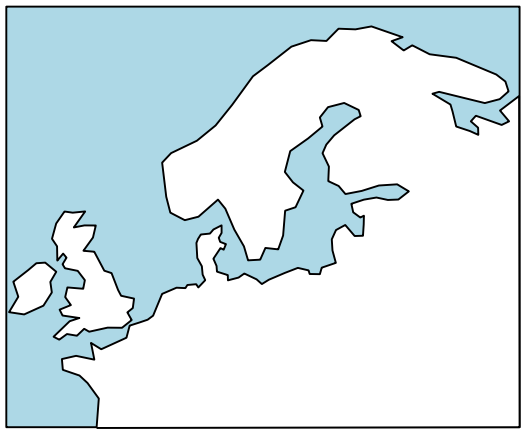
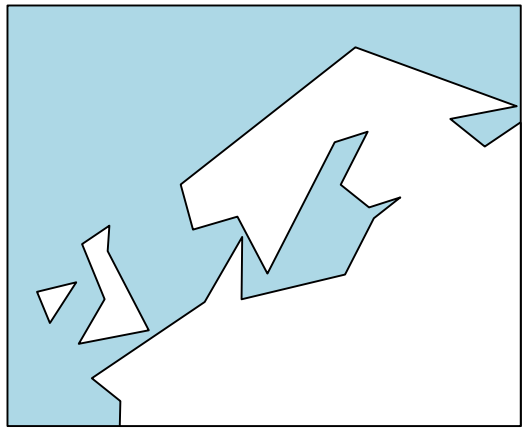
Parallelity in Choromatic Territorial Outlines

14th Workshop of the ICA commission on Generalisation and Multiple Representation

Andreas Reimer and Wouter Meulemans





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What are chorematic diagrams?

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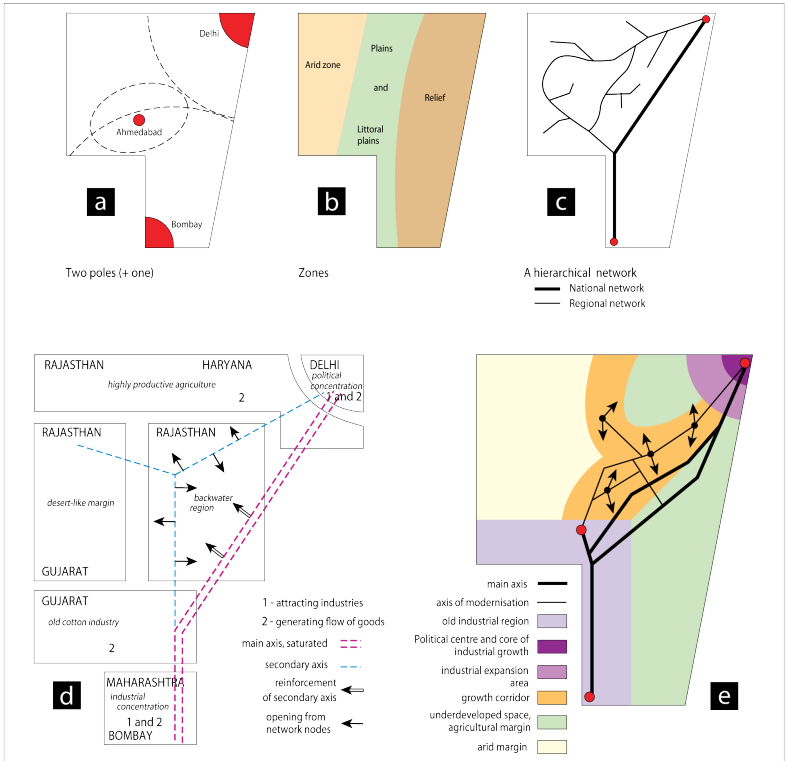
- Thought up and popularised by Roger Brunet
- Effectively used in Geography and political consulting

