Visualizing Micro-blogging Data

using Clustering and GIS

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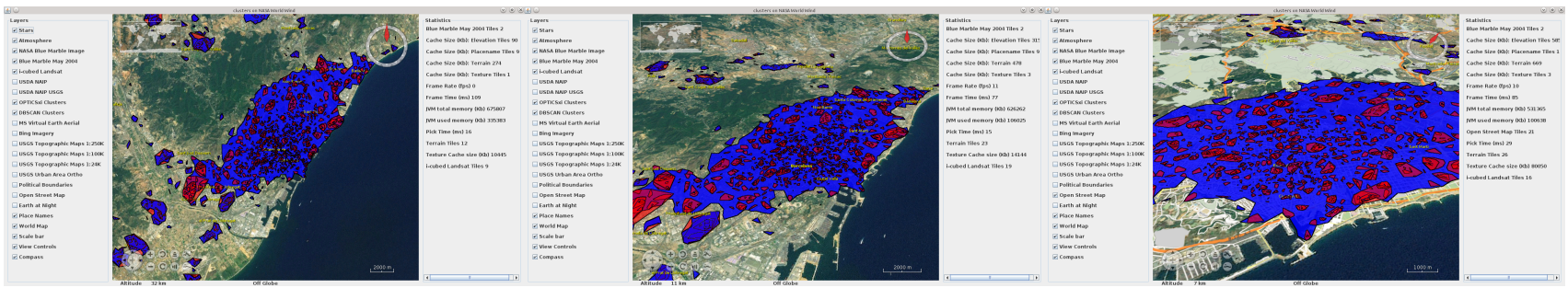
May 11, 2015



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Introduction

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- A proxy for human presence: powerful representations of the distribution of social media users within the territory.
- Due to its willingness in sharing data, Twitter has been a prime *playground*, for researchers and practitioners around the world.

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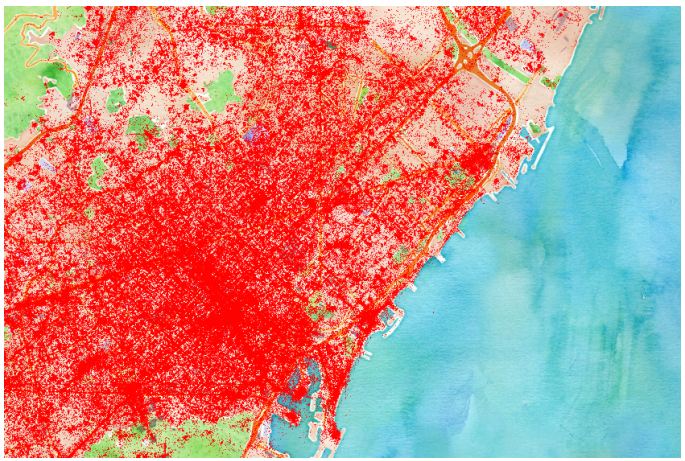
- Users on Twitter generate over 400 million tweets everyday.



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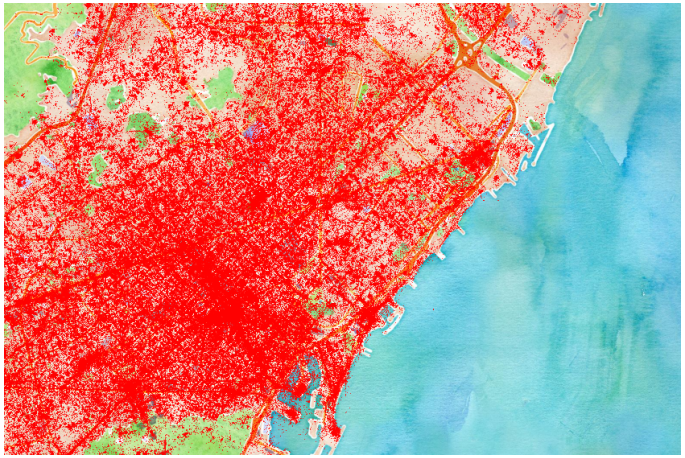

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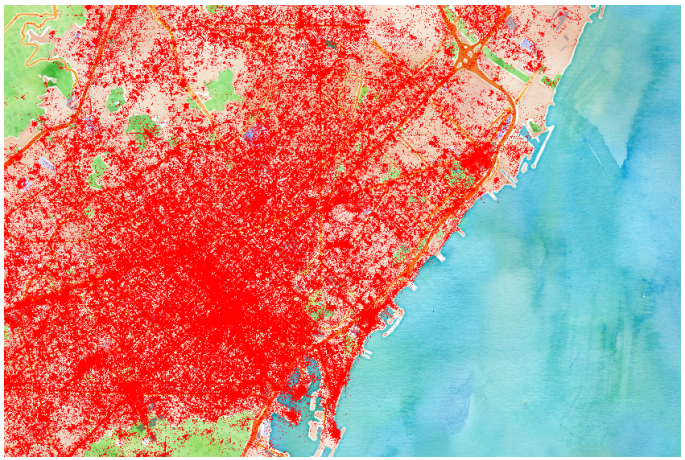
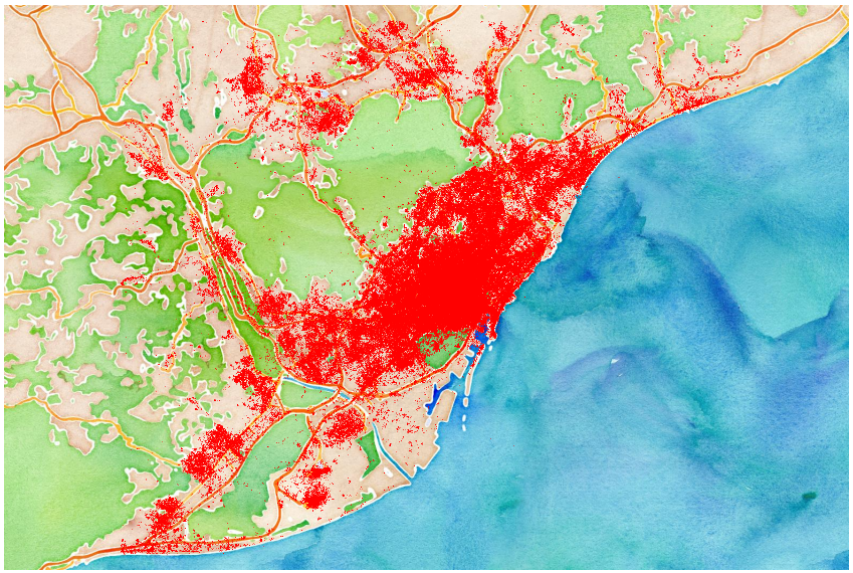
- This amount of data is not easily assimilated by the "human-eye"



Motivation

How to assimilate these large datasets and extract some relevant information?



