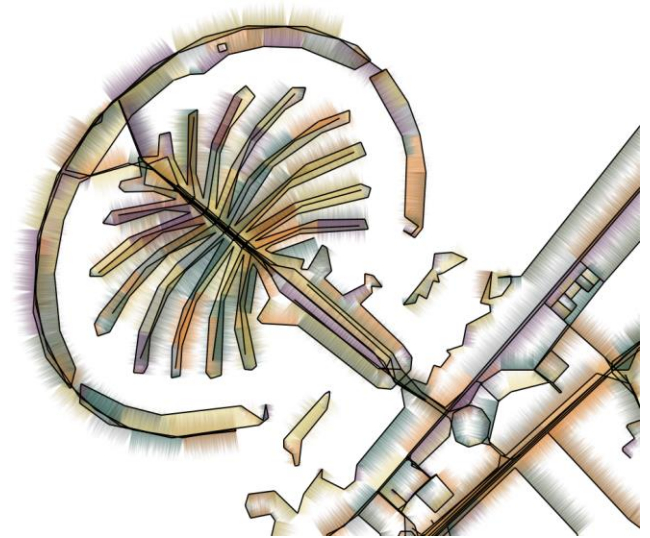


Cartographic Journal 50(1):8–18, 2013:

Visual Abstraction and Stylization of Maps

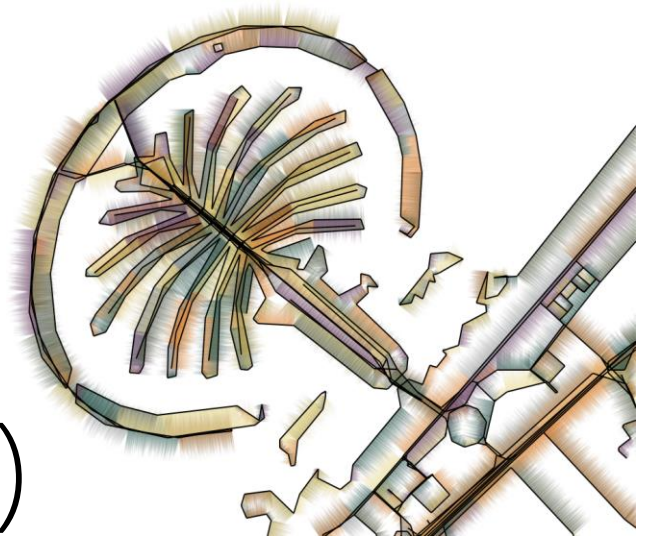
Tobias Isenberg



Cartographic Journal 50(1):8–18, 2013:

Visual Abstraction and Stylization of Maps

Tobias Isenberg



What is this talk/project about?

What is this talk/project about?

abstraction

What is this talk/project about?

visual abstraction

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interactive & exploratory
visual abstraction

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interactive & exploratory
visual abstraction

disclaimer: this is not about new graphics algorithms, but about using existing ones for a visual goal

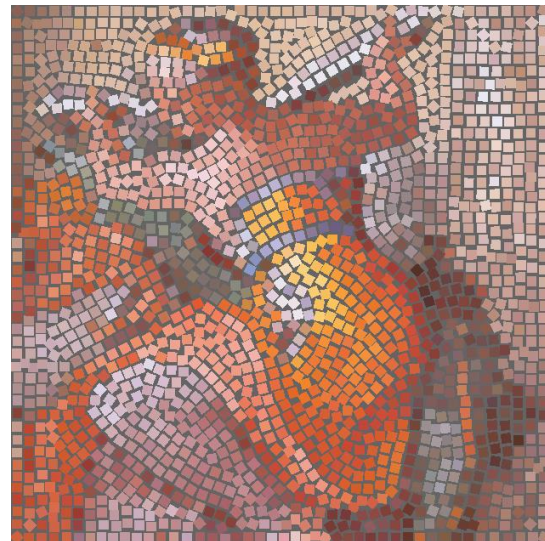
Abstraction in NPR/Expressive Graphics



Curtis et al., 1997

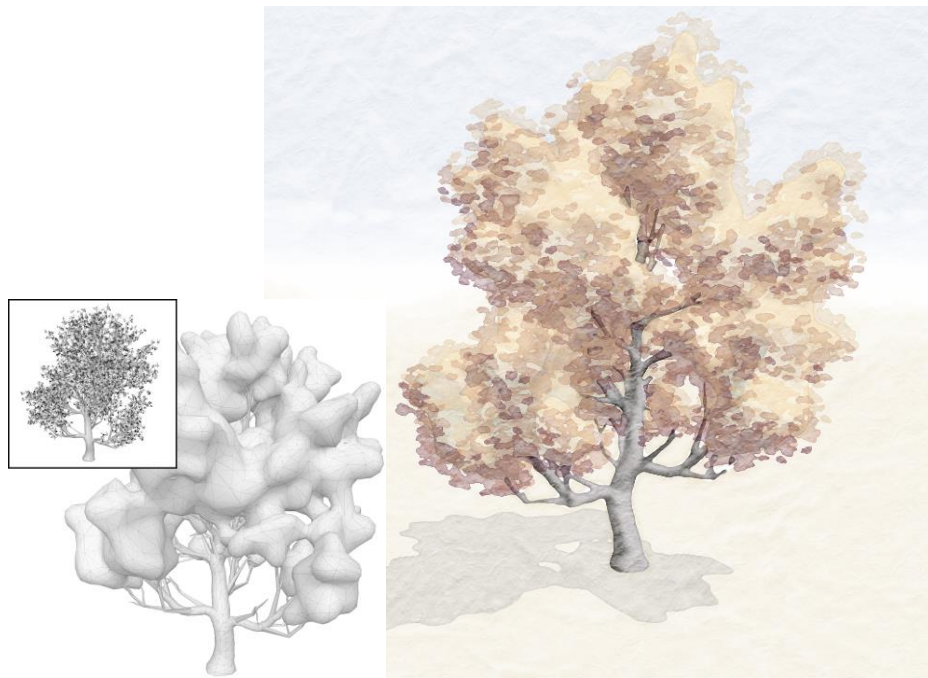


Hertzmann, 1998



Hausner, 2001

Abstraction in NPR/Expressive Graphics

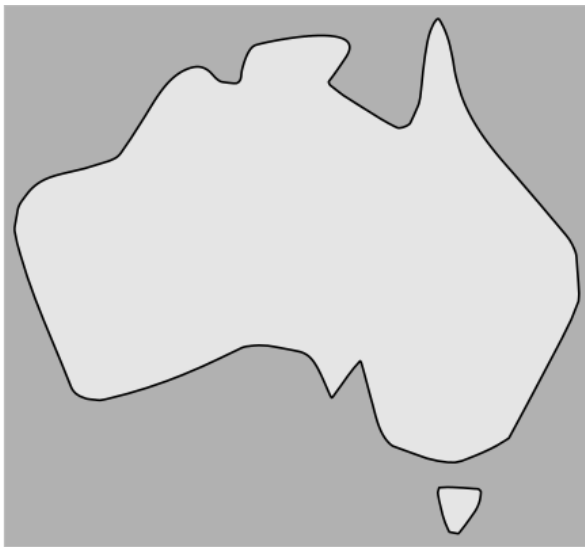
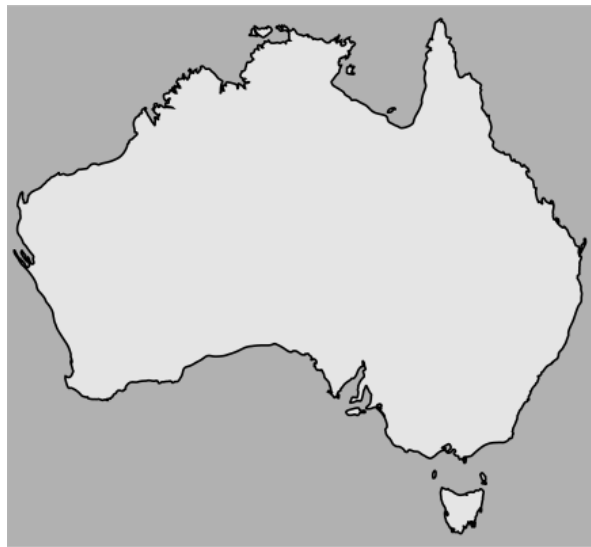


Luft & Deussen, 2006



DeCarlo & Santella, 2002

Abstraction in NPR/Expressive Graphics



Mi et al., 2009

Inspiration: Substrate simulation by Tarbell



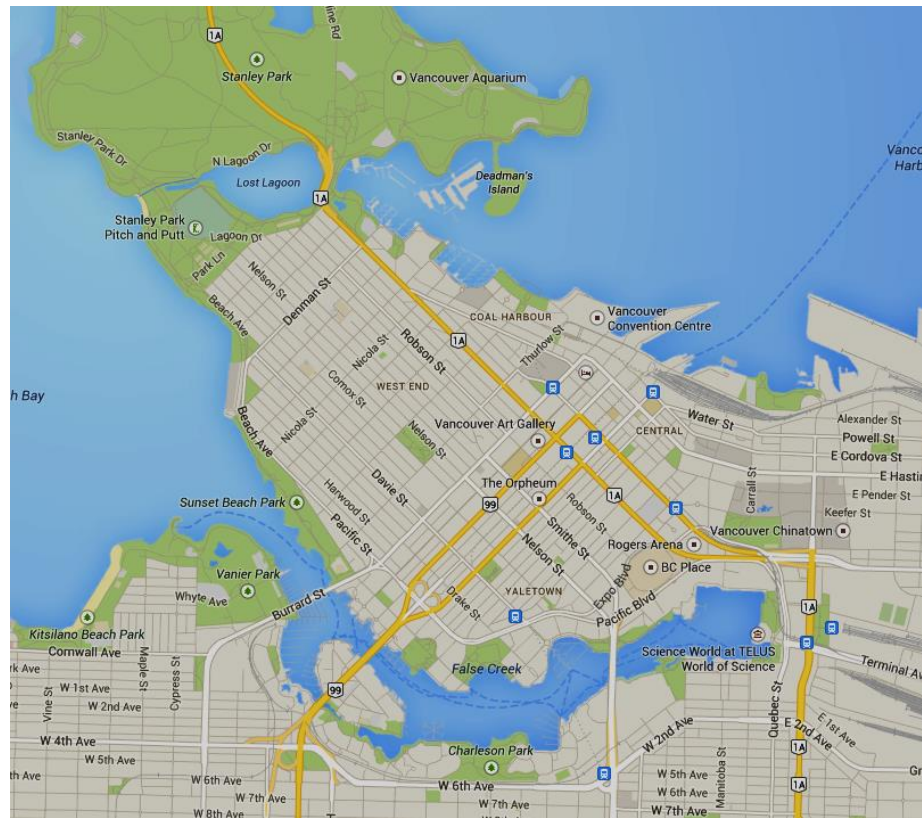
<http://www.complexification.net/gallery/machines/substrate/>

