What: Data

Stenomaps: Shorthand for shapes

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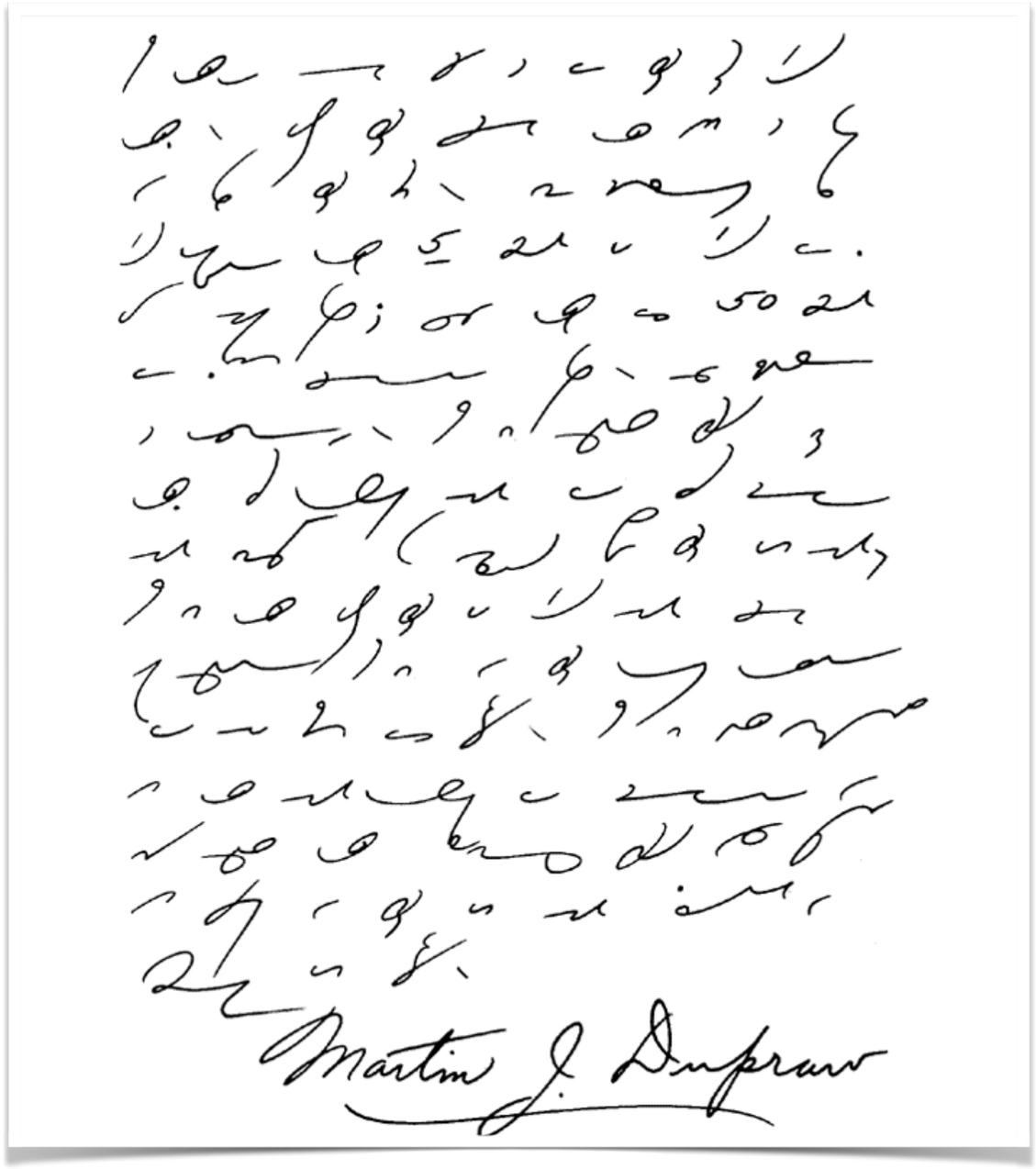
Stenomaps

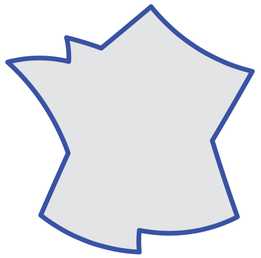
Analogy with Stenography



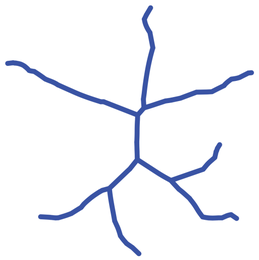
What: Derived

Area-to-line Transformation for Geometric Abstraction

Geometric Abstraction



Generalized Boundaries



Medial Axis

Stenomap Glyph

France

Why: Task

Why Abstraction?

