Processing large datasets into a vario-scale structure

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Introduction

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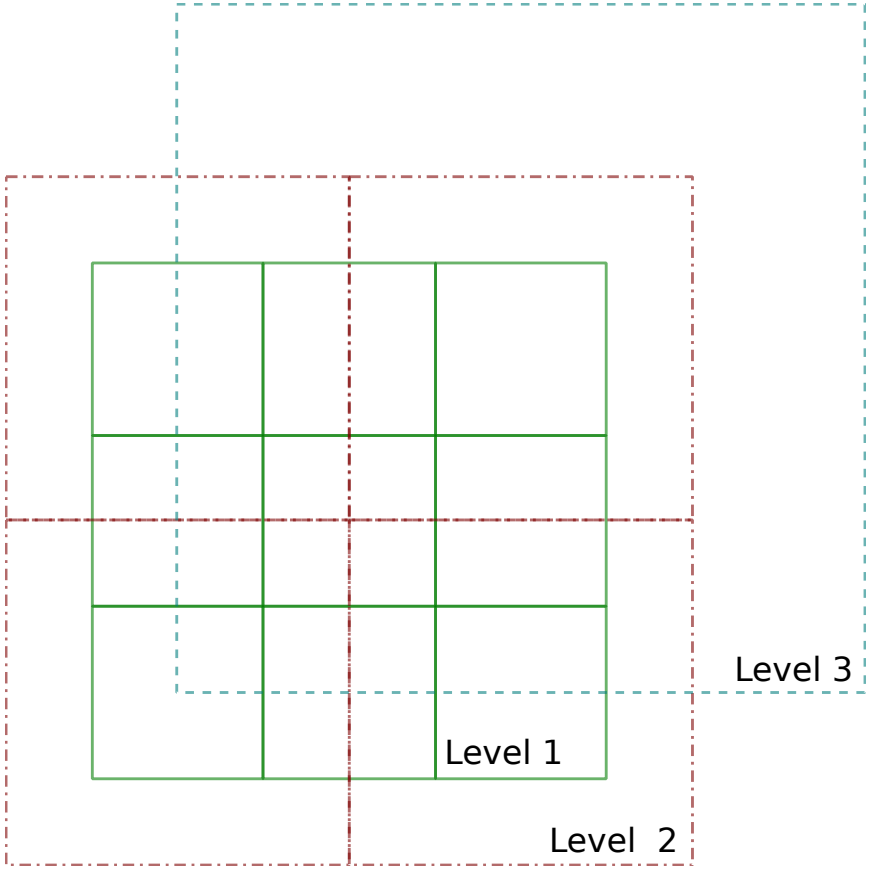
- Limited to around 50 000 input areas
- Does not fit in main memory
- Split input in smaller pieces (divide) and union results (conquer)

Split in pieces

Use partition fieldtree (Frank and Barrera, 1990)



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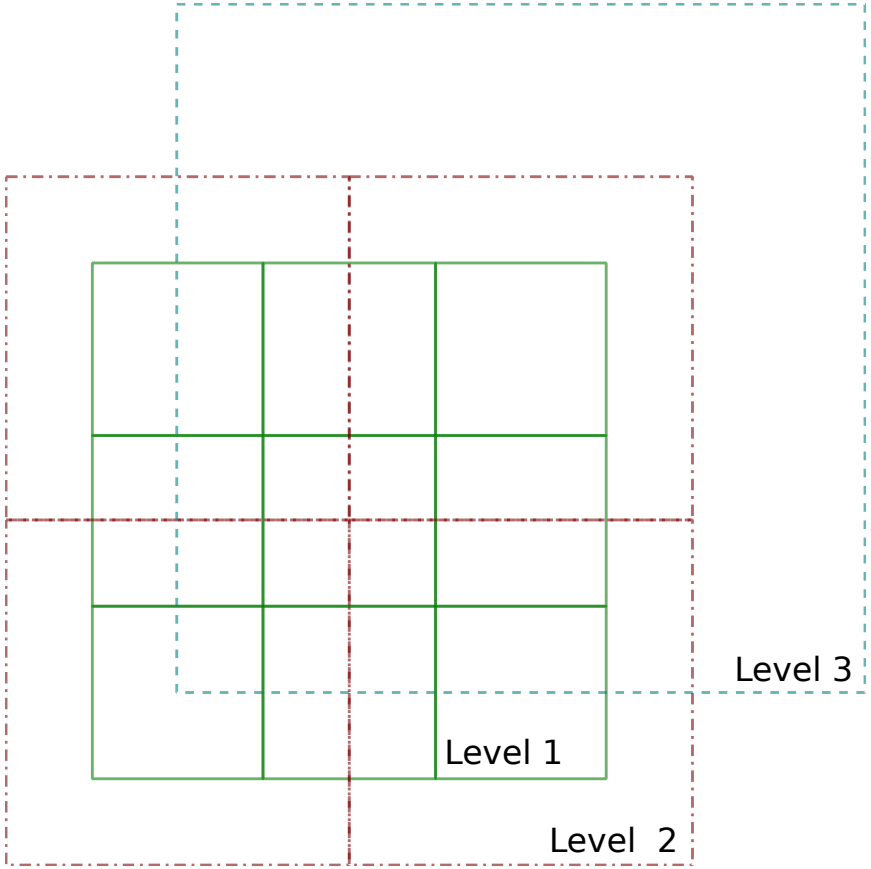
- Tree of fields (a field is a box)