Inspiration: (Old) Artistic Map Depictions



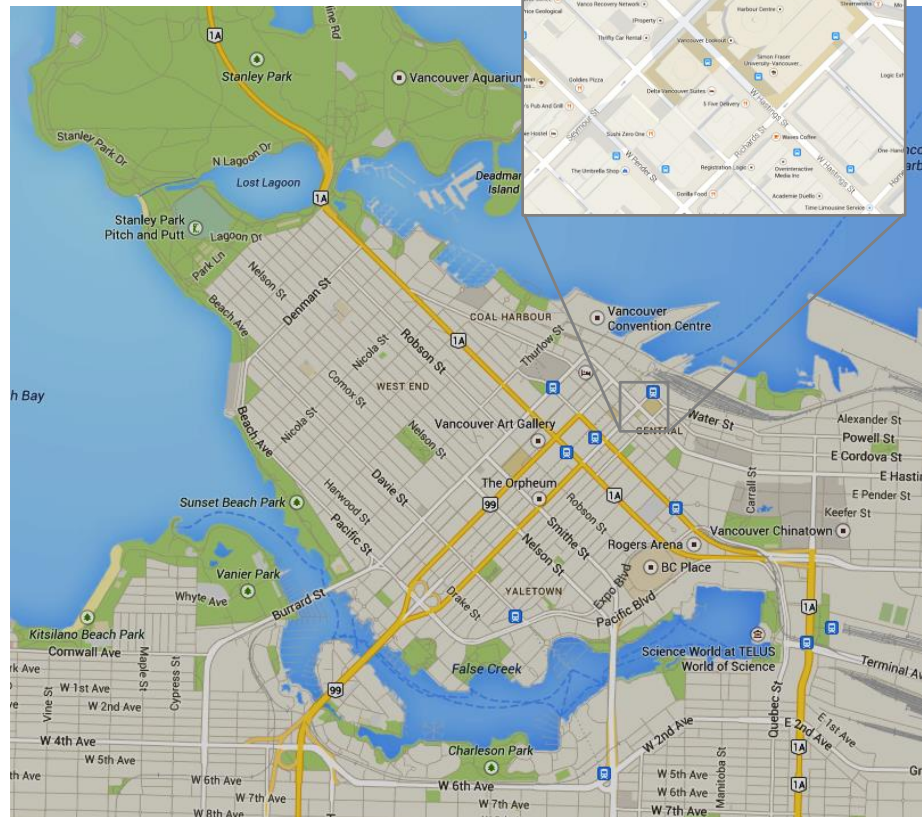
Abstraction in Cartography

- abstraction based on scale level
- show more or less detail
- show elements (e.g., streets) wider than they are in reality
- elements are shown/hidden depending on a map's purpose



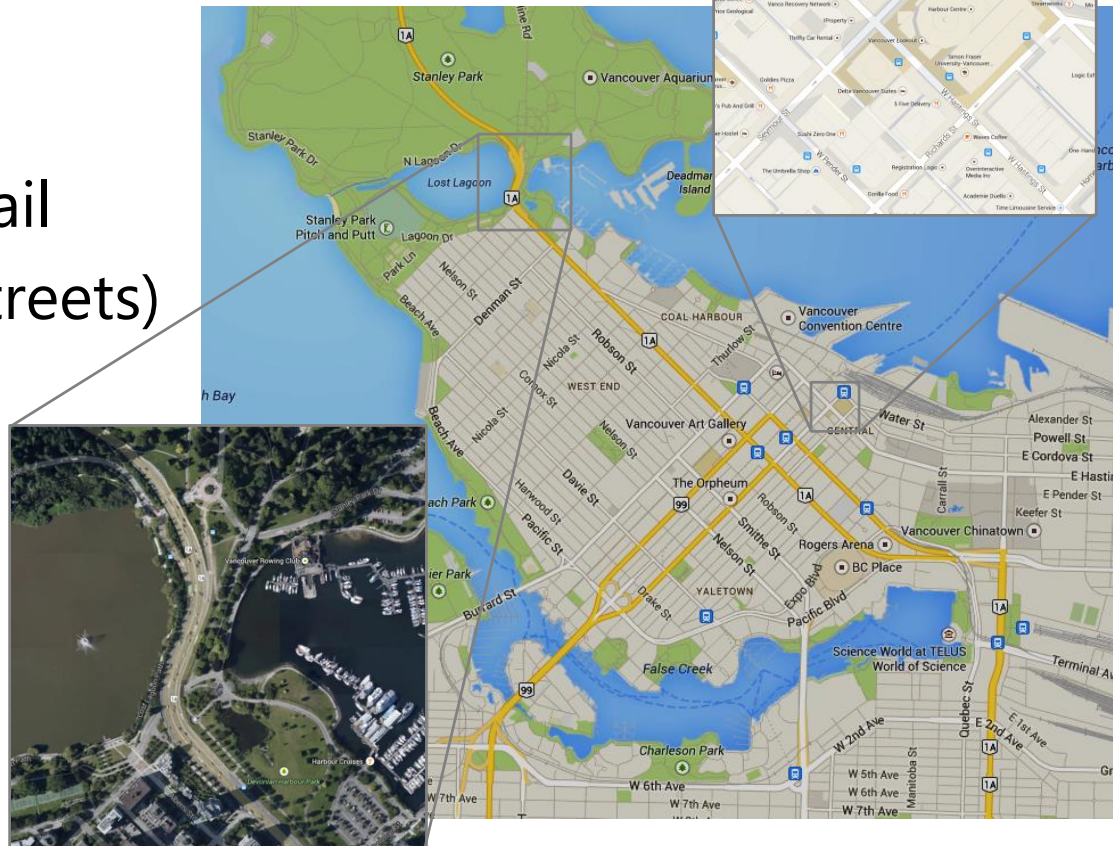
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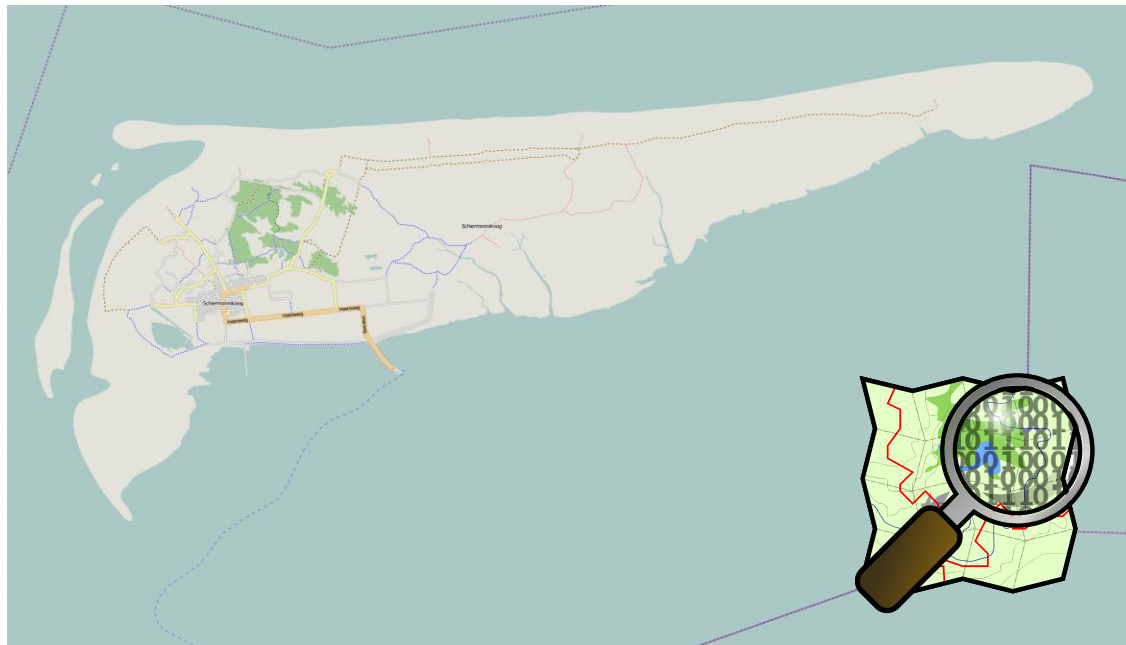
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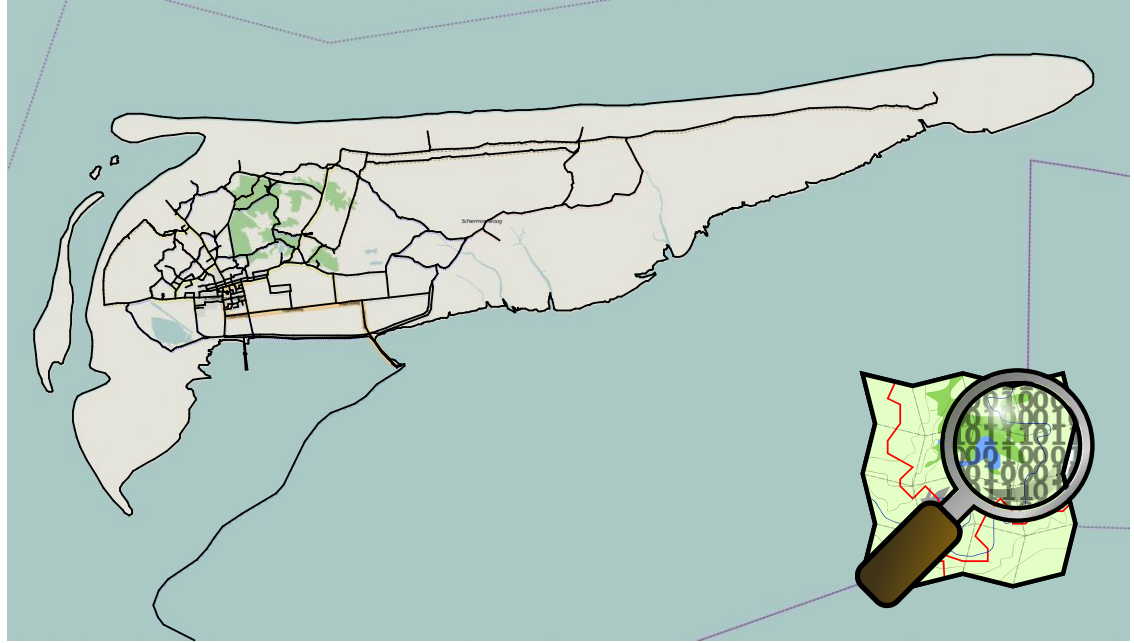
Input Data & Its Characteristics