Free up graphical space and distinct visual variables

Direct attention to main data

Use Cases of Stenomaps

Cartographic Lines

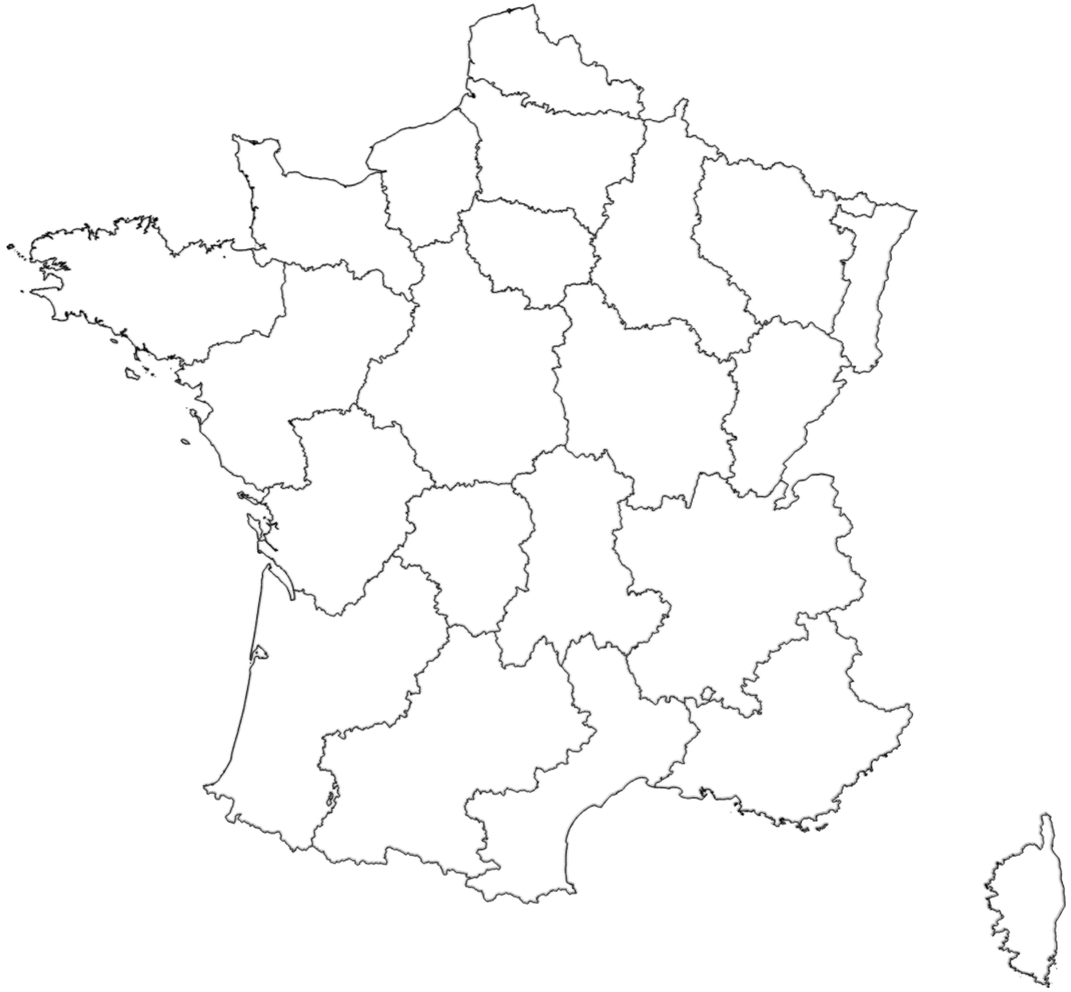
Variation in Pattern and Width

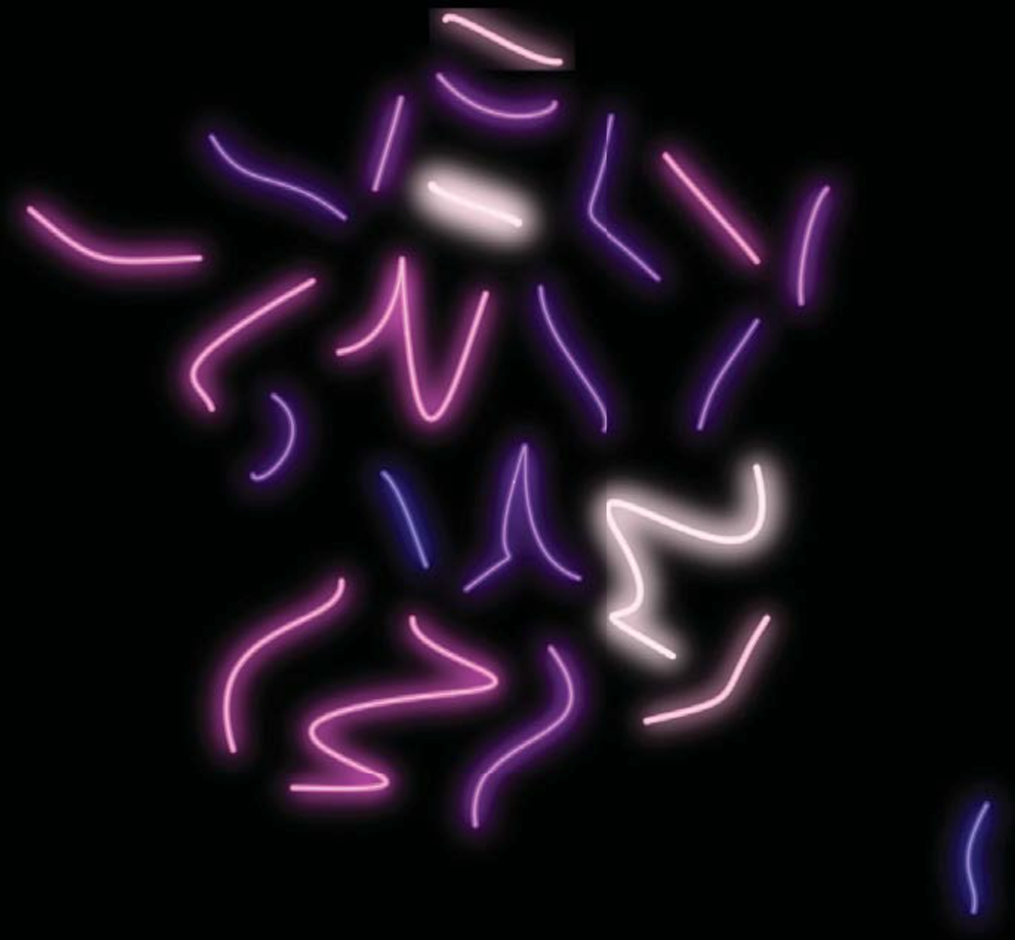
Not as limited as boundary lines