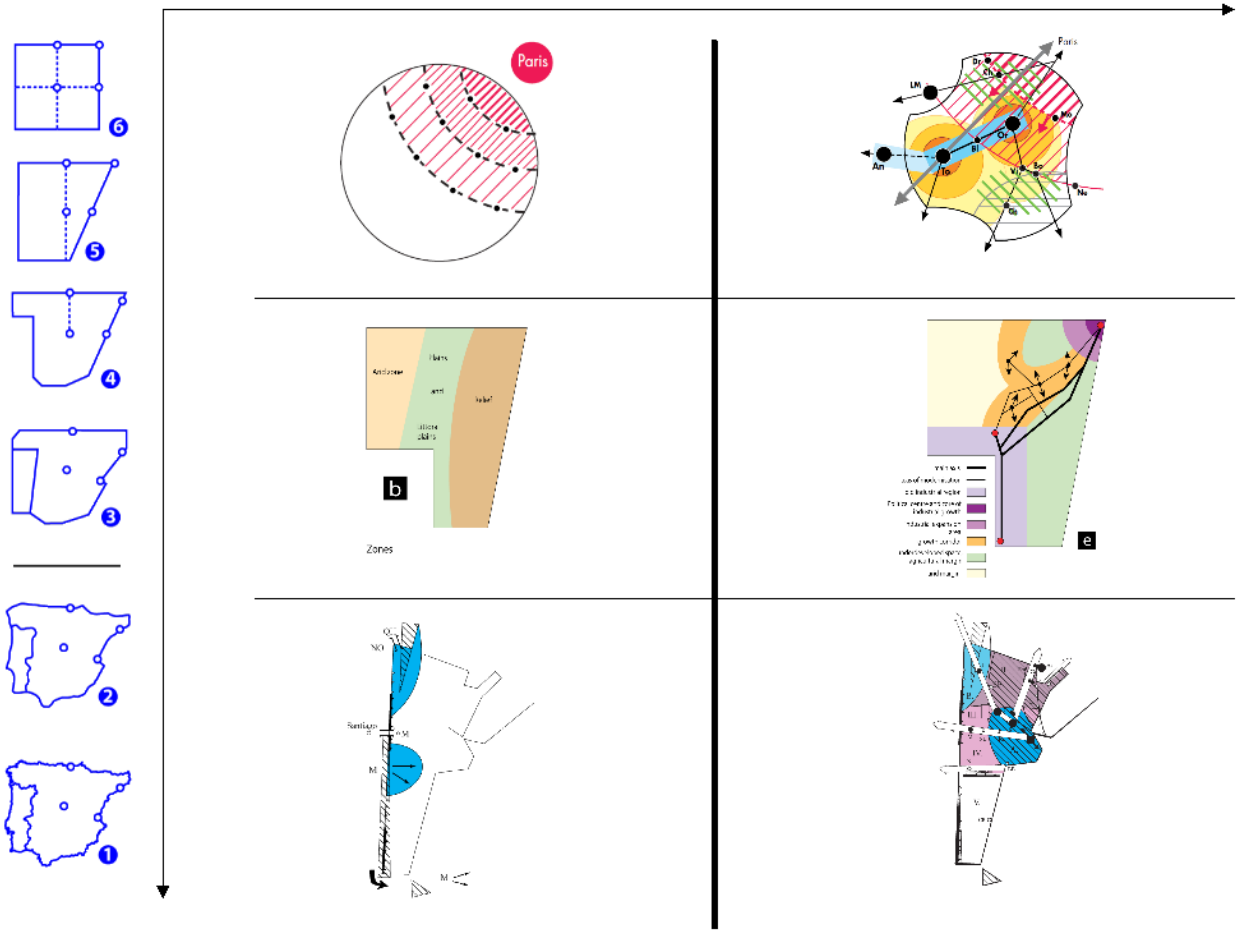
Terminology

	Point	Line	Area	Network
models of the manner in which a region is subdivided	chief towns 1	adm. boundary 2	state, region 3	centers, boundaries and polygons 4
models of a region's infrastructure	node vertex 5	lines of communication 6	service, irrigation drainage area 7	network 8
models of gravity	satellite points 9	lines of gravity orbits 10	attraction area 11	preferred relationships 12
models of fronts of communication	passage point 13	rupture, interface 14	contact areas 15	base "port" coast abutment of a bridge 16
models of unilaterally biased movements	directed movement 17	division line 18	tendency surfaces 19	dissemmetry 20
models of conquest diffusion	point evolutions 21	axes of propagation 22	areas of extension 23	tissue of change 24
models of hierachies	urban pattern 25	dependency relationship 26 administrative boundaries	subset 27	linked network 28



The Bombay-Delhi Axis: Spatial Organisation

Classes of Choromatic Diagrams



Challenge: Automatised Construction

- Many application scenarios if automated construction was available
- frex: consenus building in time critical situations, high level interactive pattern comparisons, small multiples etc.