- map data from OpenStreetMap
- graph of polygonal streets/paths and shape elements
- geographic and political elements
- data not always consistent/correct



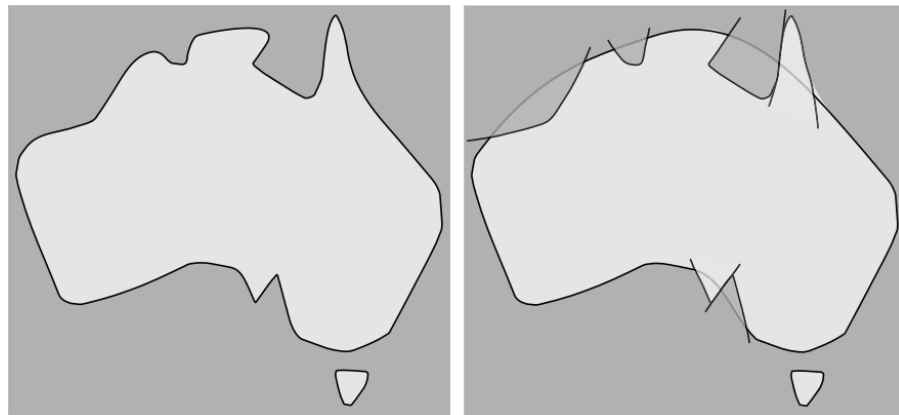
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Constraints for the Abstraction

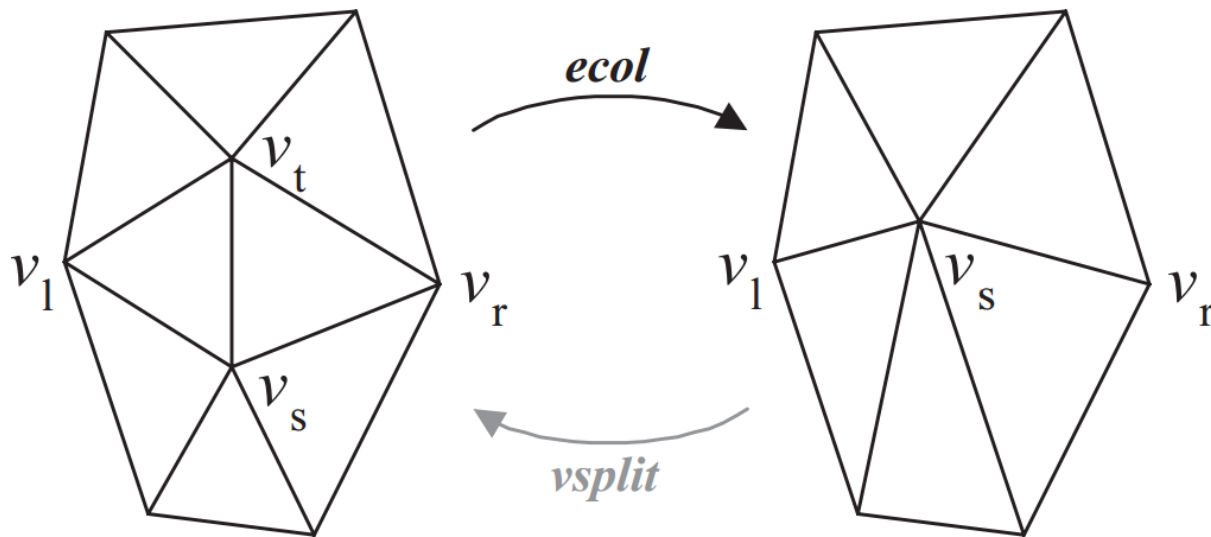
- data: polygonal network
- no inside/outside
- ordered sequence of abstraction steps



Mi et al., 2009

- abstraction not by quantitative quality
but by visual effect: not only simplification but relocation
- iterative application & interactive exploration

Abstraction by Progressive Meshes

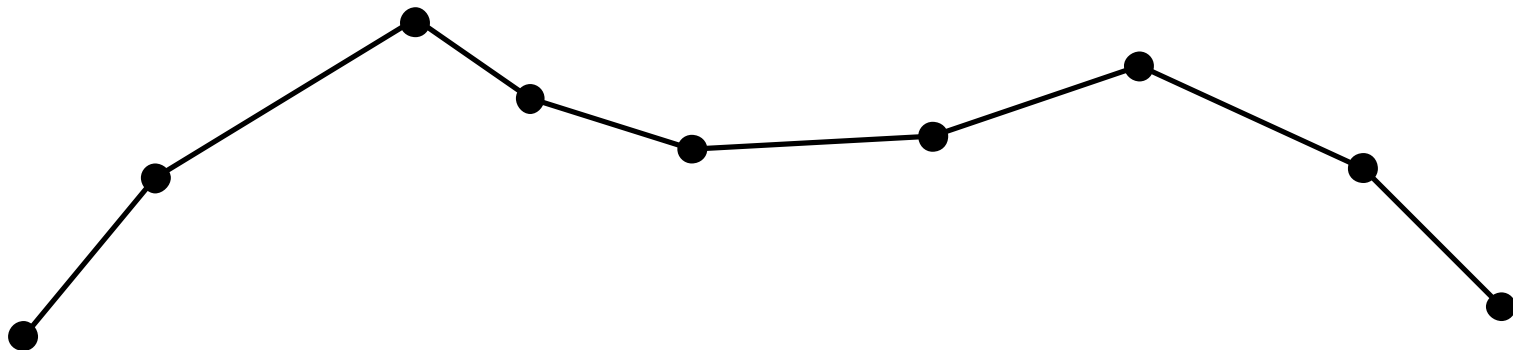


Hoppe, 1996

Abstraction by Progressive Meshes

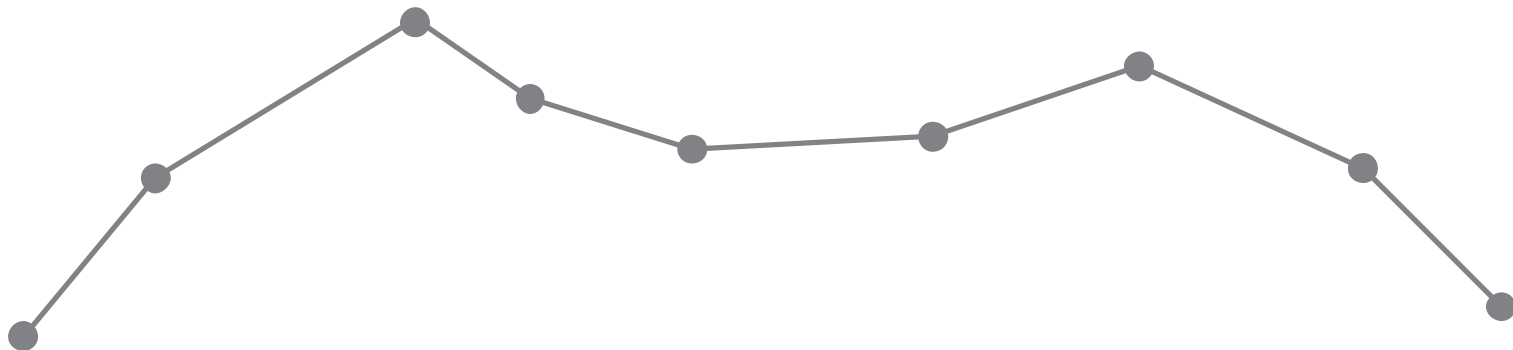


Abstraction by Ramer-Douglas-Peucker



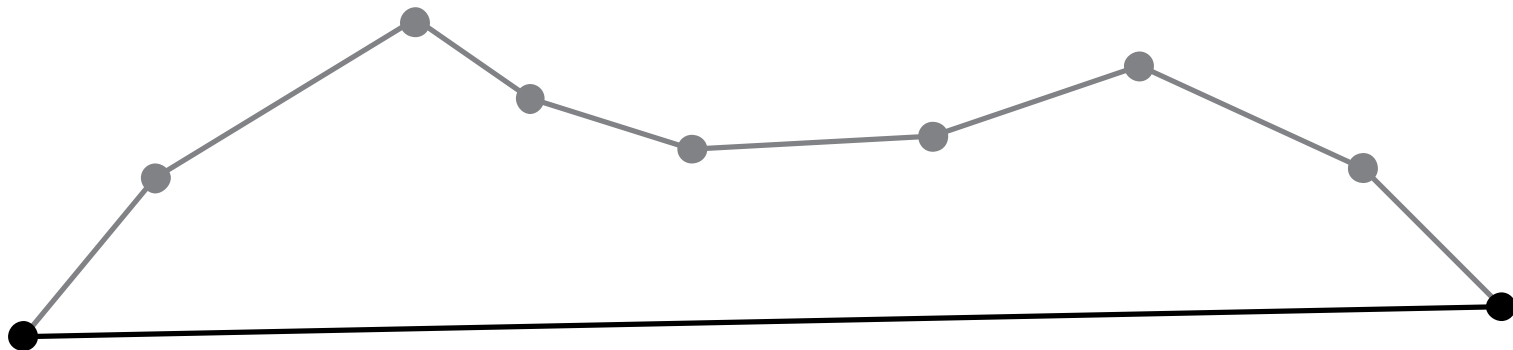
Ramer [1972] / Douglas & Peucker [1973]