Multi-band line symbolisation

Isotype icons as line replacement

Labels as line replacement





Energy consumption in the Regions of France, 2010

Why: Task

Spatial Uncertainty

Selective Perception

Highlight main data by reduce geography

Illusion of Accuracy

Prevent inferences of exact location

Cross-boundary Data

Continuous Natural Phenomena

Not tied to political boundaries

Erroneous Perception

Colour interpreted as uniform within each polygon

Stenomaps: less intrusive

Maintain continuity

Give reference to location

Allow comparison between maps

Solar potential in Europe

Design Choices

C^1-continuous

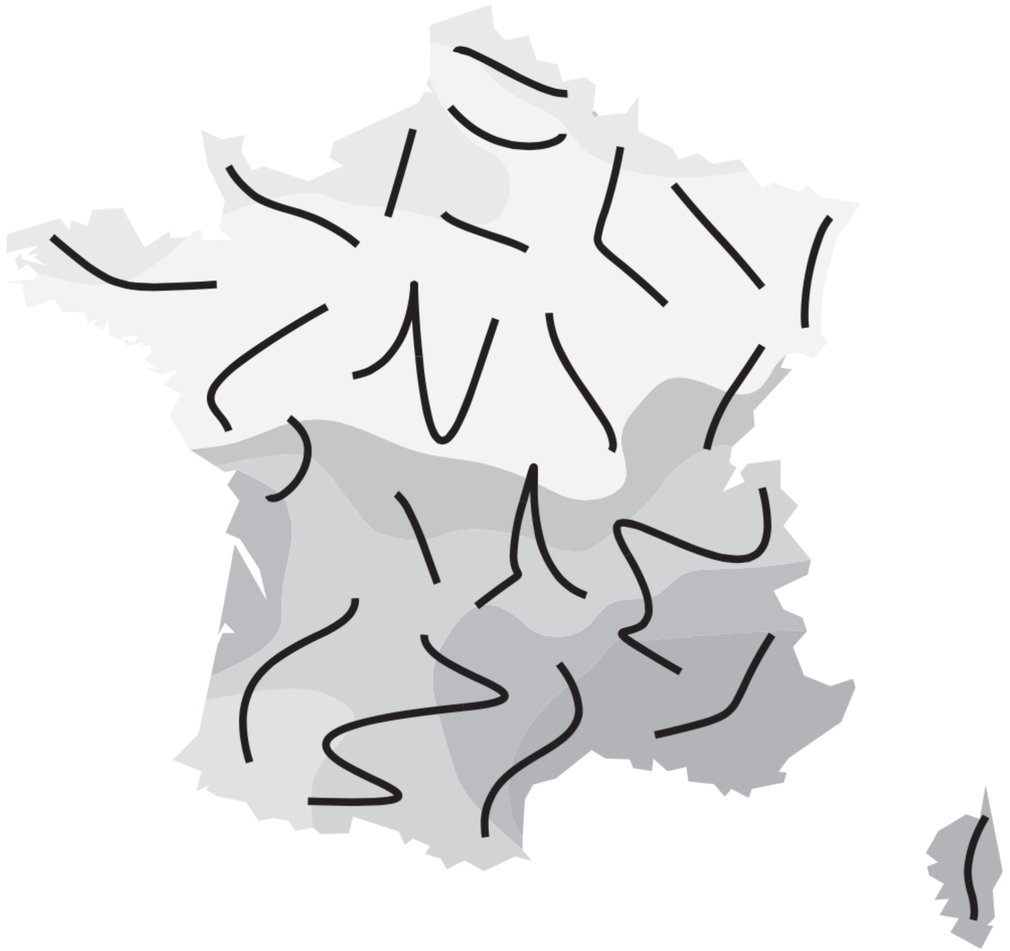
Hand-drawn appearance

Few curves

Low complexity

Area vs Boundary

A trade-off



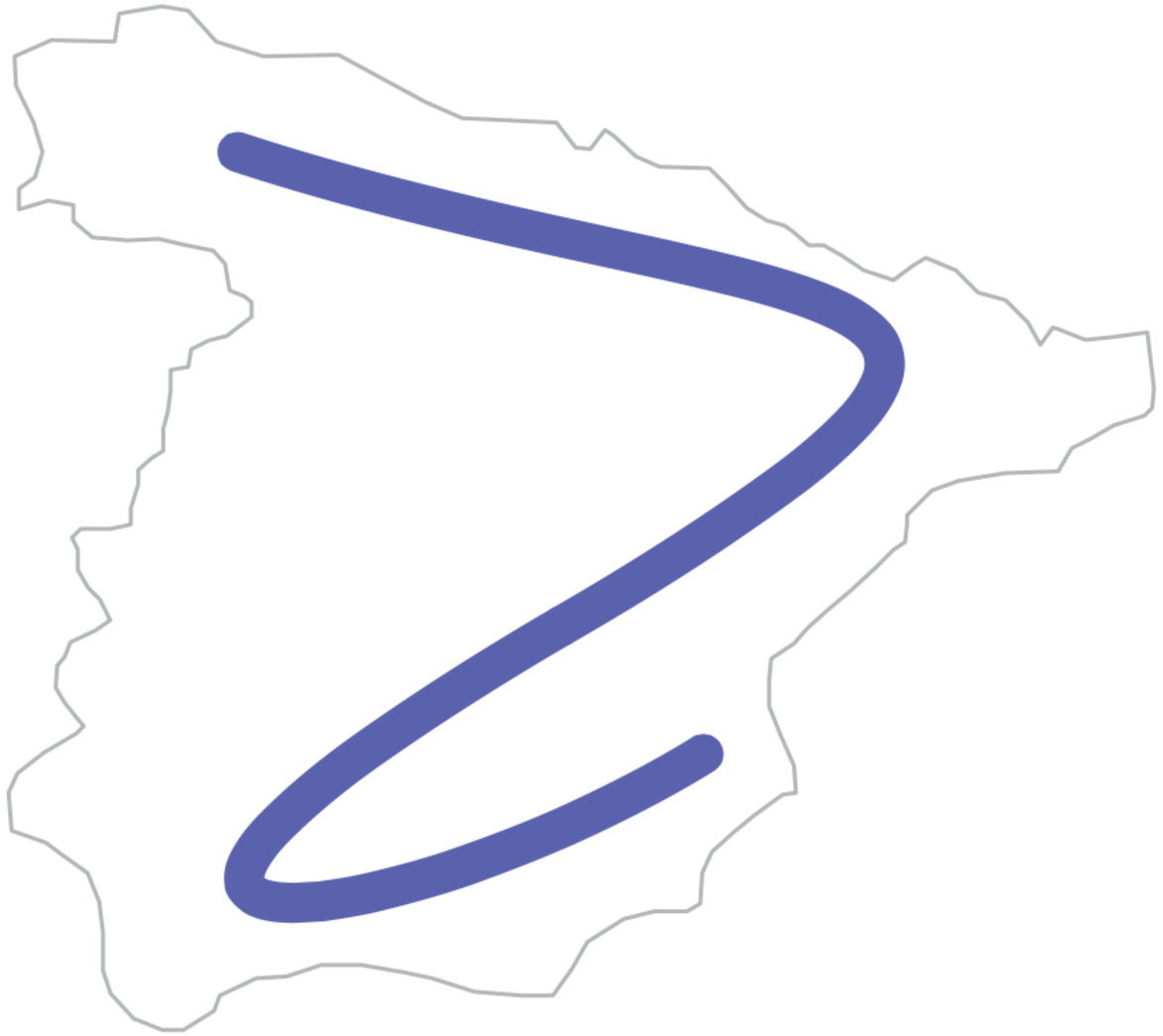
4-step Algorithm