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- *The cartographic design rules are insufficiently codified*

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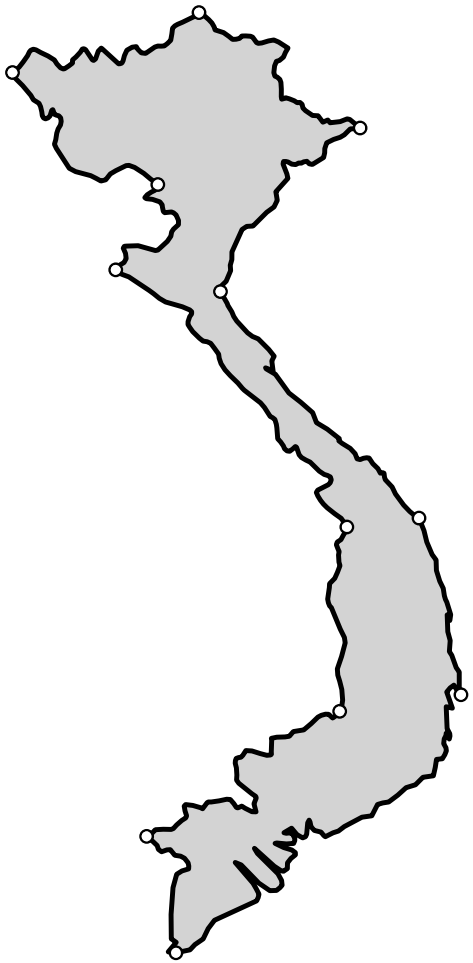
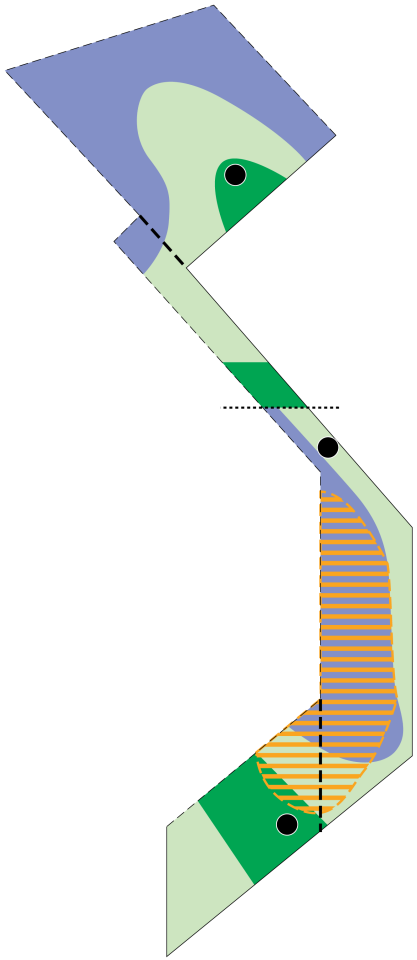
- frex: consenus building in time critical situations, high level interactive pattern comparisons, small multiples etc.