Abstraction by Ramer-Douglas-Peucker



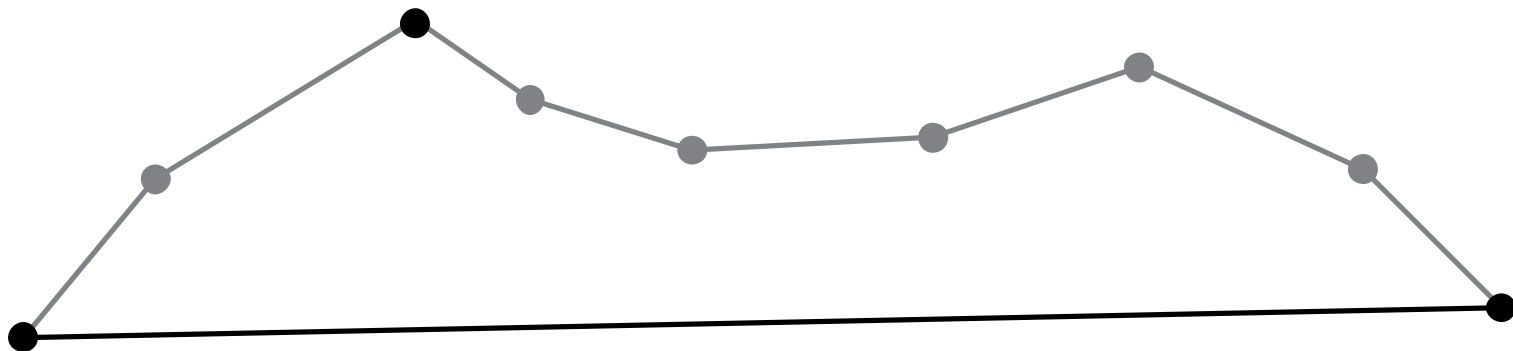
Ramer [1972] / Douglas & Peuker [1973]

Abstraction by Ramer-Douglas-Peucker



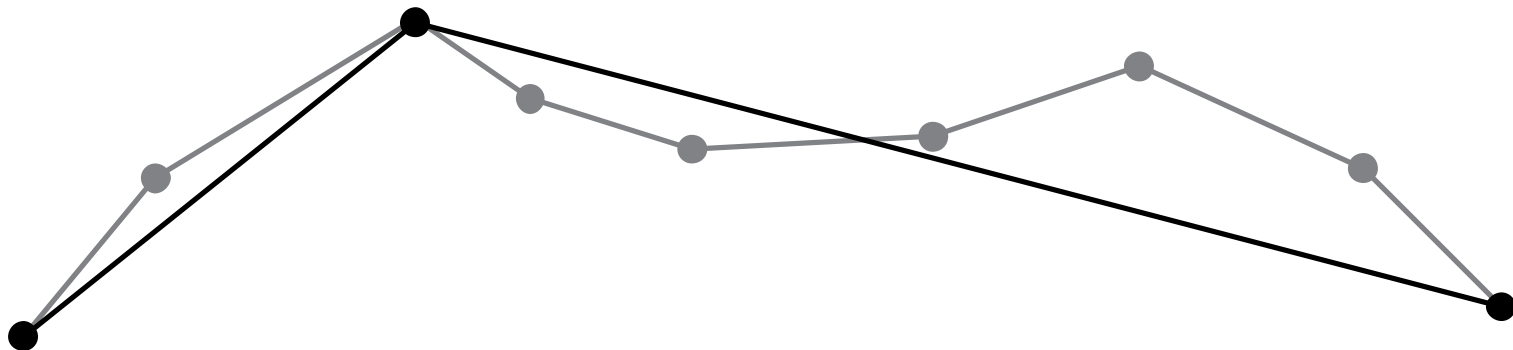
Ramer [1972] / Douglas & Peucker [1973]

Abstraction by Ramer-Douglas-Peucker



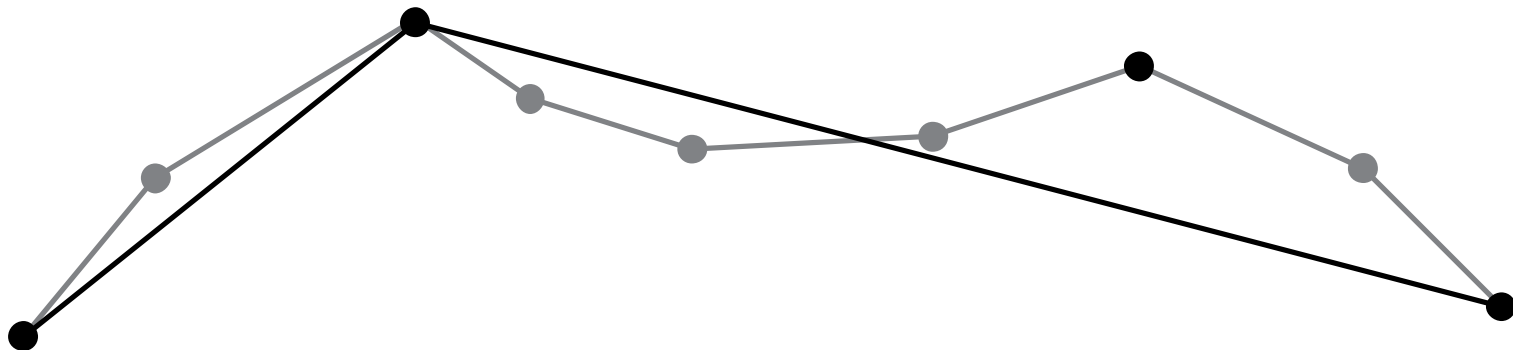
Ramer [1972] / Douglas & Peucker [1973]

Abstraction by Ramer-Douglas-Peucker



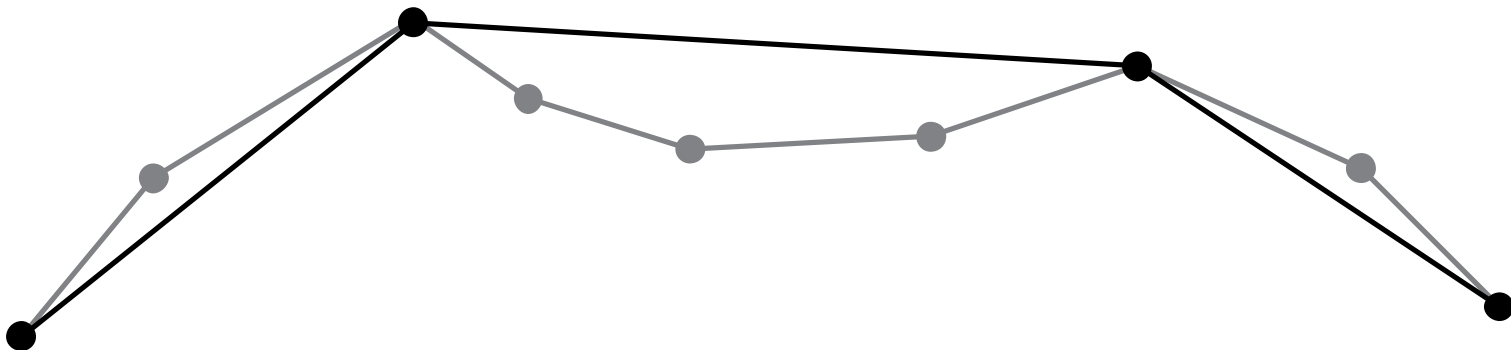
Ramer [1972] / Douglas & Peucker [1973]

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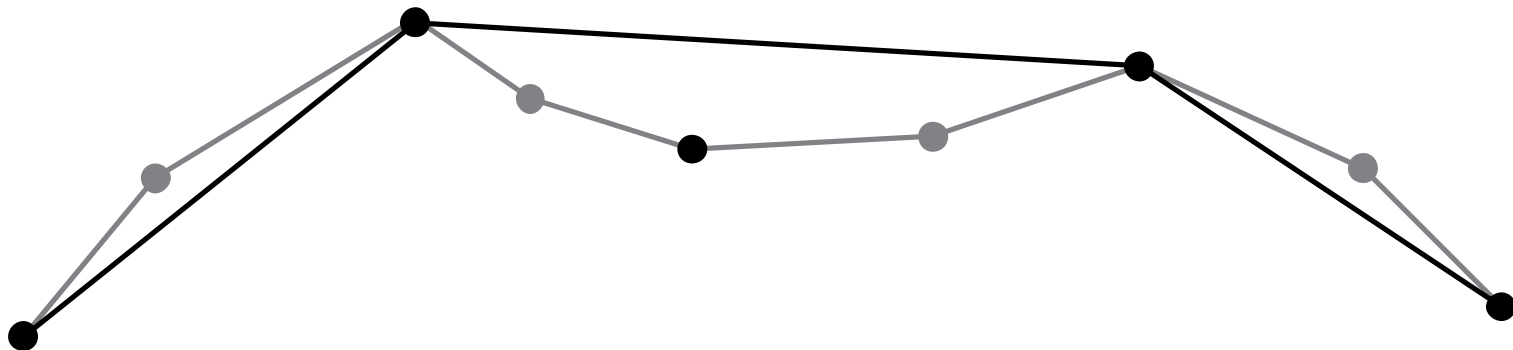
Ramer [1972] / Douglas & Peucker [1973]

Abstraction by Ramer-Douglas-Peucker



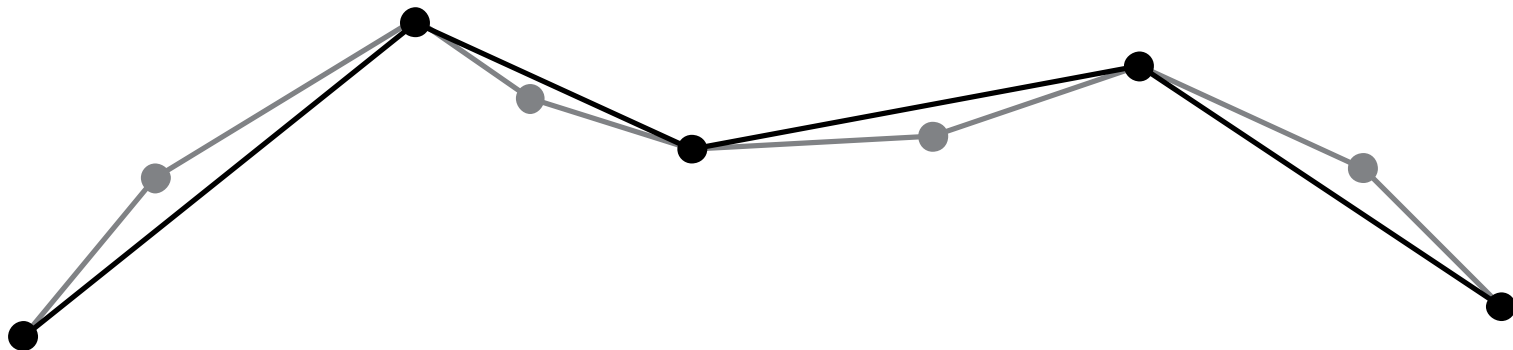
Ramer [1972] / Douglas & Peucker [1973]