Find **feature points**

Obtain glyph **region**

Find **backbone**

Create **glyph**

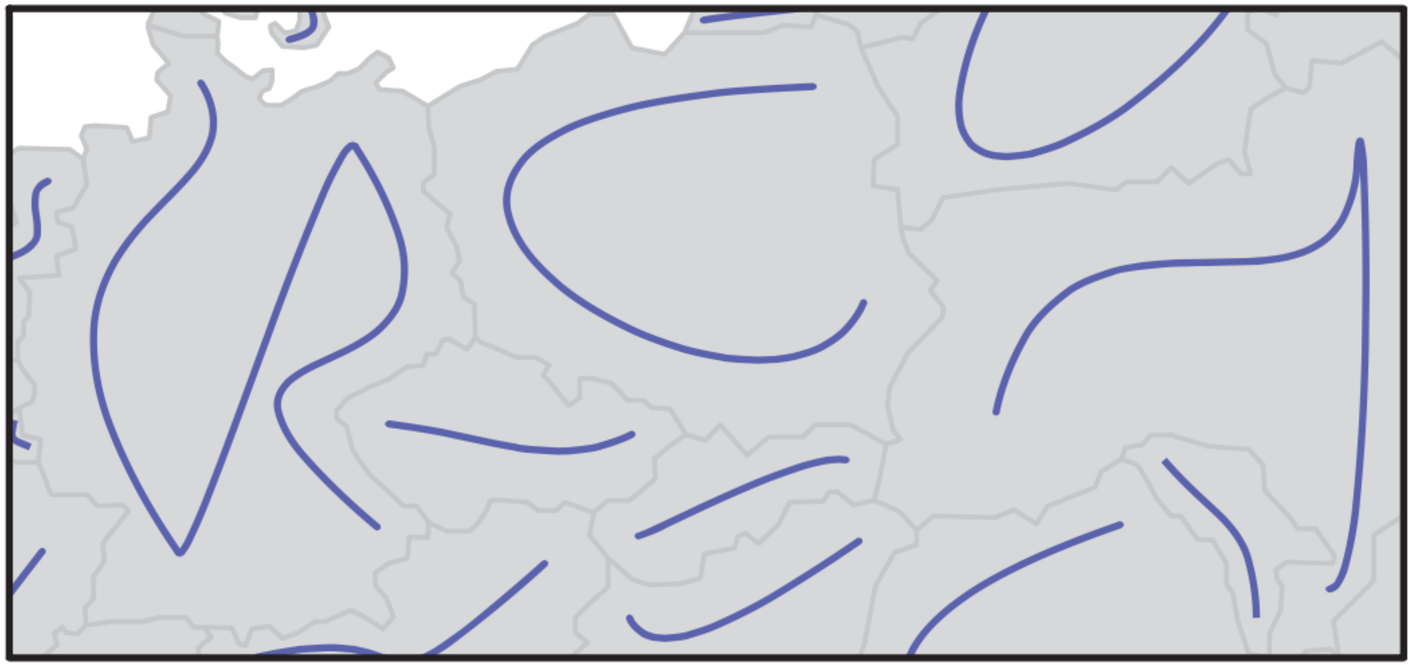


Glyph Types

Simple

Locally intersecting

Tree-based



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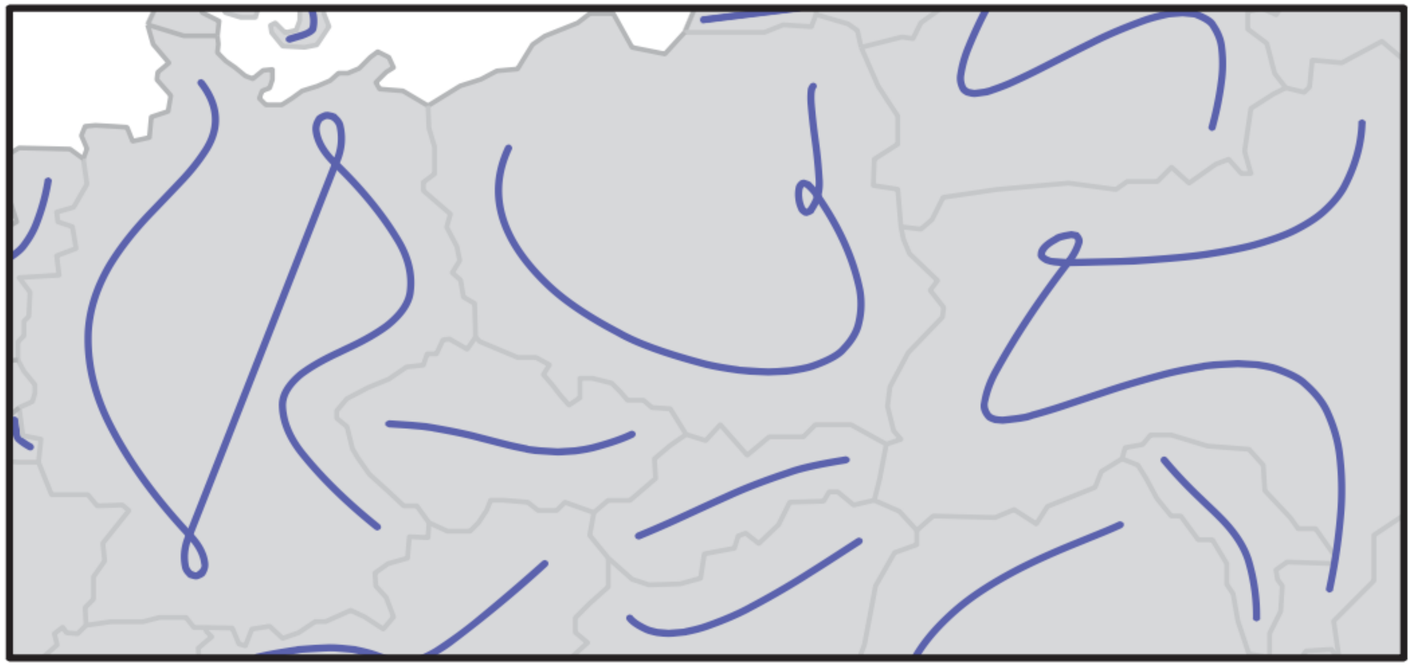