Fact

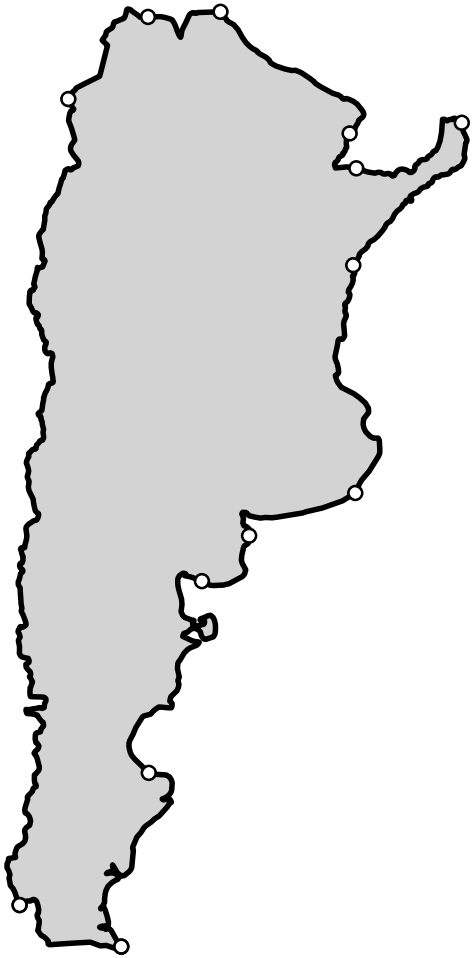
- *Existing chorematic diagrams have all been created manually*
- *The cartographic design rules are insufficiently codified*
- *For the automatised construction, more formalisable design paradigms and rules are required*

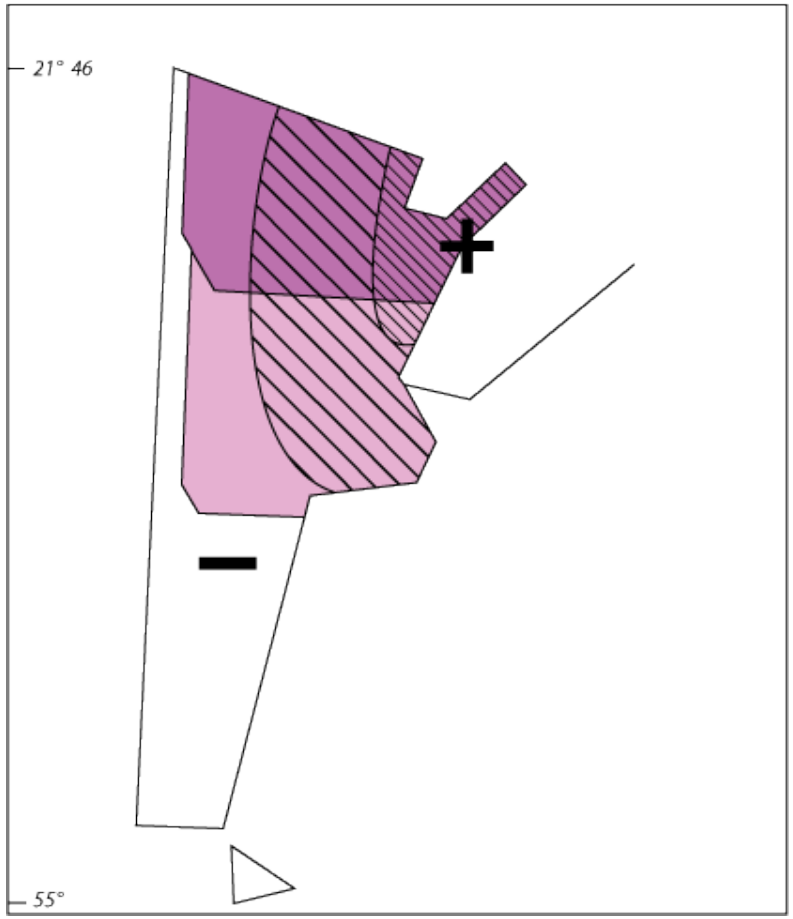
Territorial Outlines: Design Rules





Territorial Outlines: Octolinearity?





Territorial Outlines

Conjecture

Good chorematic diagrams:

Territorial Outlines

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- Outlines with few vertices

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Approach

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Conjecture

Good chorematic diagrams:

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Approach

1. Choose characteristic points
2. Displace points to optimise parallelity

Characteristic Points

Detecting k CPs

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- Imai-Iri algorithm, threshold based