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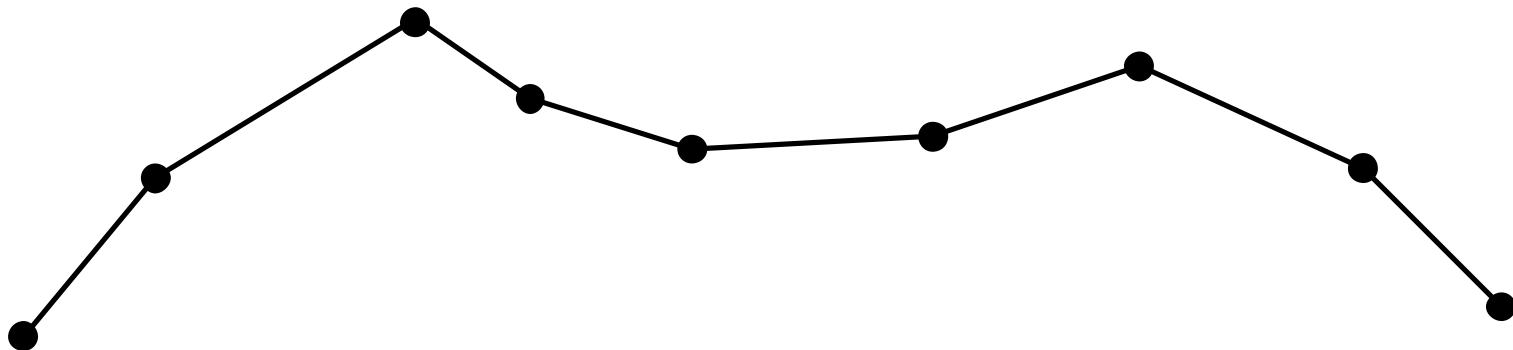
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Ramer [1972] / Douglas & Peucker [1973]

Abstraction by Ramer-Douglas-Peucker

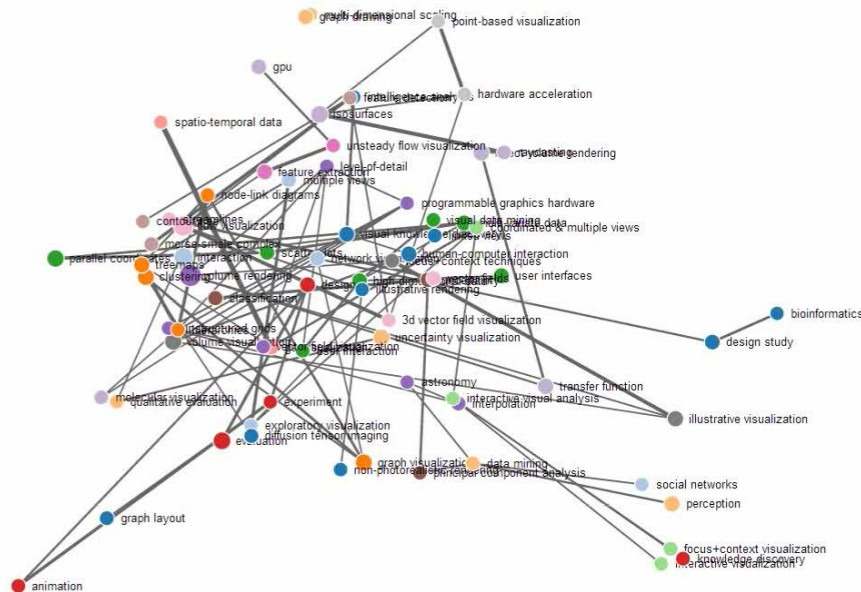


Ramer [1972] / Douglas & Peucker [1973]

Abstraction by Ramer-Douglas-Peucker



Abstraction by Force Direction

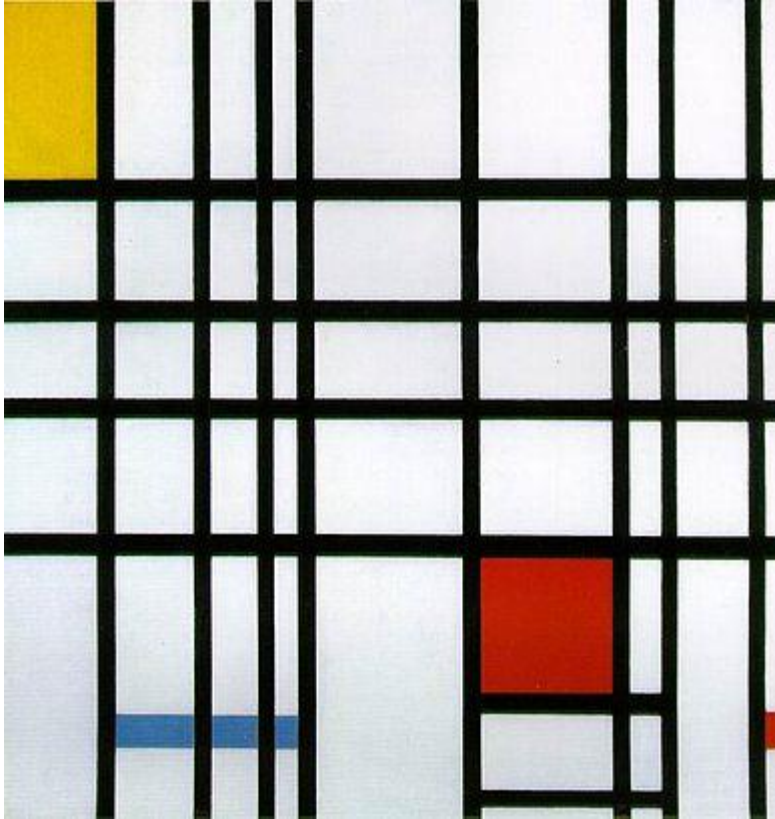


at...

Abstraction by Force Direction



Abstraction by Orthogonalization

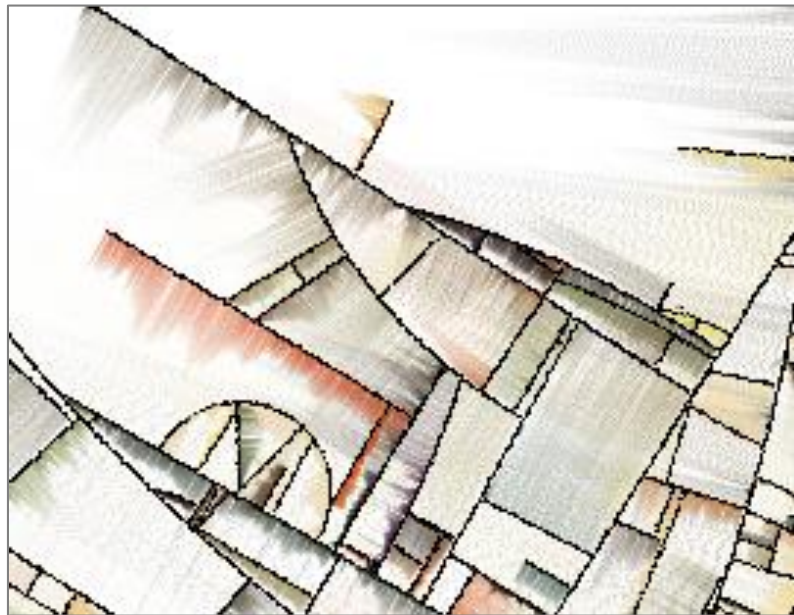


Composition with Yellow, Blue and Red (1937–42)
by Piet Mondrian (1872–1944)