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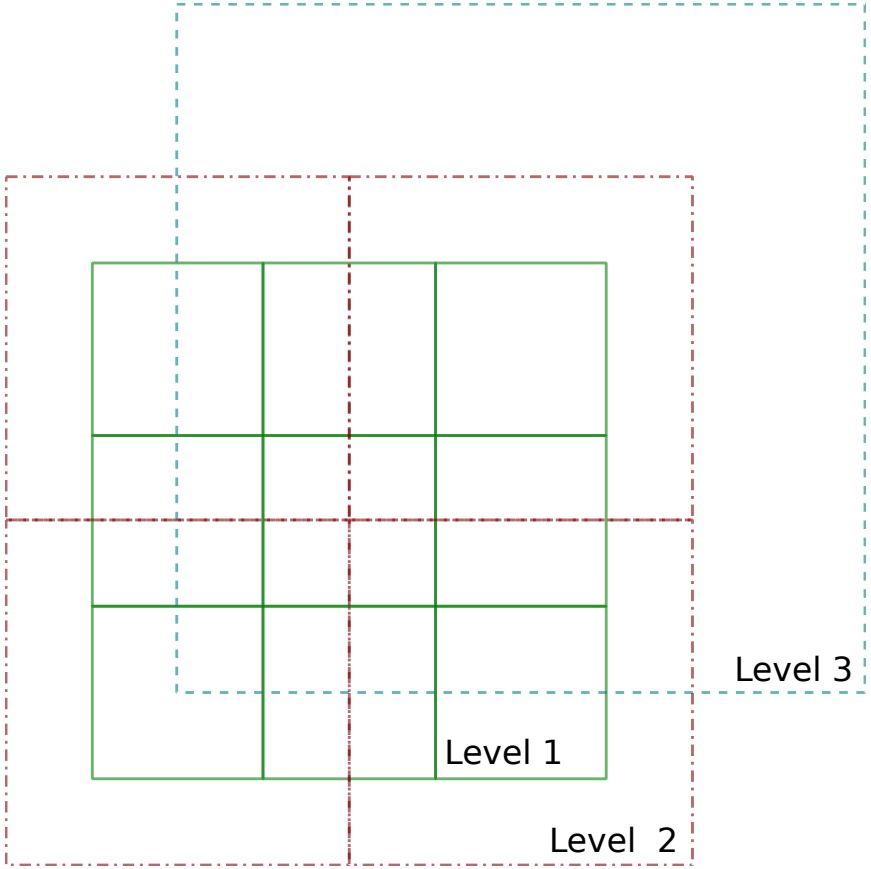