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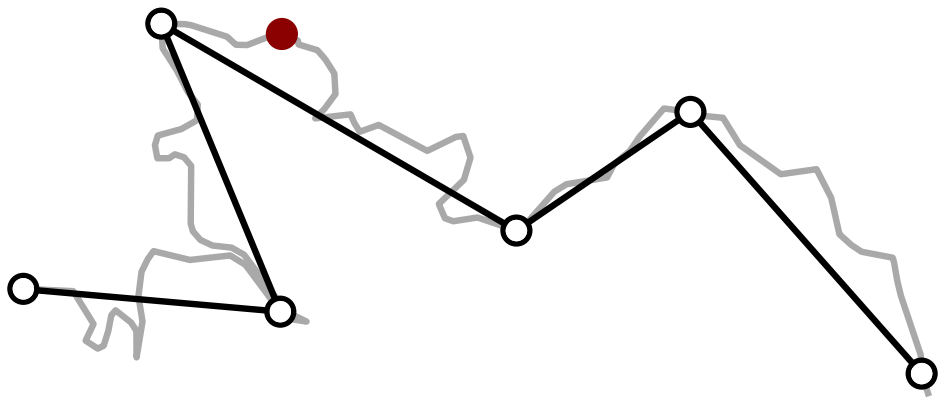
Known Problems

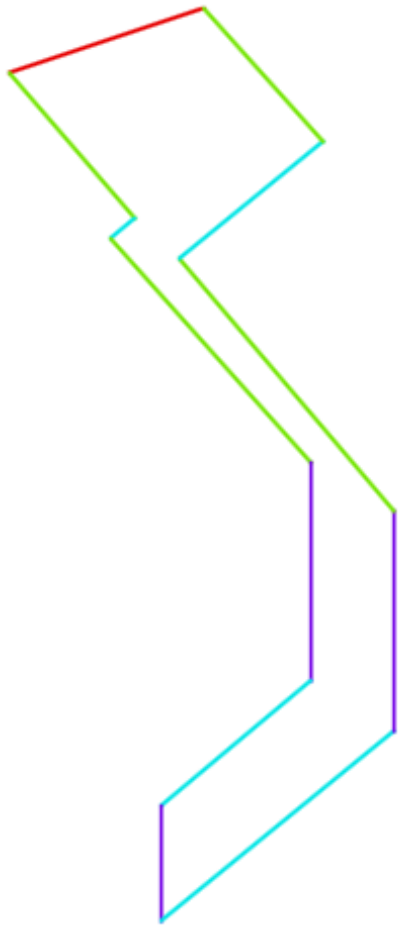
- Starting point dependency: use a diametrical point
- Geographic vs Geometric CPs: not addressed



Parallelity as a quality measure

Parallelity as quality

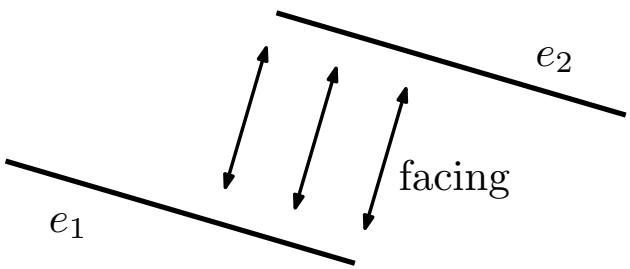
- Edge contributes length iff it is parallel