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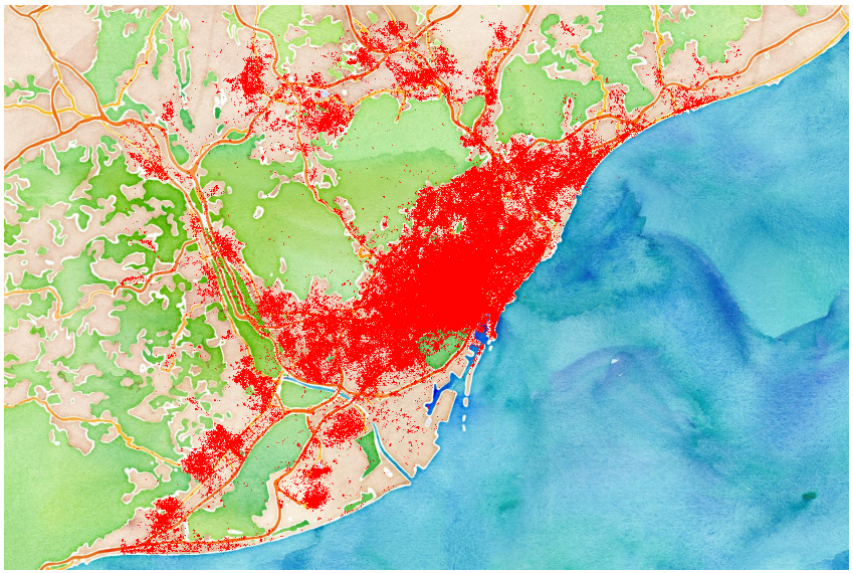
- Technological Challenge + **Representation Challenge**



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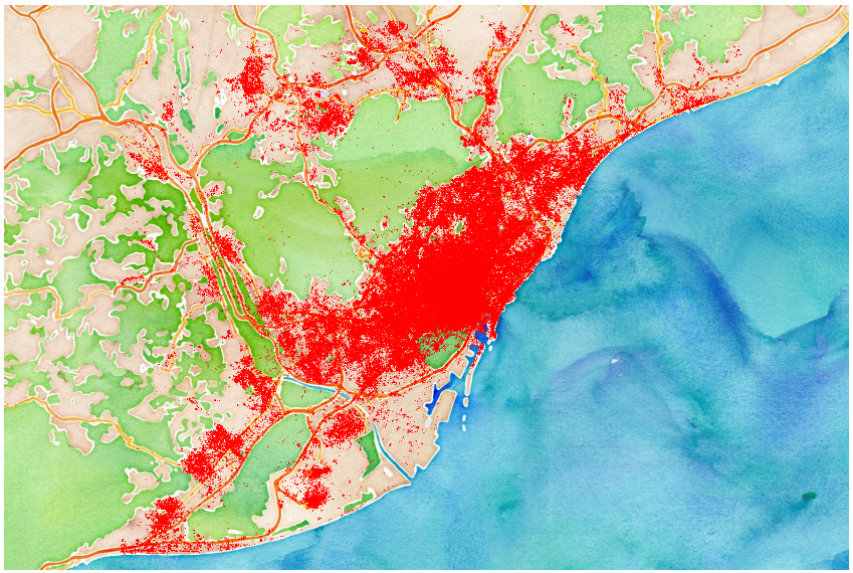
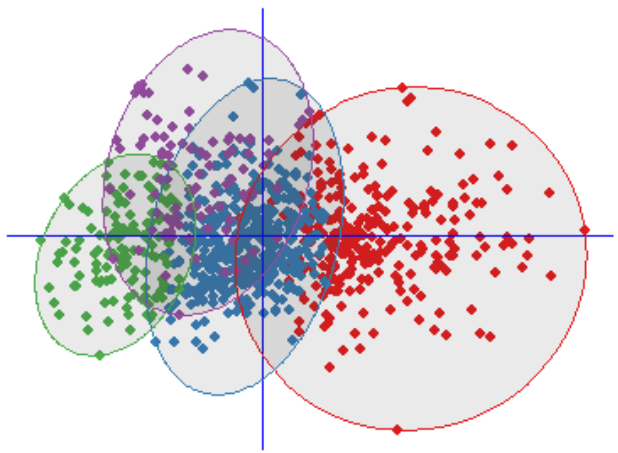
- Data mining/ Machine Learning



Clustering

- Widely used due to its segmentation and summarization features.