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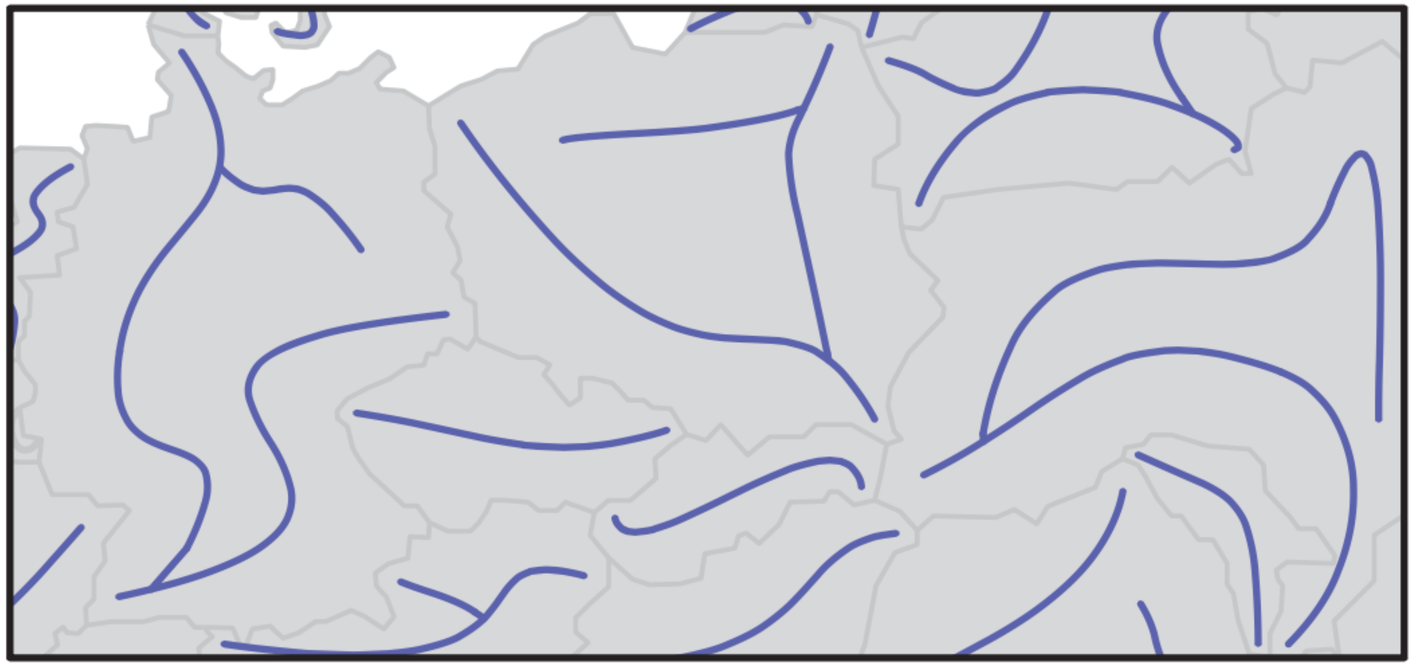
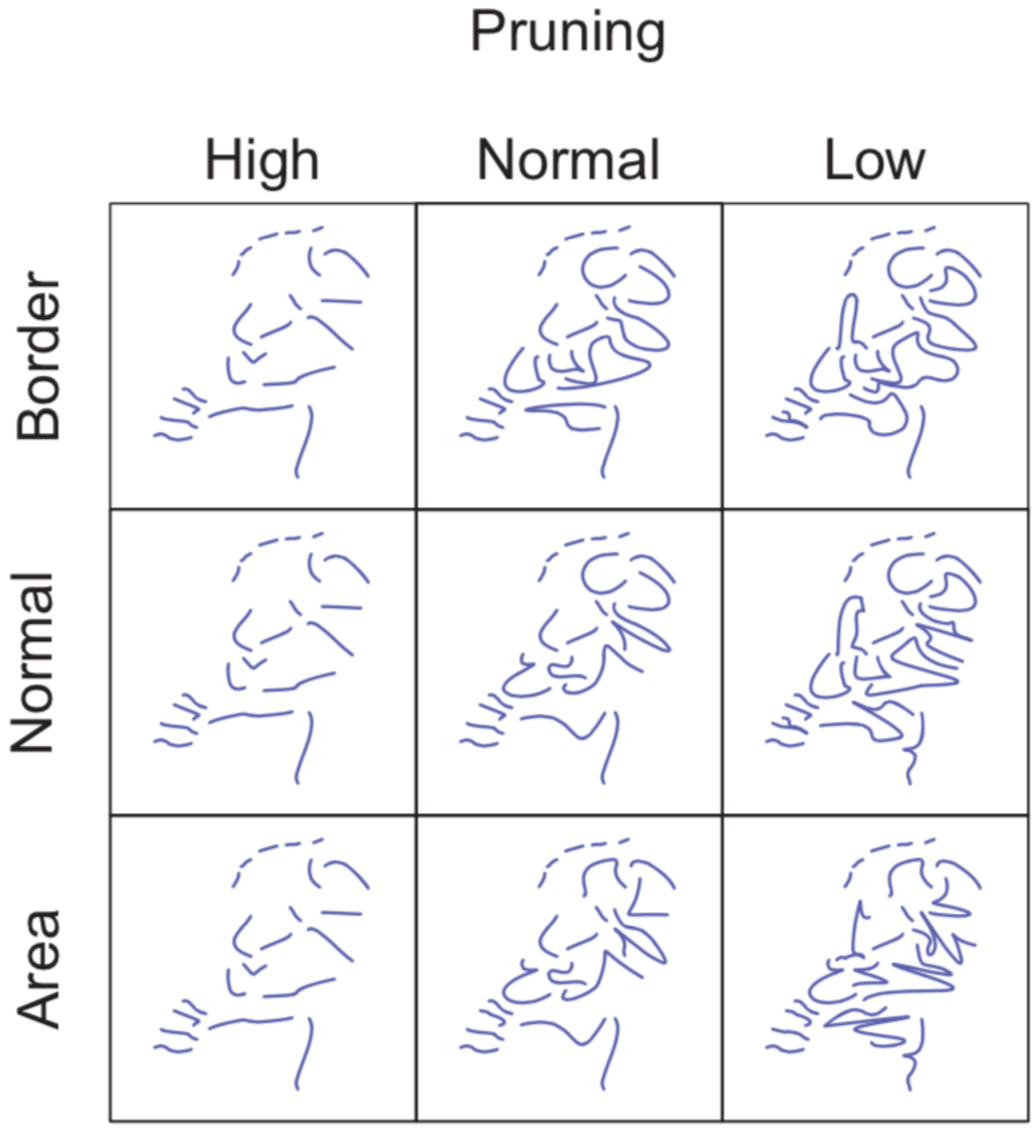
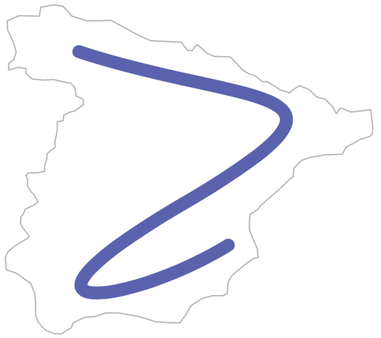


Parameter Space



Strengths and Weaknesses



- Simple, smooth
  - Efficient abstraction
- Represent both area and boundary
- Opportunities to expand the cartographic design space

- Recognizability
  - Users must be familiar with the original geography
- Inconsistency in the large parameter space
- No user study

Constraint: Only intended for tasks where exact boundaries are not needed

Scalability

- If a map with borders looks reasonable, its **second-level boundaries** can likely be transformed with stenomaps.
  - Map of a continent: one stenomap for each country.
  - Map of a country: one stenomap for each province/state/region.
- Generally, it is equivalent to **up to 100 stenomaps** per map.
- Algorithm can adapt to produce the desired level of details in stenomaps.

Summary

System	Stenomaps
What: Data	Geometry: 2D borders in maps
What: Derived	Area to line transformation, which converts a border to a line that represents both the boundary and the area features.
Why: Task	Present and enjoy the maps with less intrusive borders and without inferences of exact location.
How: Encode	Geotagged data can be encoded into the line as its width or colour, or the data can replace the line by icons or text.
How: Reduce	Dimensionality reduction (area to line).
Scale	100 stenomaps per map (generally equivalent to second-level boundaries).

Questions?

Thank you.