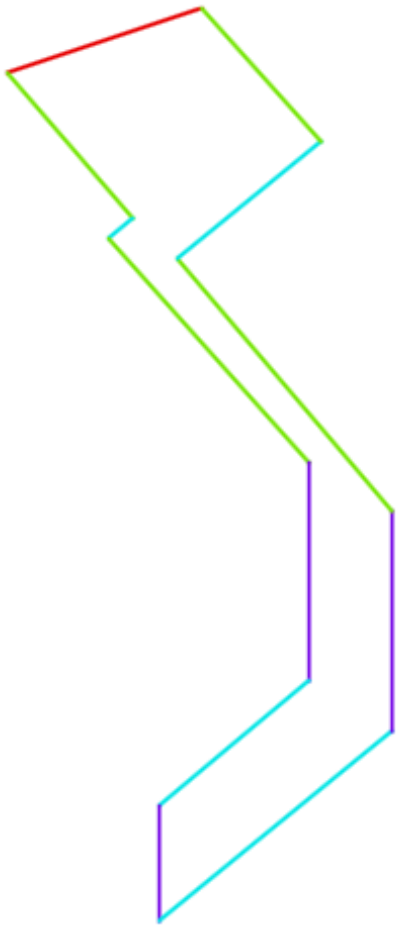


Parallelity as a quality measure

Parallelity as quality

- Edge contributes length iff it is parallel
- Facing bonus





Simulated annealing

generic

generic framework for optimisation problems

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- local search
- flexibility to escape local optima
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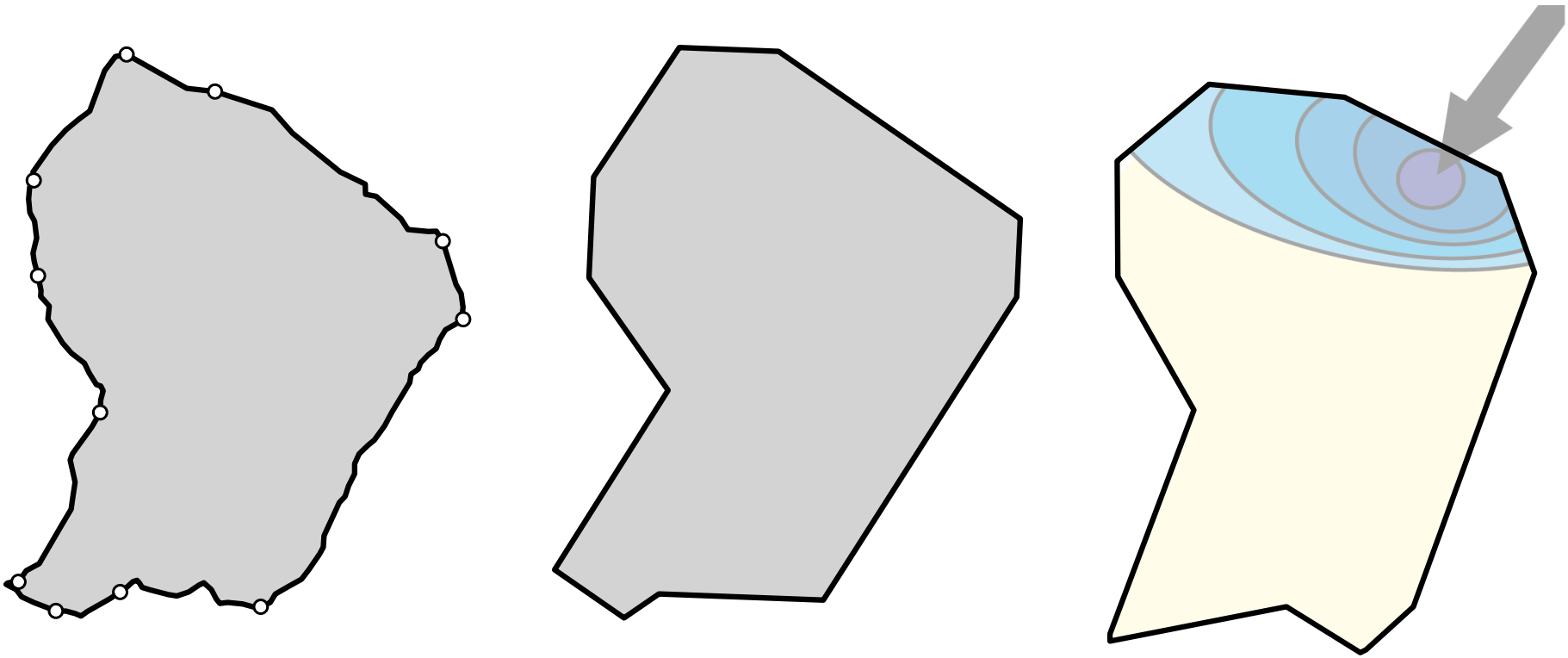
specific

- optimise parallelity
- move vertices
- randomly select rotation effect of adjacent edges
- gaussian contribution to steer solutions