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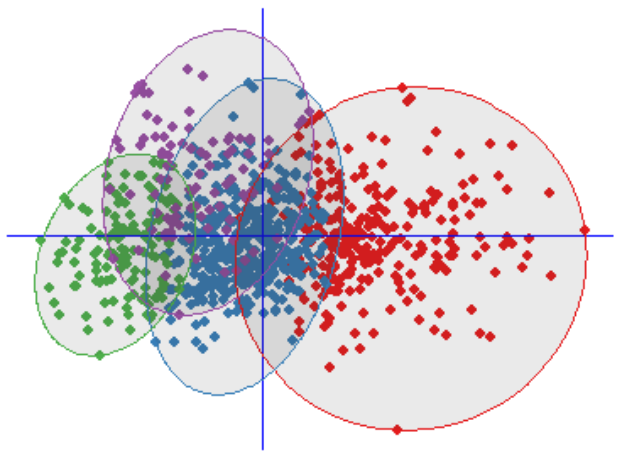

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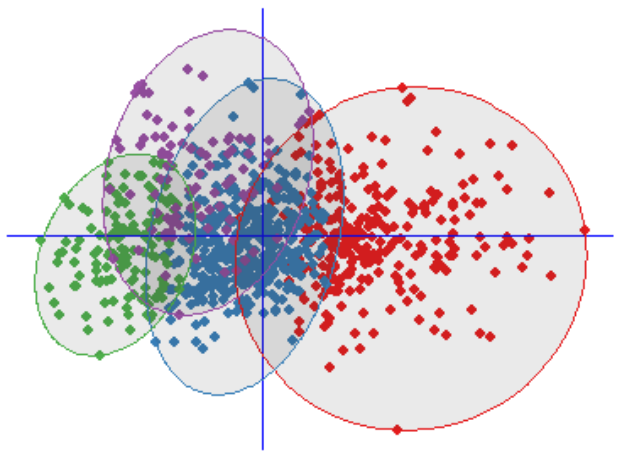
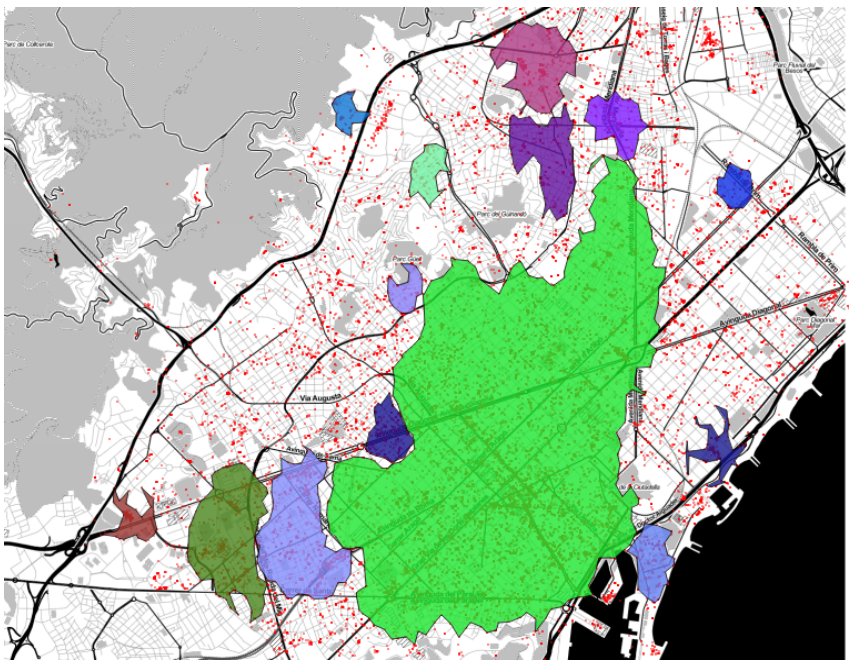
- Identifies groups of objects, which are similar between them, and distinct from the rest.

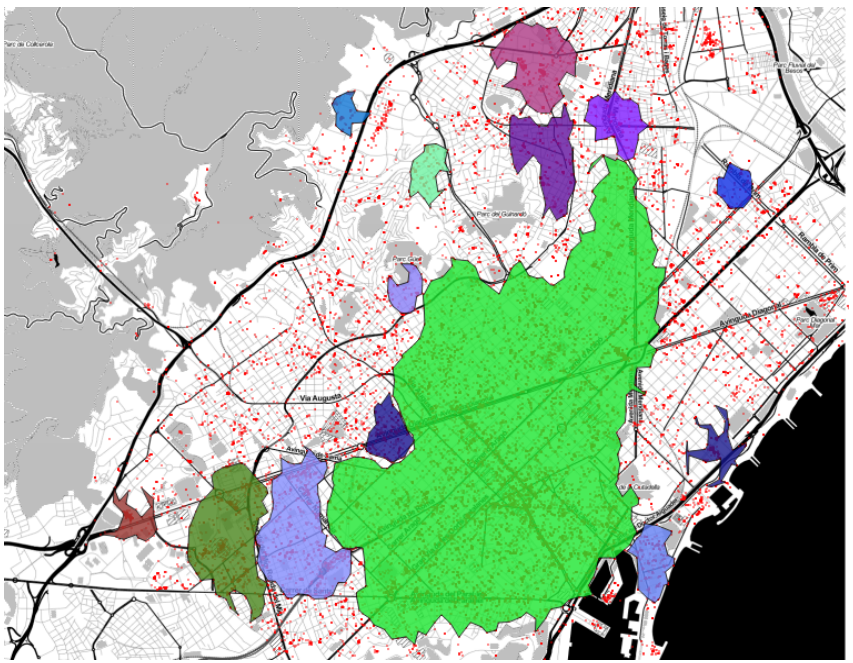


DBSCAN



DBSCAN

- Detects an a priori unknown, number of clusters with an arbitrary shape.



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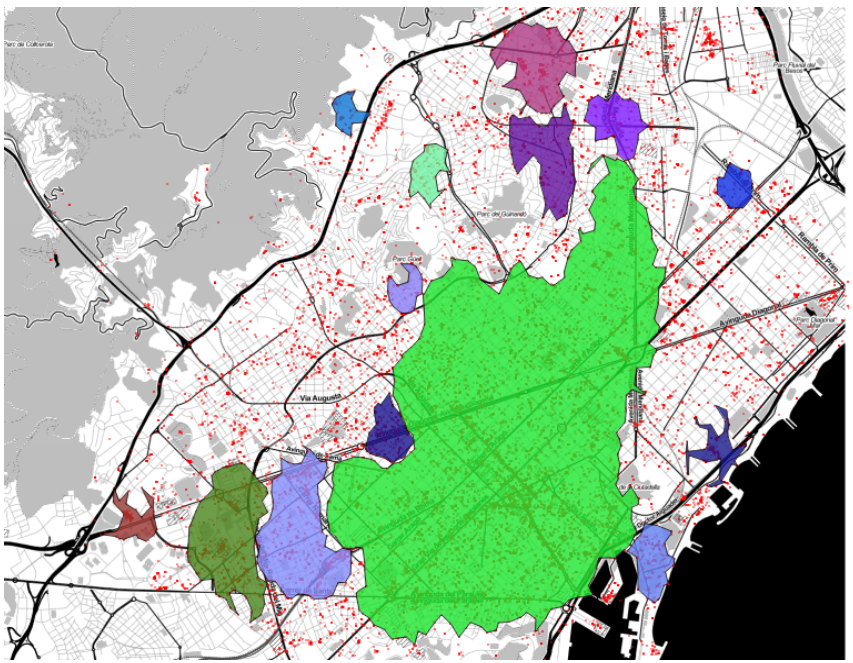