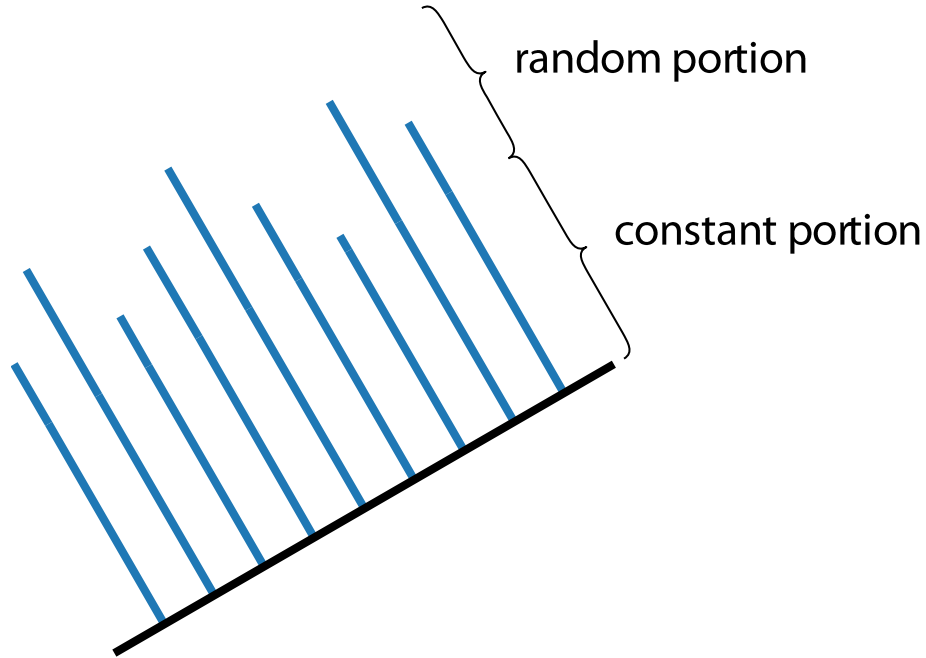
Abstraction by Orthogonalization



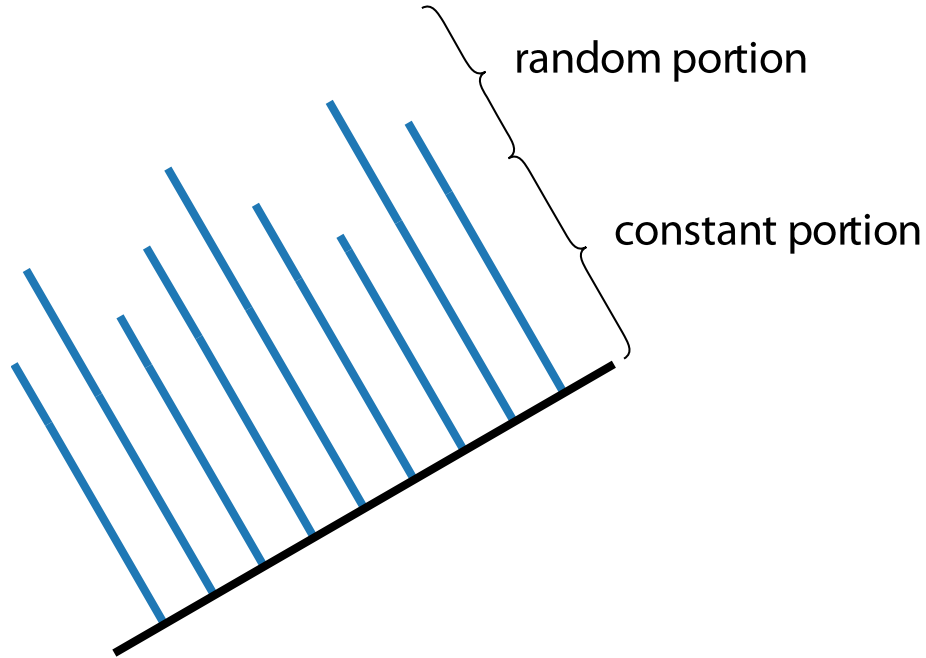
Realization to Match Visual Inspiration



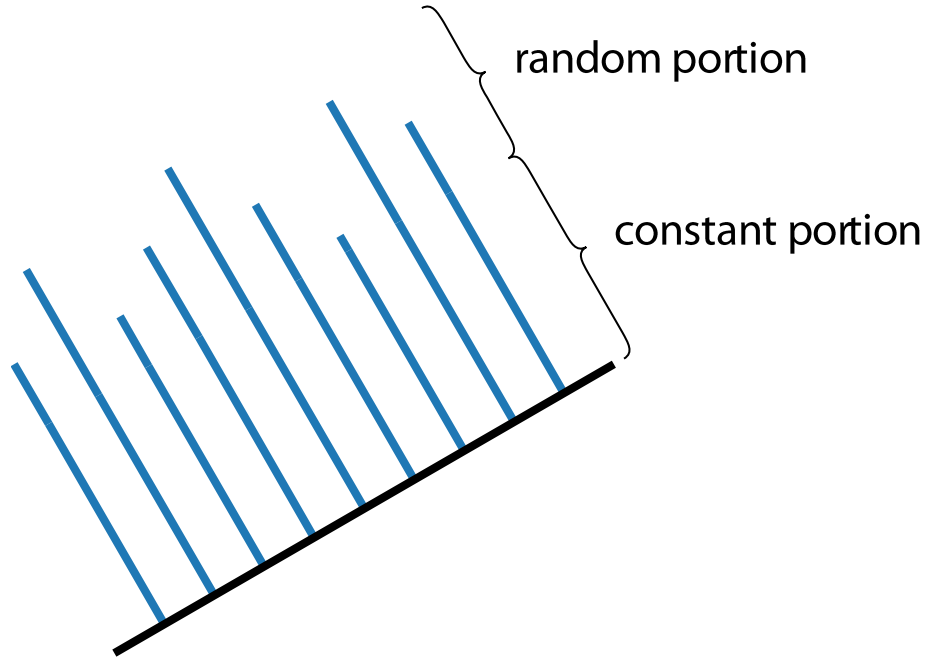
Realization to Match Visual Inspiration



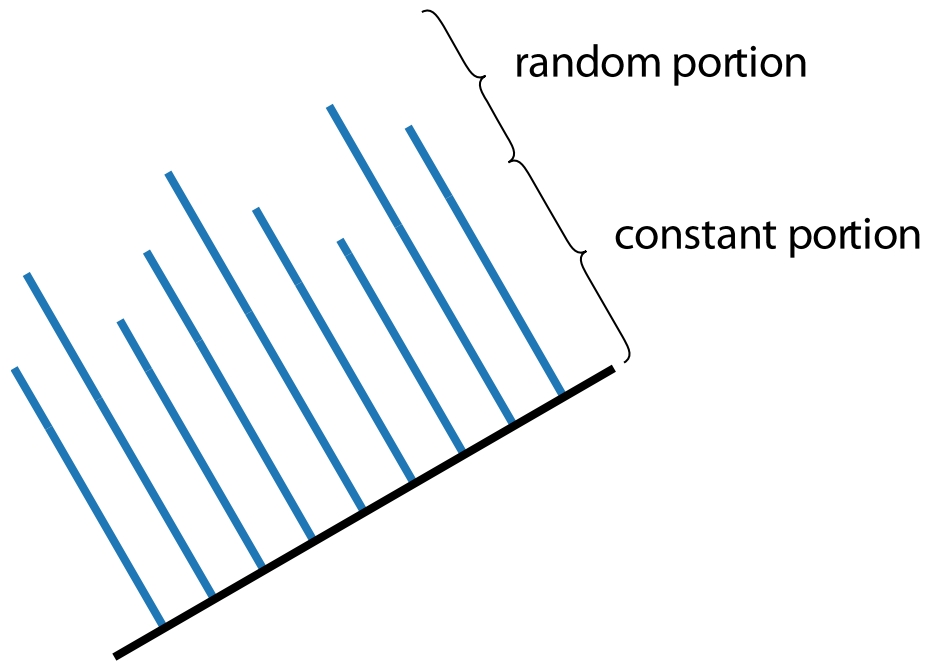
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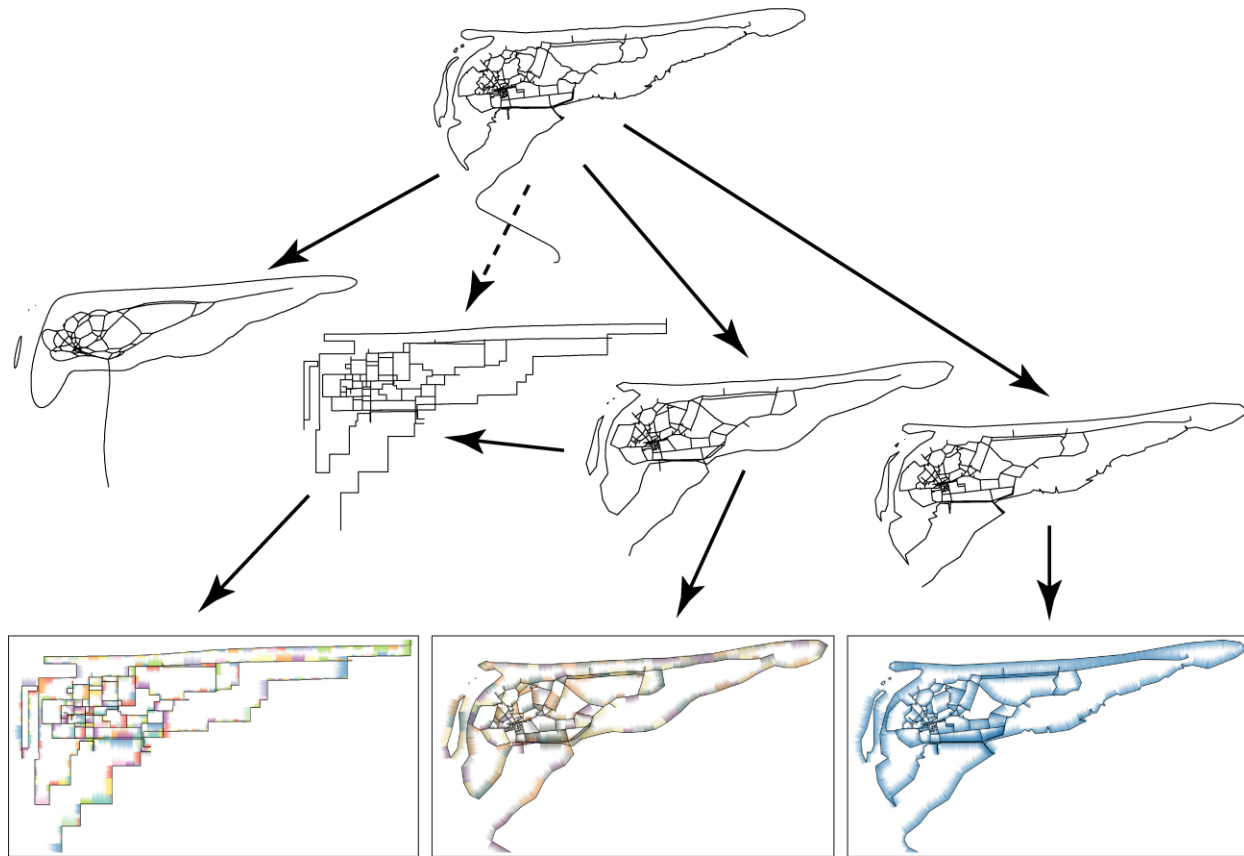
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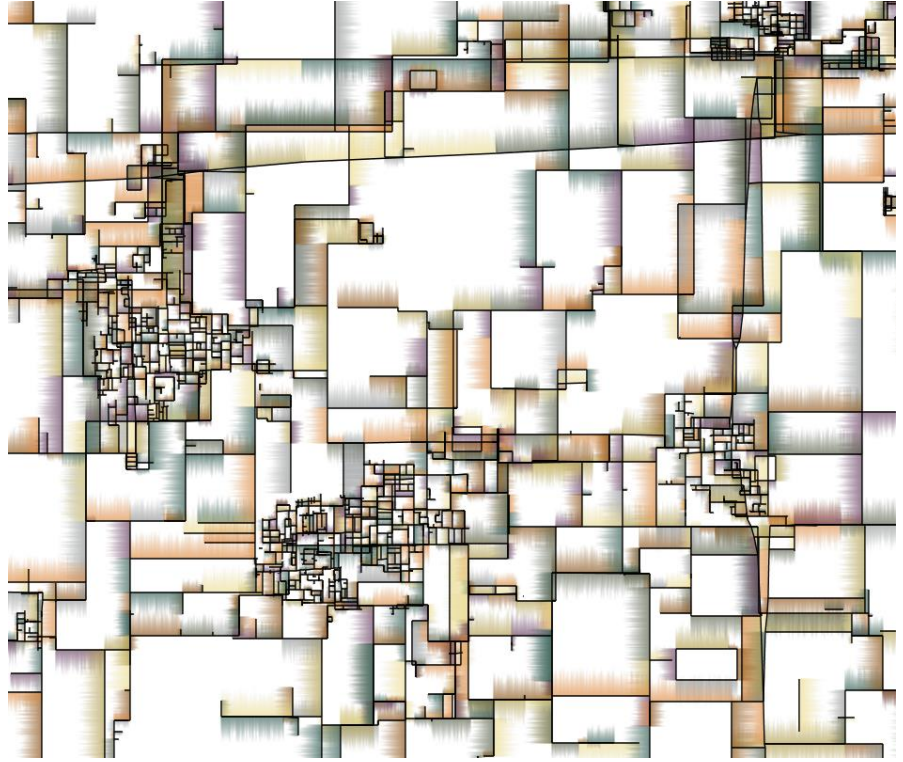
How to use the different elements together



