
01:43
exbrayat
Explorer3D - Graphem
Fichiers Perspectives Outils Aide
Attributs complémentaires
Modalité
--
Données associées
GR_Name
Label
--
Forme
--
Couleur
--
Paramètres de style
Fond d'espace
Sombre
Quadrillage espace
Standard
Appliquer
Paramètres d'espace
Dilatation objets
Dilatation de l'espace
Outil Loupe
Diametre de la loupe
Coefficient de la loupe
Opacité de la loupe
Taille des données : 1008 x 163
Specif Data
Spec Langage
Mat Ind/Attr
Mat Similarité
Mat Distance
CROP 94
VISU 3D !
Lecture fichier... file:/home/exbrava...
Visualisation 3D : file:/home/exbrayat/documents/recherche/developpement/graphem/Guillaume0311/Guillau
X2
X1
X3
535
535
X3
13,47 / 4,42
0,00 x 0,00
Diapo 36 / 42
Standard
112%

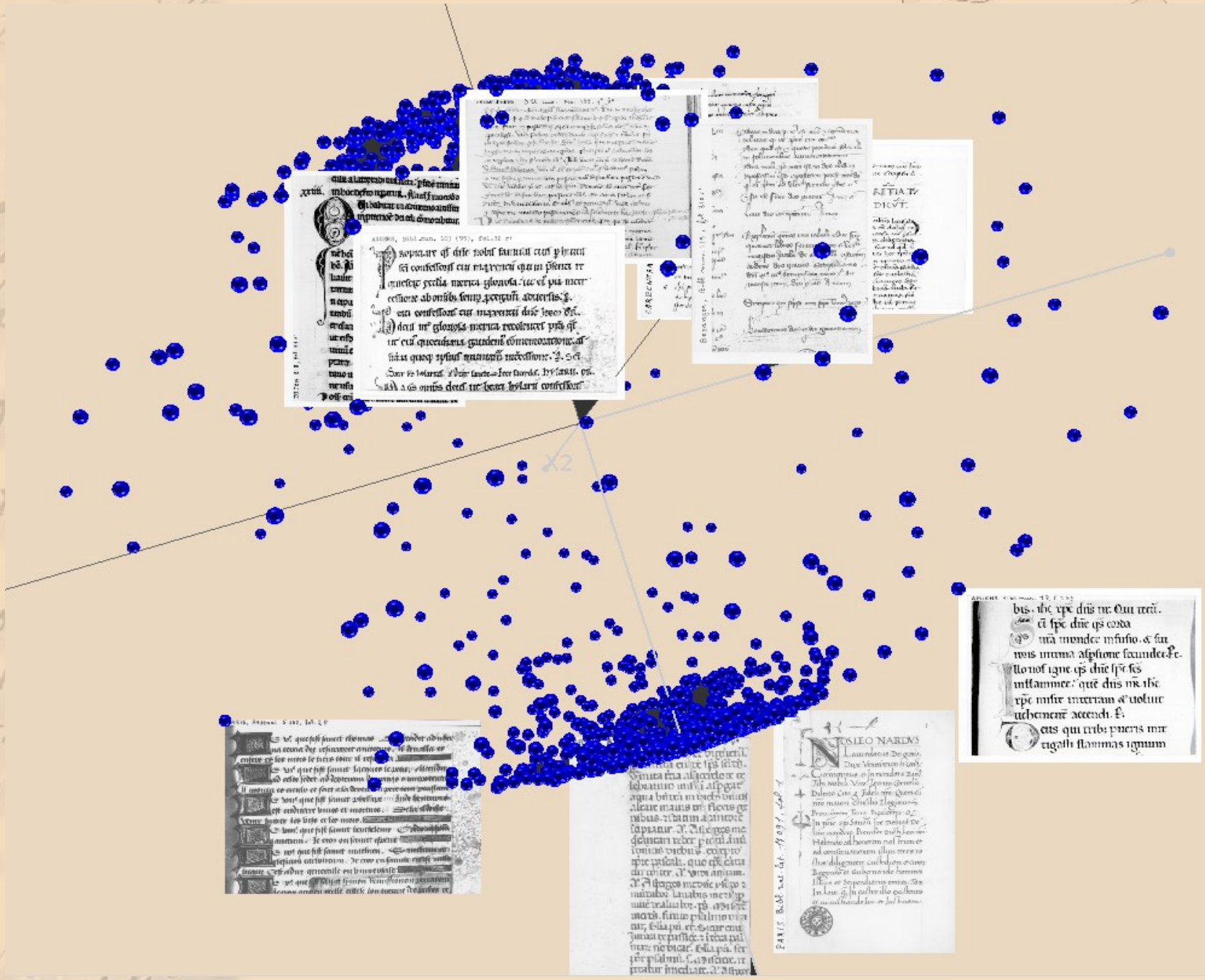
Additional functionalities

- Clustering
- Non linear projections

Clustering

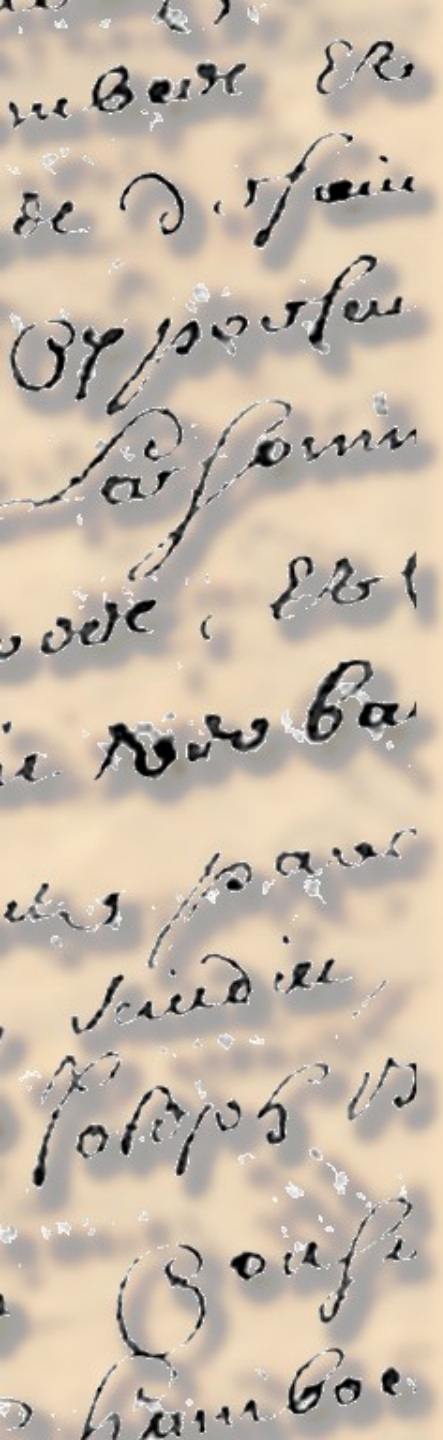

Légende
Visualisation
Infos mod.
Modalité Ellipsoïde Enveloppe convexe Couleur Nom Card.
1 277
2 152
3 73
4 198
5 299





Summary

- Various kinds of features
- Two ways to compare them
  - Image retrieval
  - (semi)Global view
- Next step
  - Real multisource viewing
  - A better understanding of the feature-to-style link



Graphem

Questions ?

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