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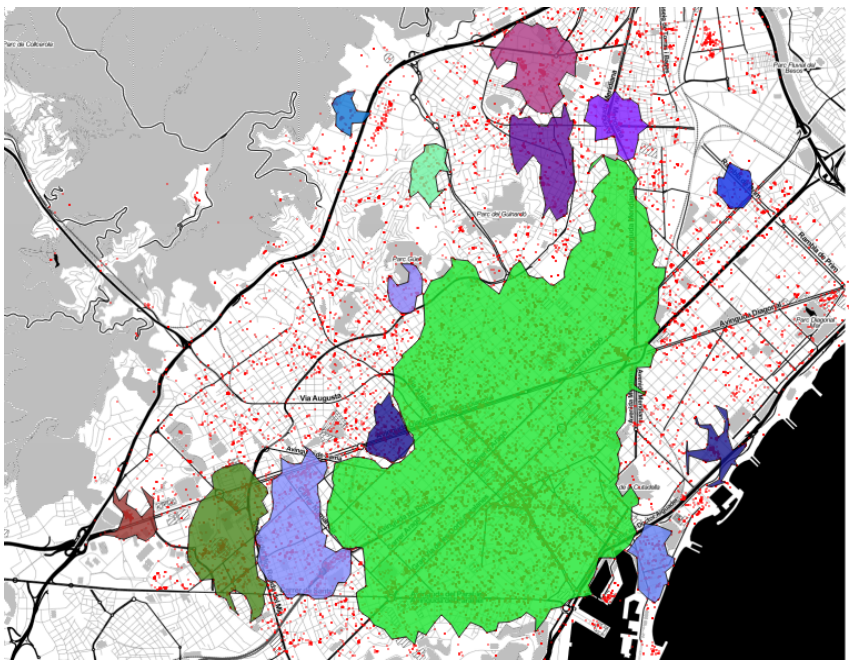

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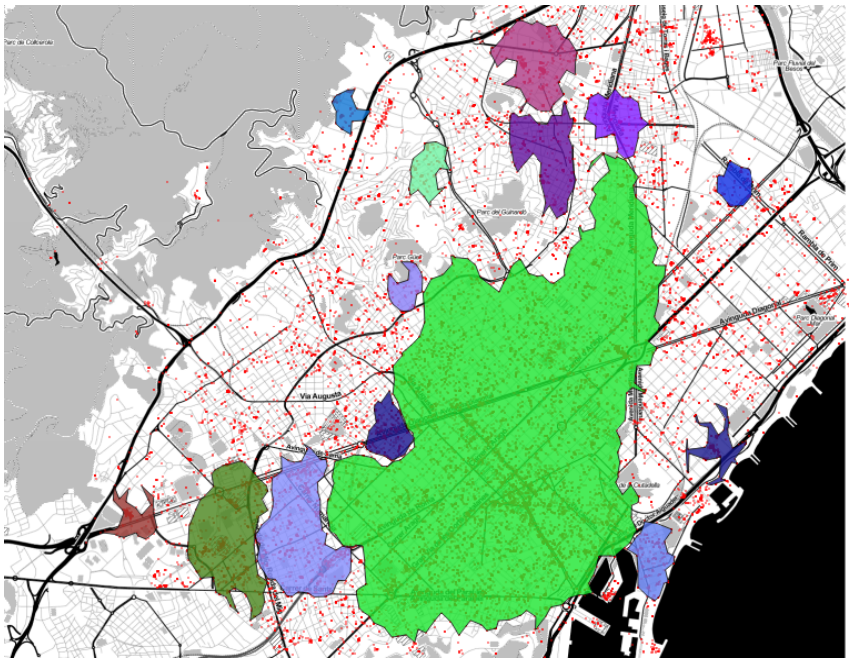
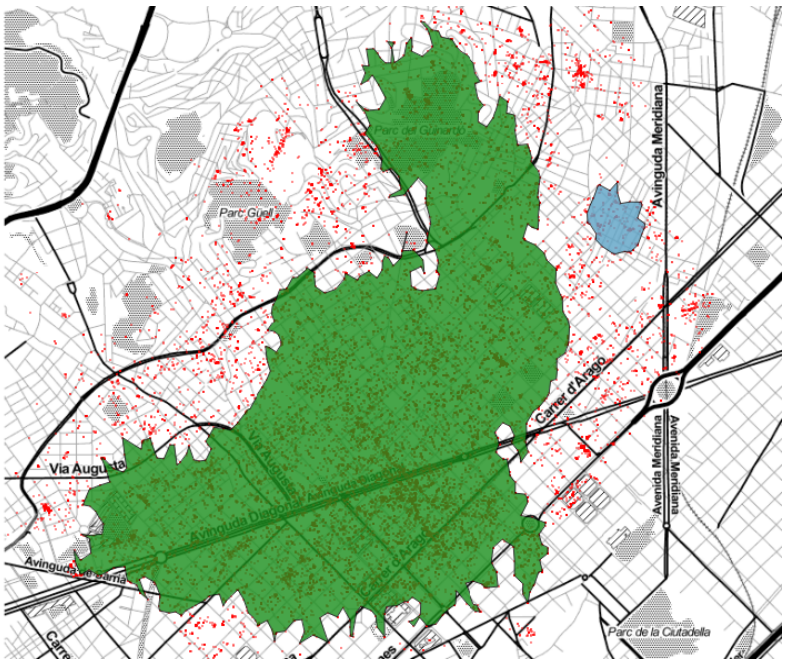
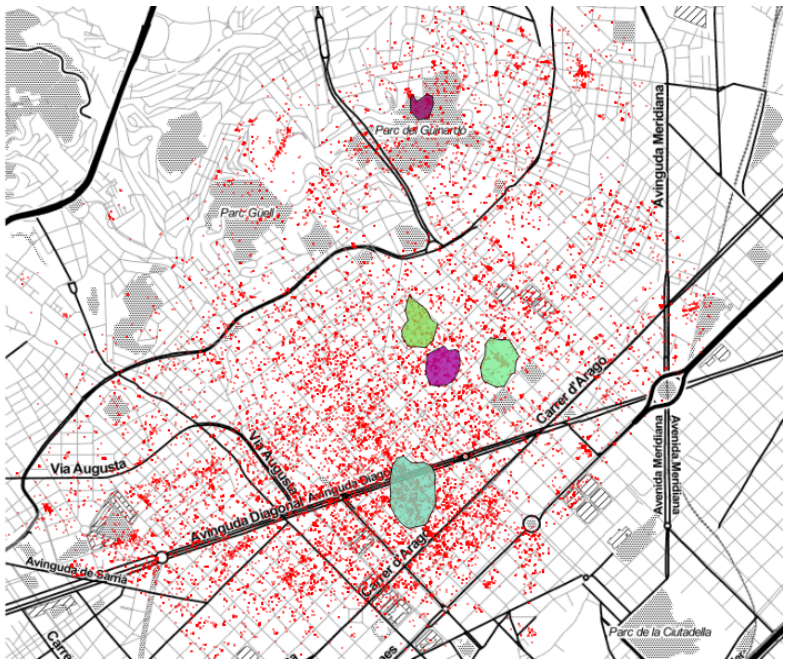
- A *dense-region* is defined by global parameters:
  - epsilon: neighbourhood radius.
  - minPts: minimum number of points required to form a dense region.