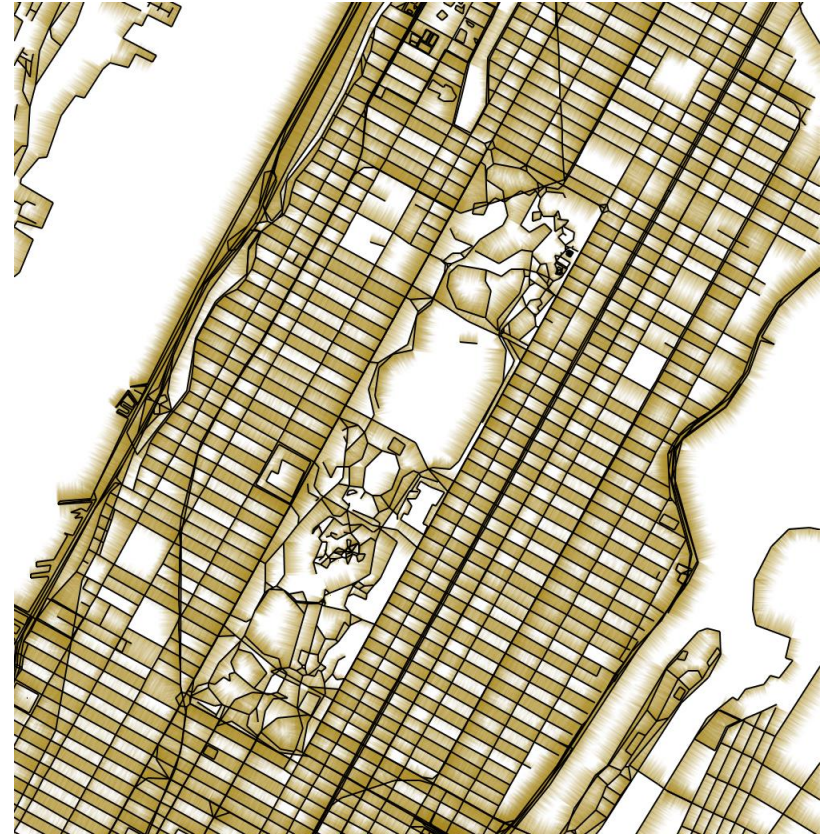
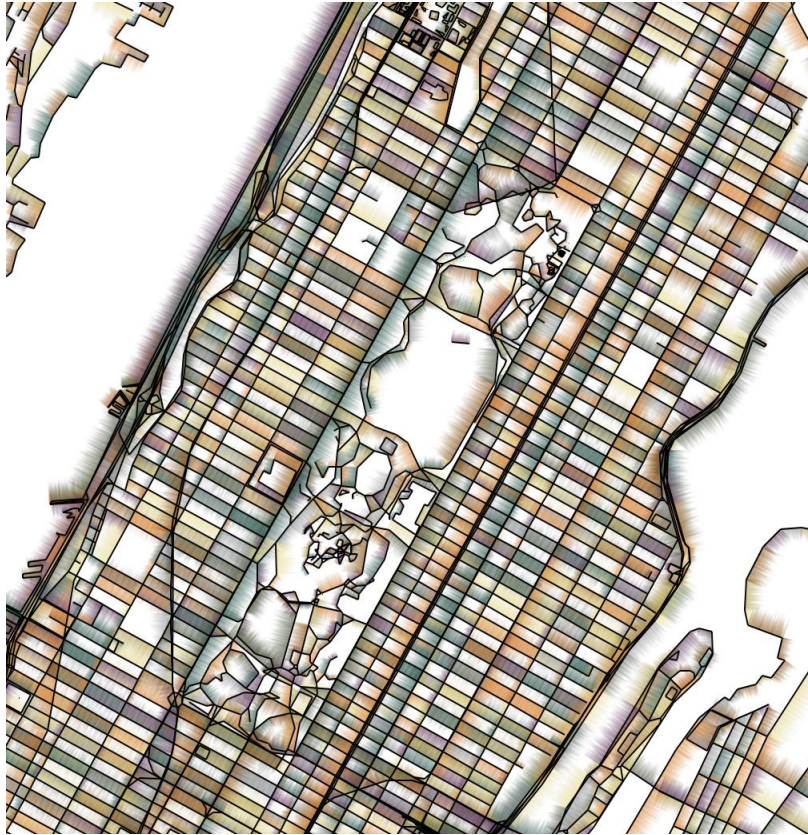
Interactive Visual Abstraction: Demo