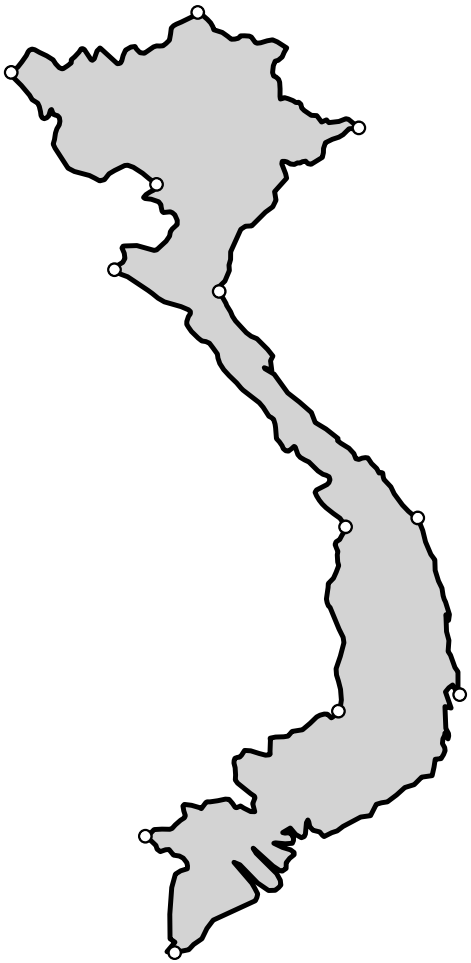
Results

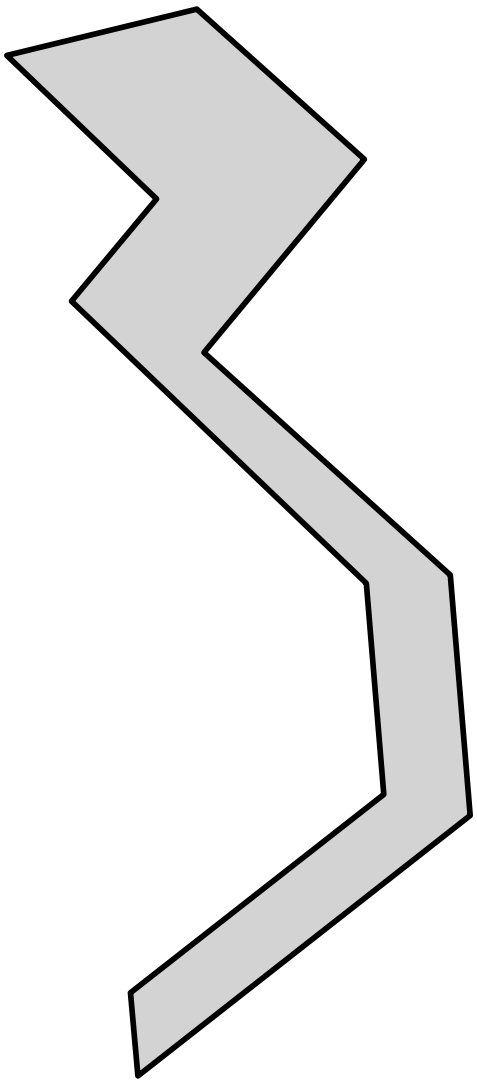
Guyane

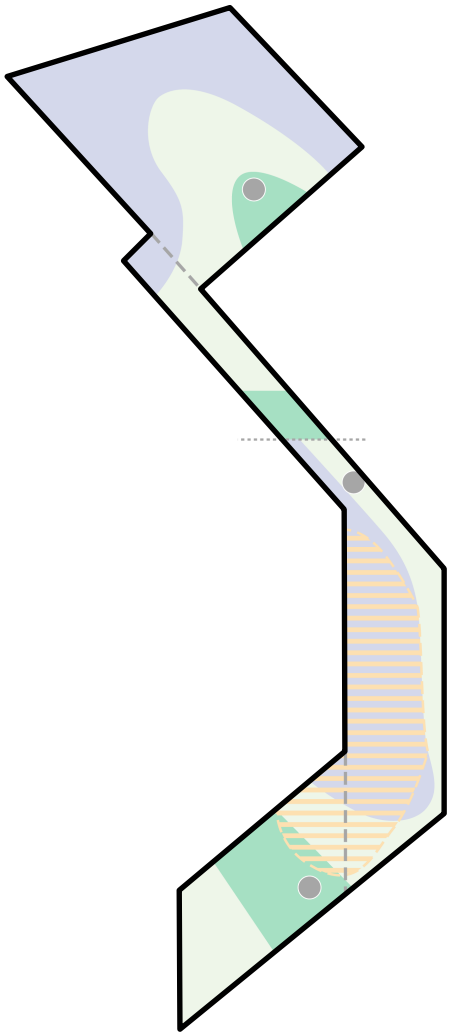


Results

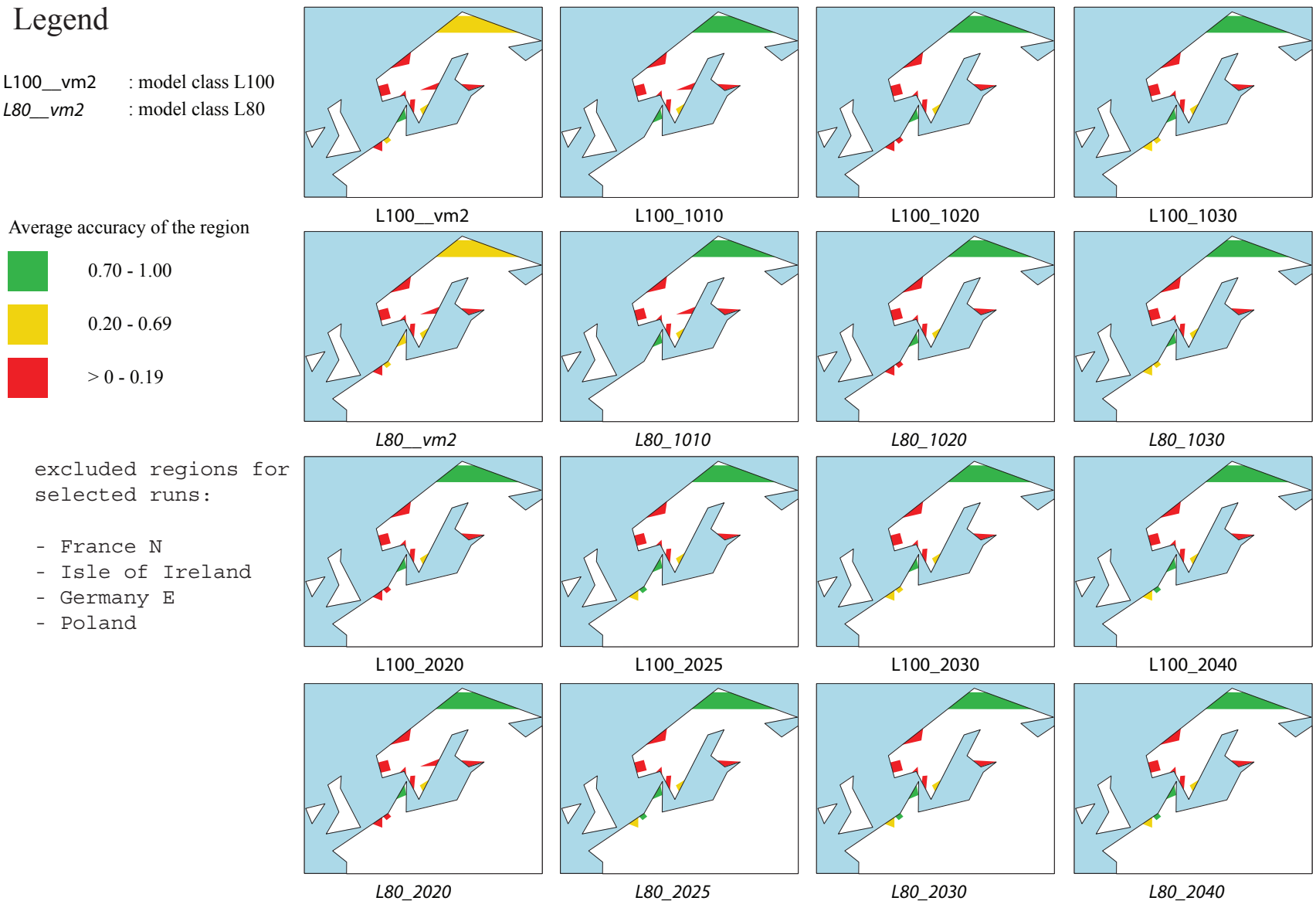
Vietnam







Small Multiples



Conclusion

- parallelity is important, but not the only design rule
- improvements on CP detection needed
- most likely via inclusion of geographic CPs