The Bottleneck: Global Parameters

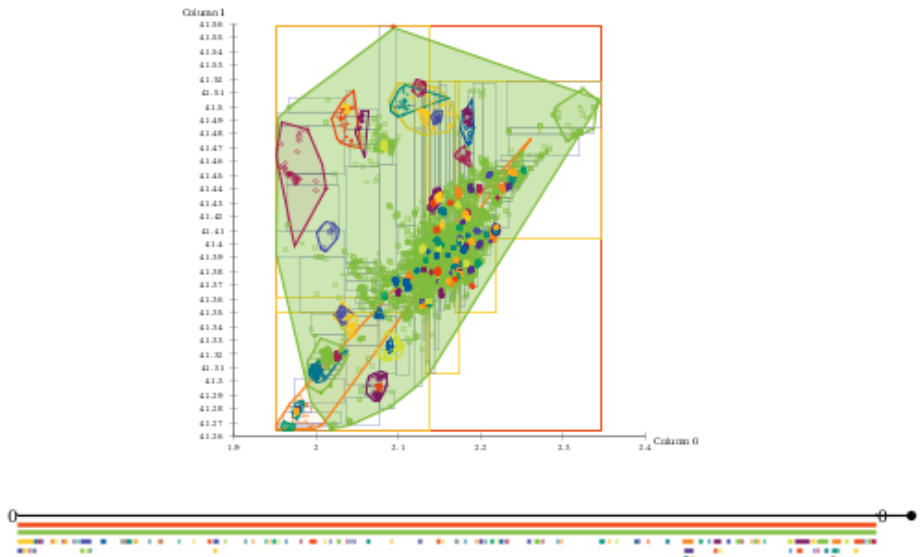


Less strict combination of parameters



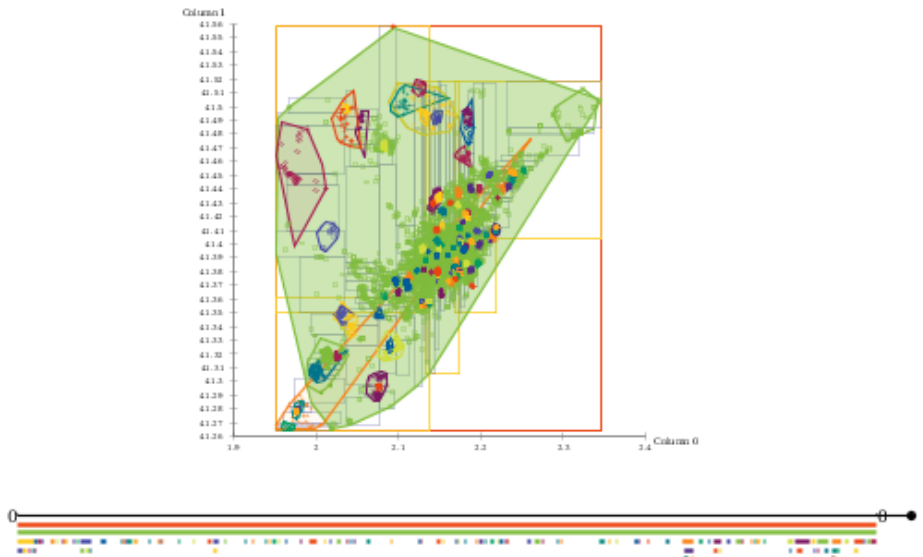
Strict combination of parameters

OPTICS



OPTICS

- Generalization of DBSCAN.