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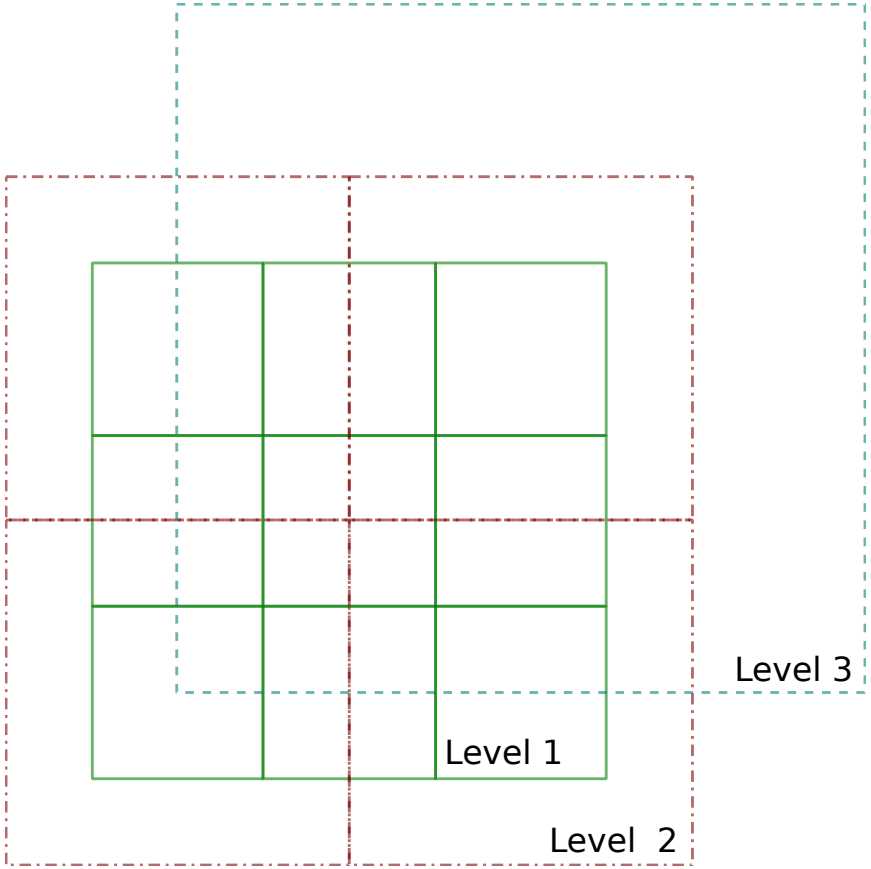