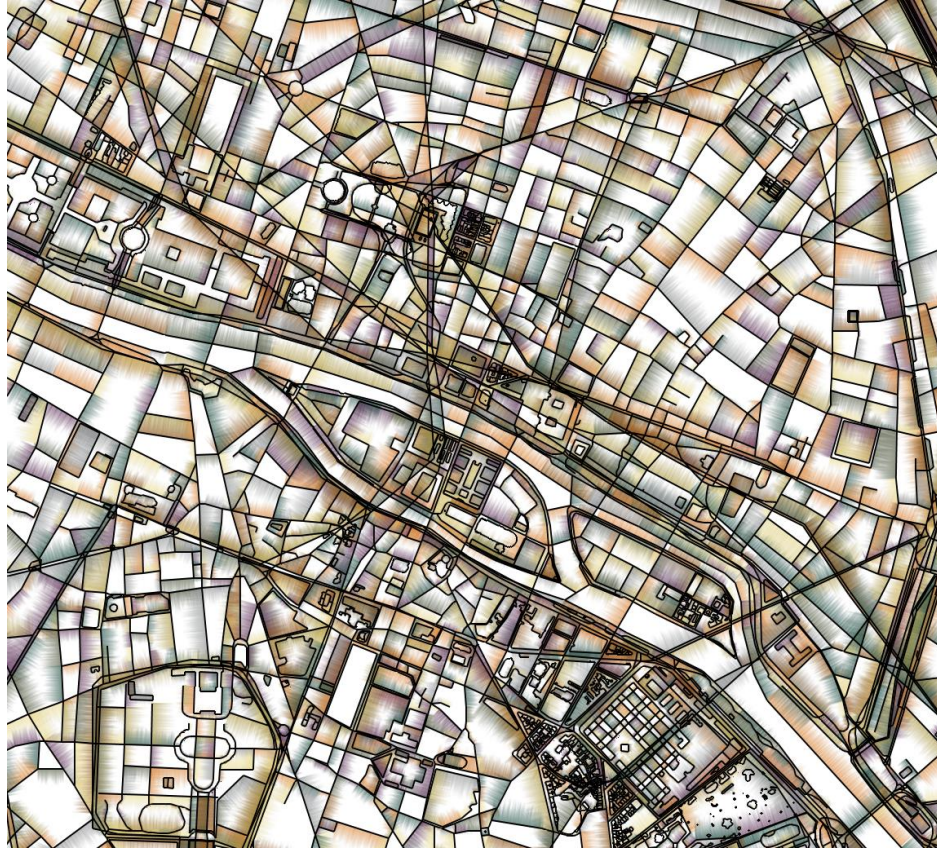
Some Examples & Insights



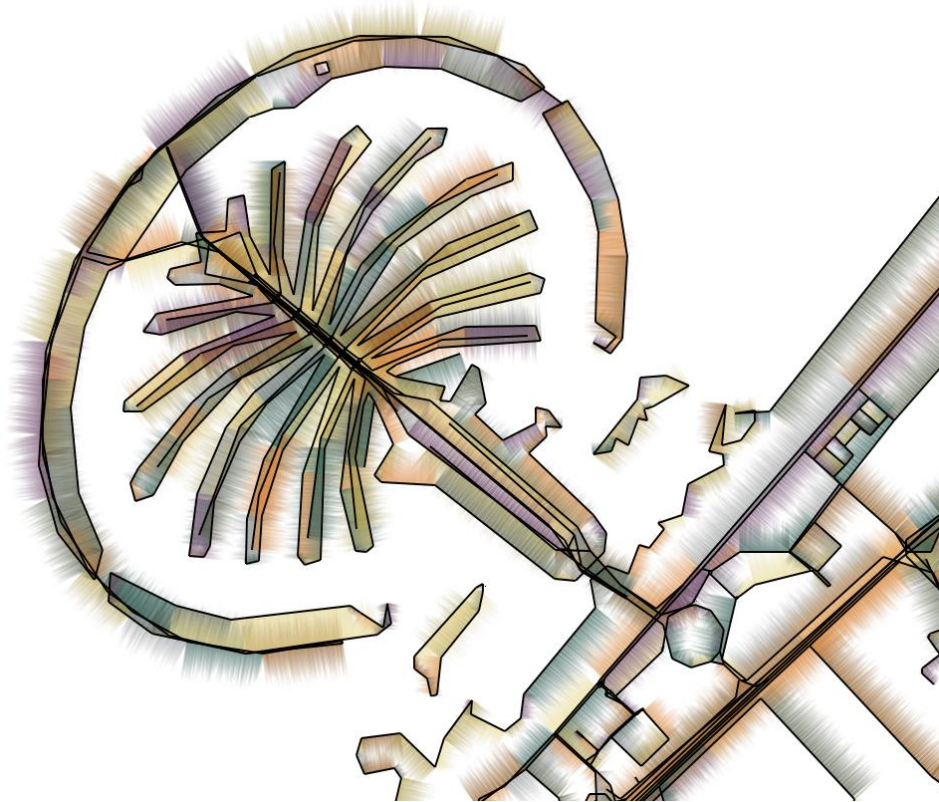
Some Examples & Insights



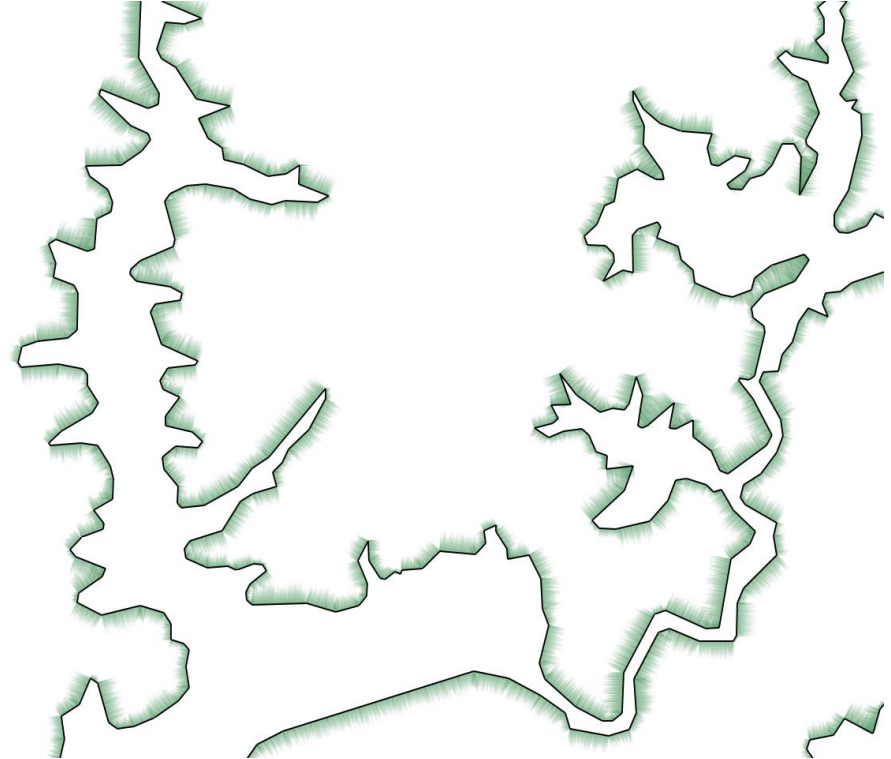
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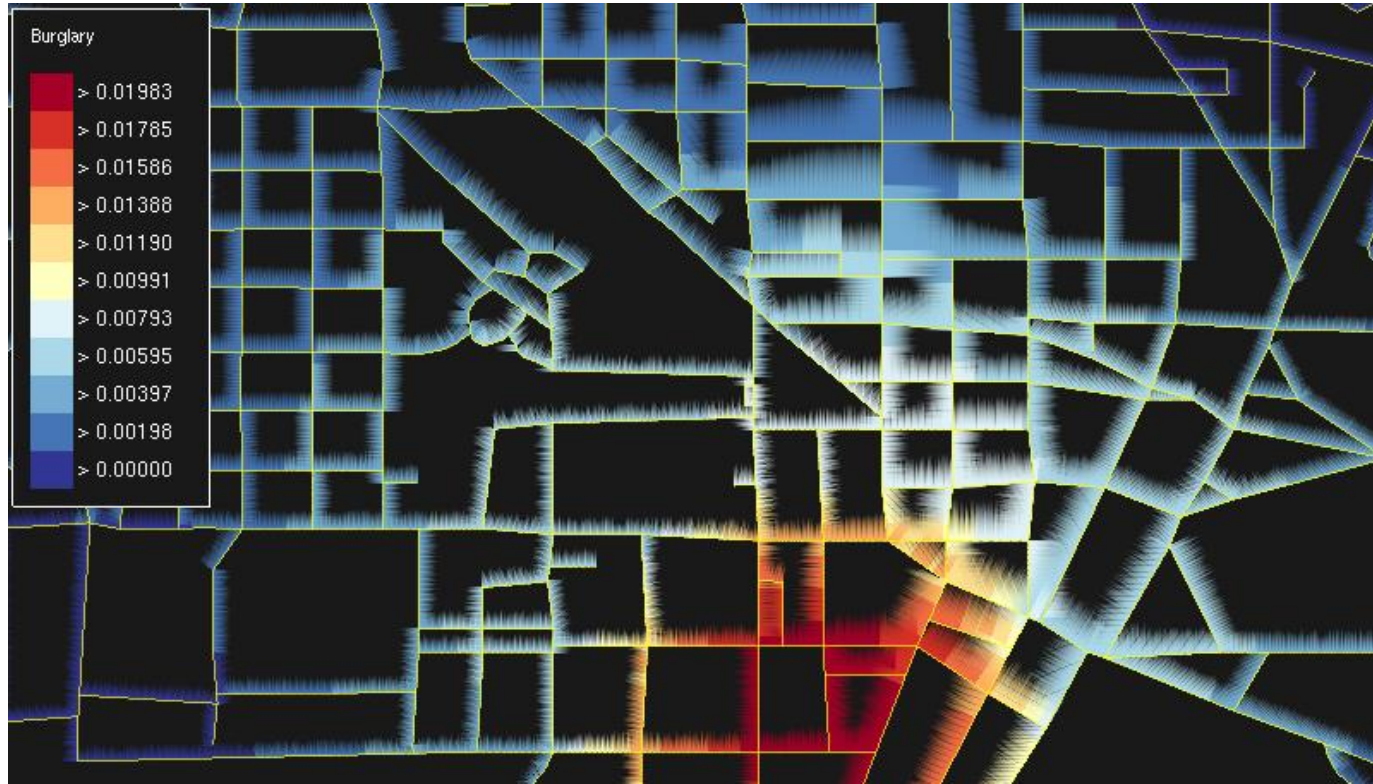
Limitations and Further Thoughts

- **visual** abstraction limited by data
- currently only line primitives; would like other shapes
- application of shading limited by data encoding
- practical limitation: size of map downloads (OSM API)
- practical limitation: only most detailed scale level available
- practical limitation: interactive control could be better; would like to go back and forth

But what does this all mean?

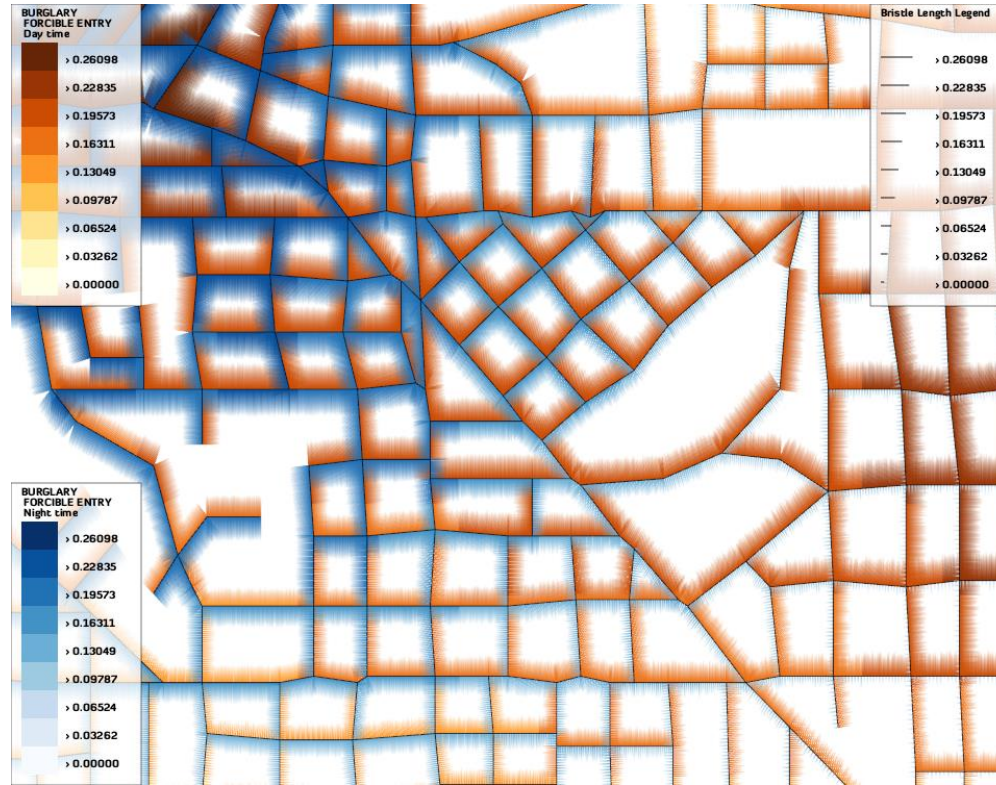
- does it have a practical use? – as such probably not really
- do you get aesthetic results? – in the eye of the beholder
- is it fun? – I believe so, started as a fun side project
- can I try it out? – yes, go to:
<http://tobias.isenberg.cc/VideosAndDemos/Isenberg2013VAS>
- can we learn something from it? – I think so:
 - dedicated control of abstraction in expressive graphics
 - the many forms of abstraction and their capabilities/limitations
- is it useful? – maybe ...

Future Work = Past Work: Bristle Maps



Kim et al. *Bristle Maps: A Multivariate Abstraction Technique for Geovisualization*. IEEE TVCG, 19(9):1438–1454, 2013

Future Work = Past Work: Bristle Maps



Kim et al. *Bristle Maps: A Multivariate Abstraction Technique for Geovisualization*. IEEE TVCG, 19(9):1438–1454, 2013

Thanks

- publication: Cartographic Journal 50(1):8–18, February 2013.
doi> 10.1179/1743277412Y.0000000007
- url & tool: <http://tobias.isenberg.cc/VideosAndDemos/Isenberg2013VAS>



- I'd love to hear about & see your results