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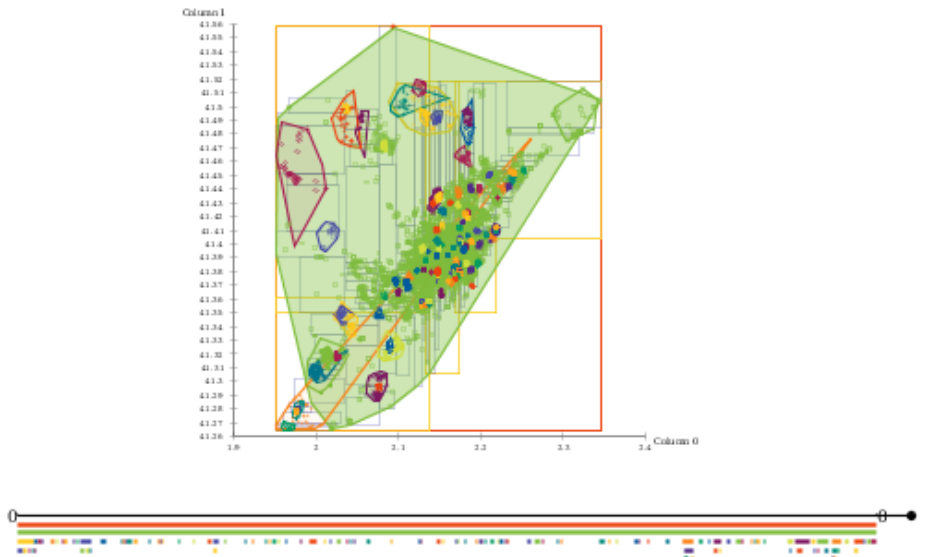

OPTICS

- Generalization of DBSCAN.
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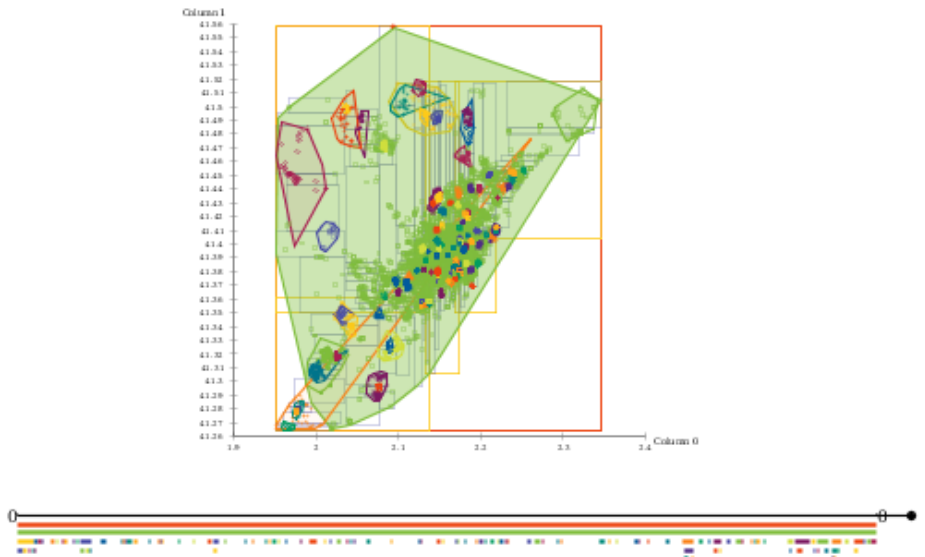
- It does **not** produce a strict partition of the data.



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- Hierarchical partition.

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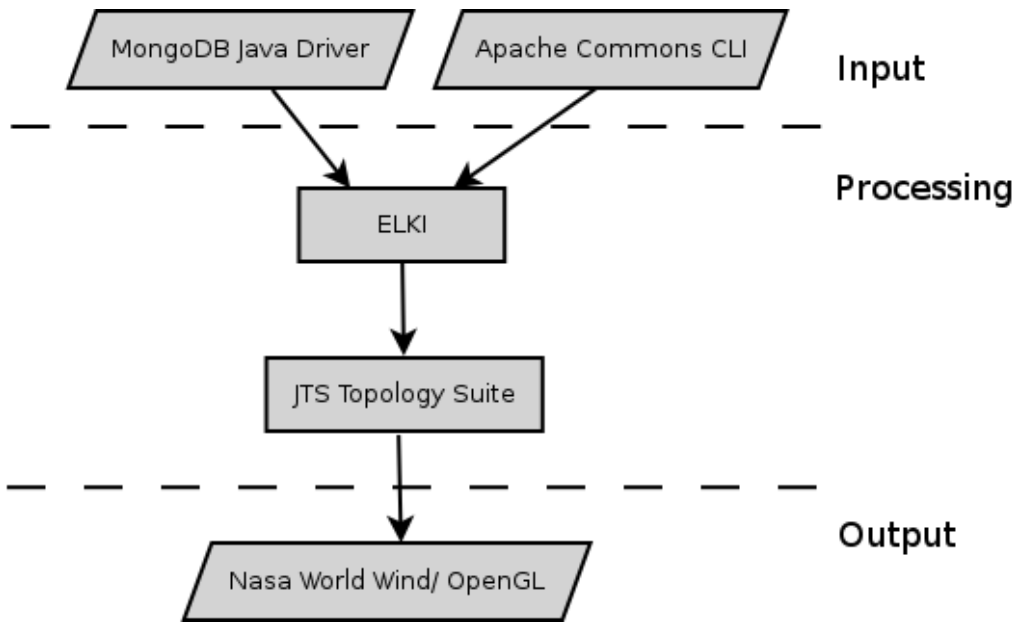
- WorldWind is an Open Source virtual globe developed by NASA that accesses a number of remote sensing datasets.
  - OpenGL.

Cluster Explorer

- Java App based on FOSS.



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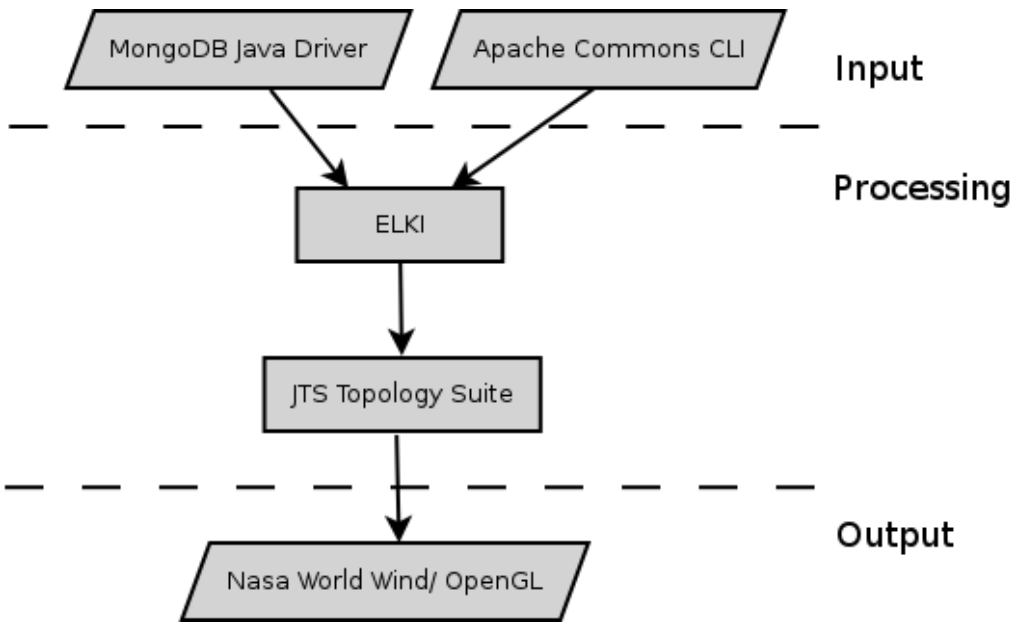

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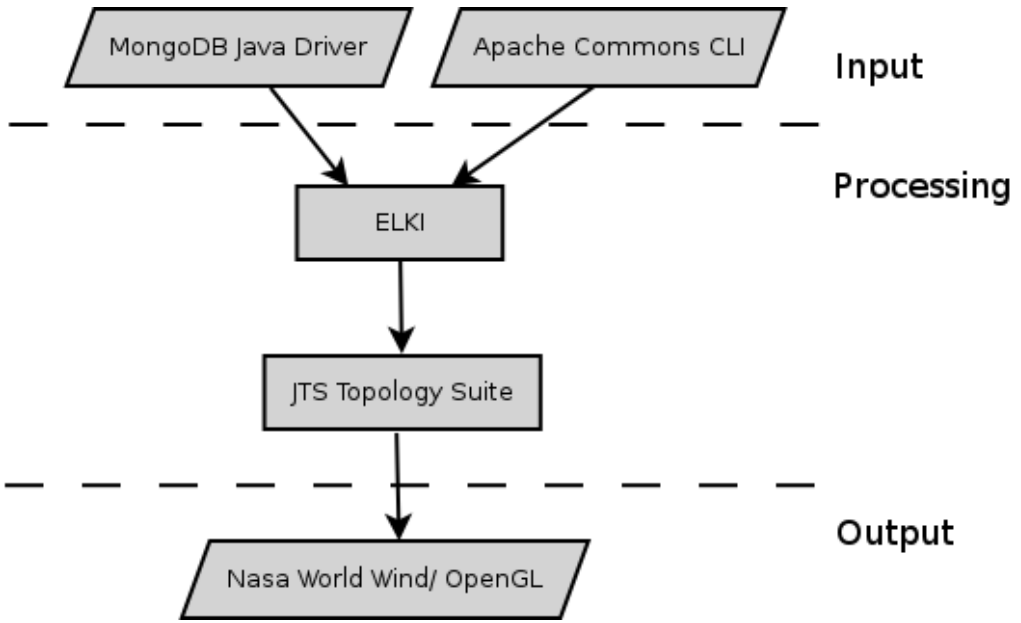
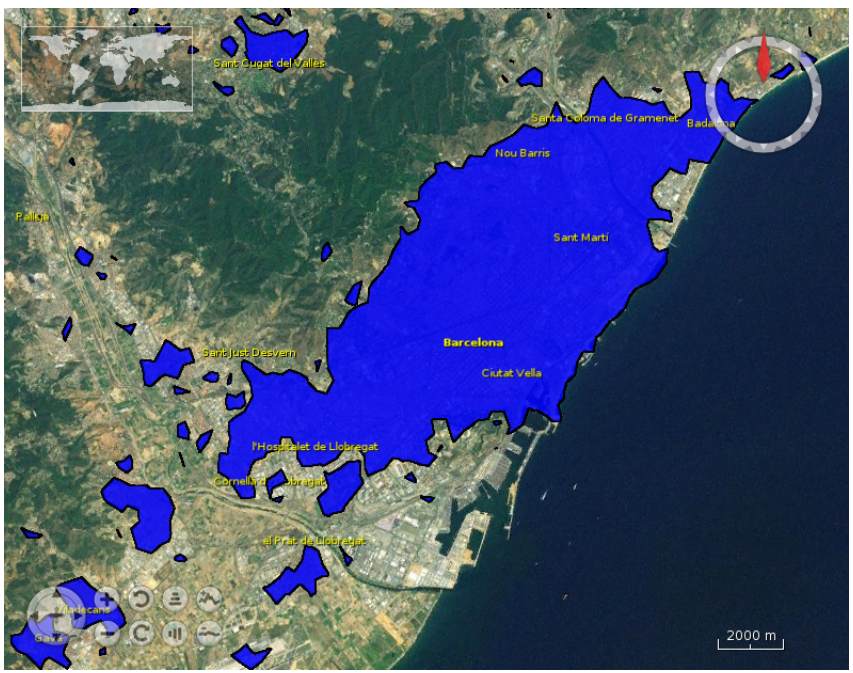
- Displays the results on a virtual globe.

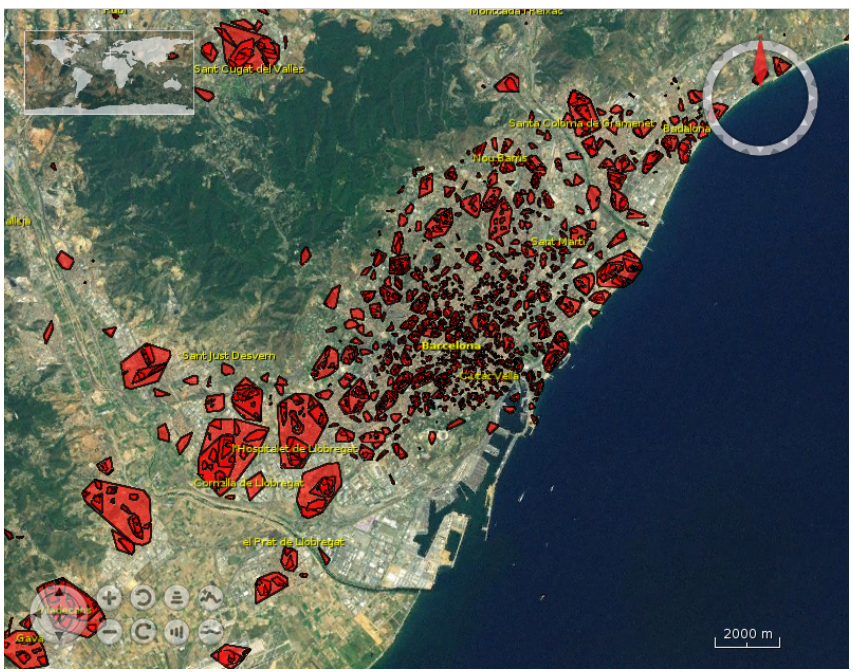


A Case Study

A set of geo-located Tweets in the city of Barcelona, over a period of five days

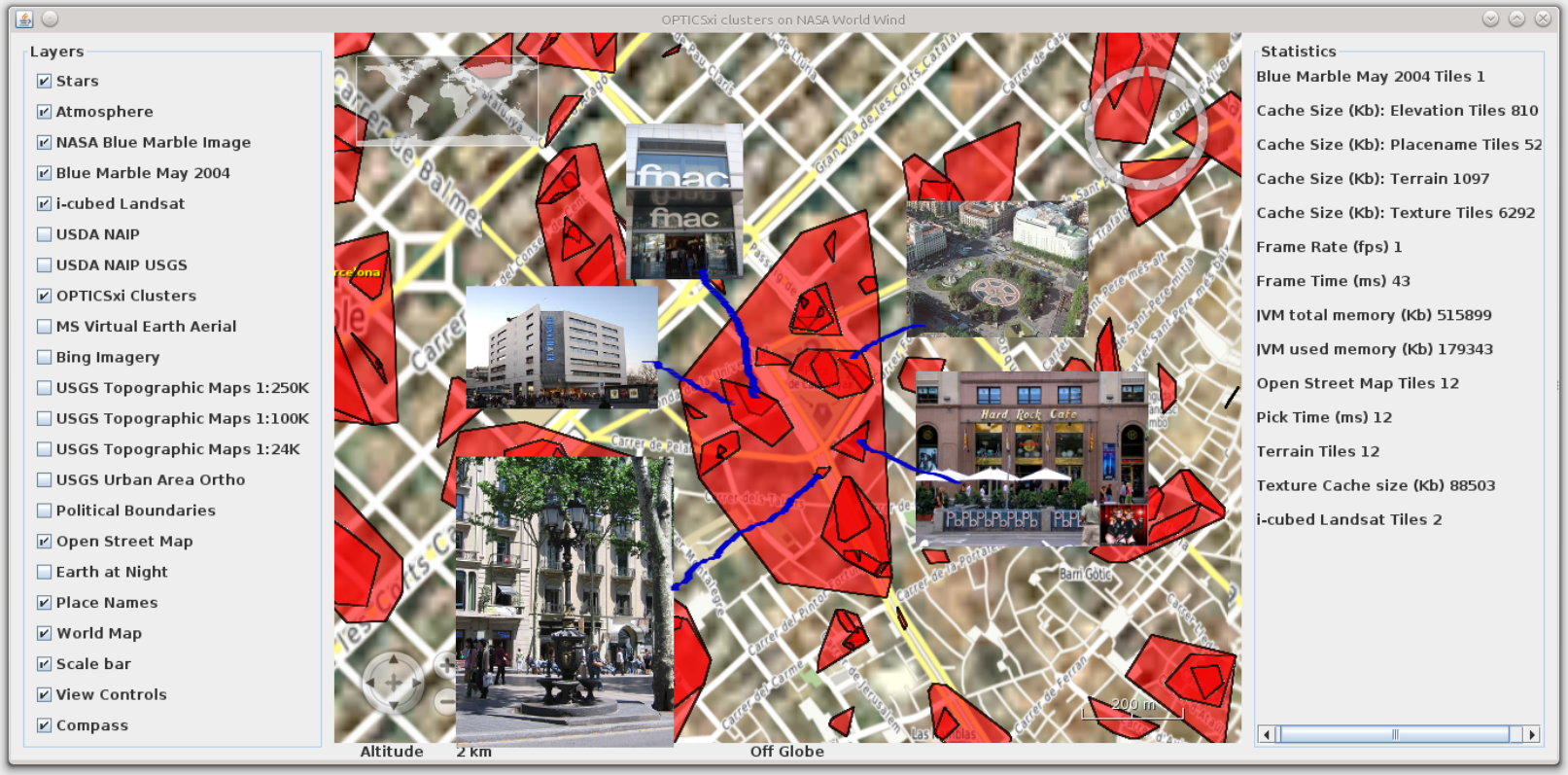


DBSCAN run



OPTICSxi run

GIS and the value of Location-Analysis



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- Hierarchical cluster partition: allows to look at city at multiple scales.
- Visualizations provided by the use of a virtual globe have proved to be a flexible and context enhancing tool, that was crucial for the interpretation of the results.
- We hope to have demonstrated some potentialities arising from the integration between spatial data mining and GIS technologies, using FOSS.

Thank You!

This presentation is available at:
`http://tinyurl.com/kclm6k9`