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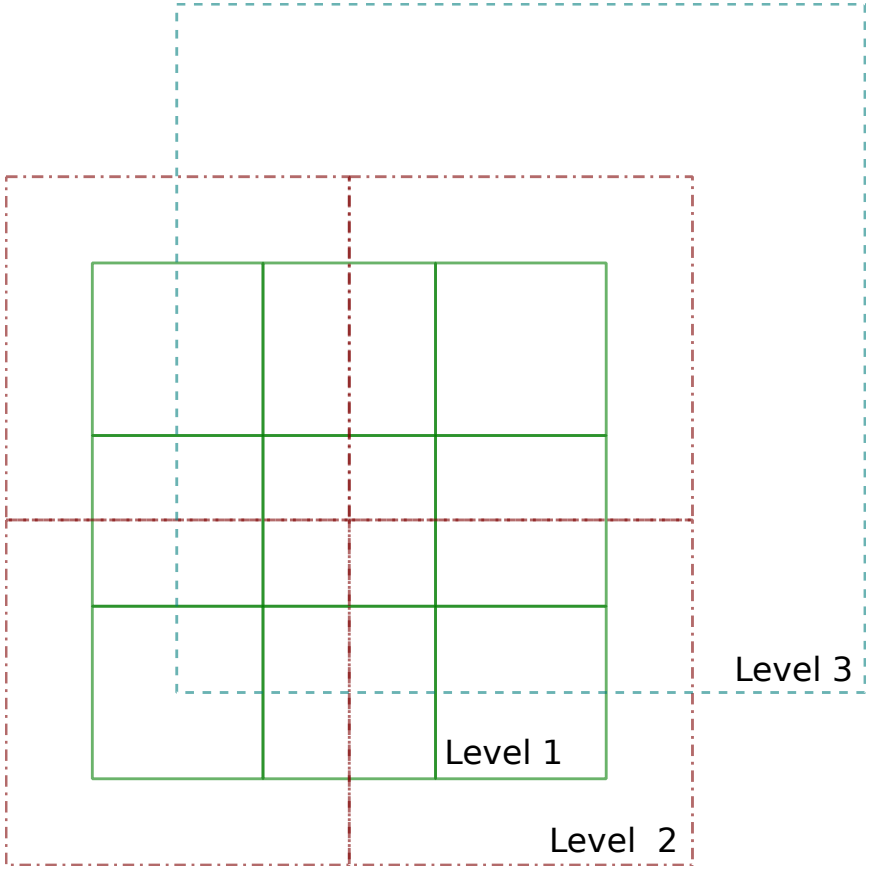
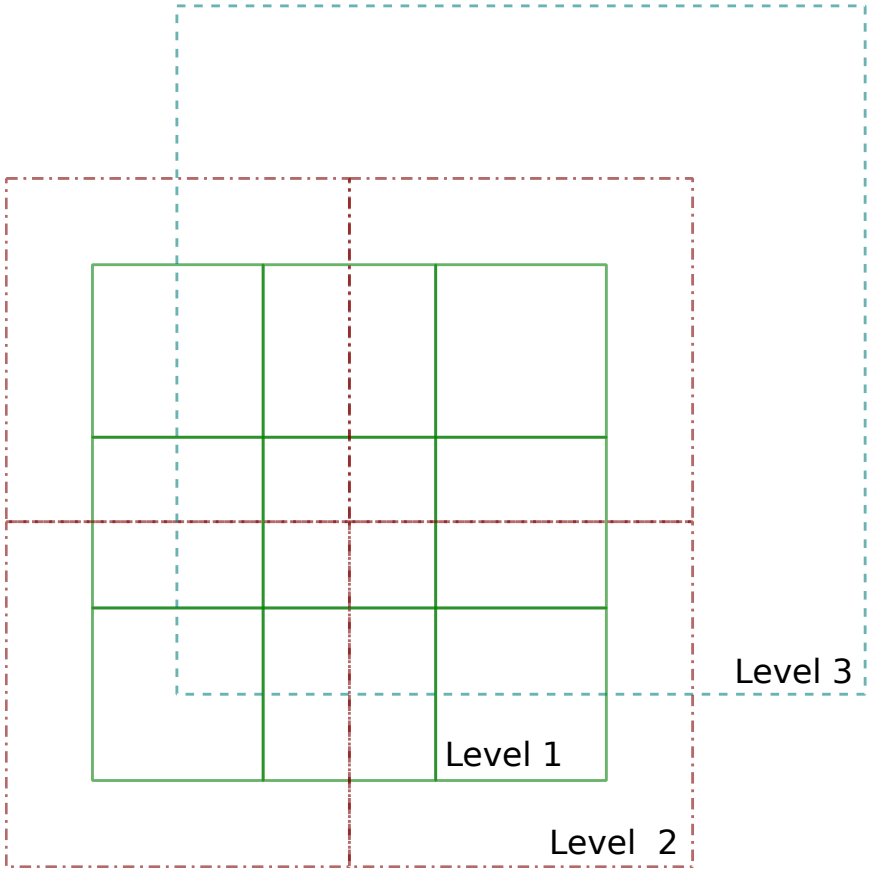
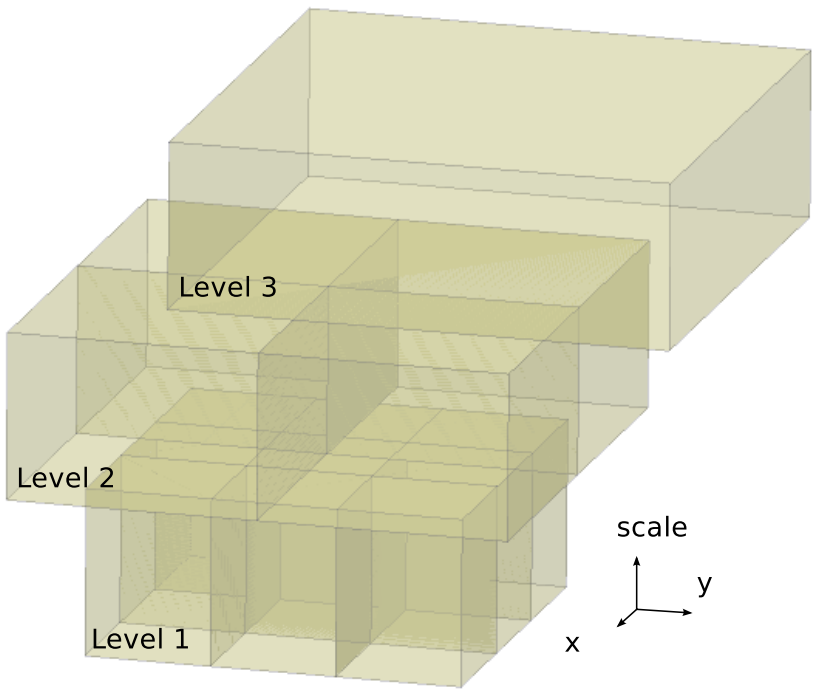
- Note, every field has (upto) 9 children, and (upto) 4 parents



Split in pieces

Alternative view of fieldtree – Scale = 3rd dimension





Processing large datasets – Method

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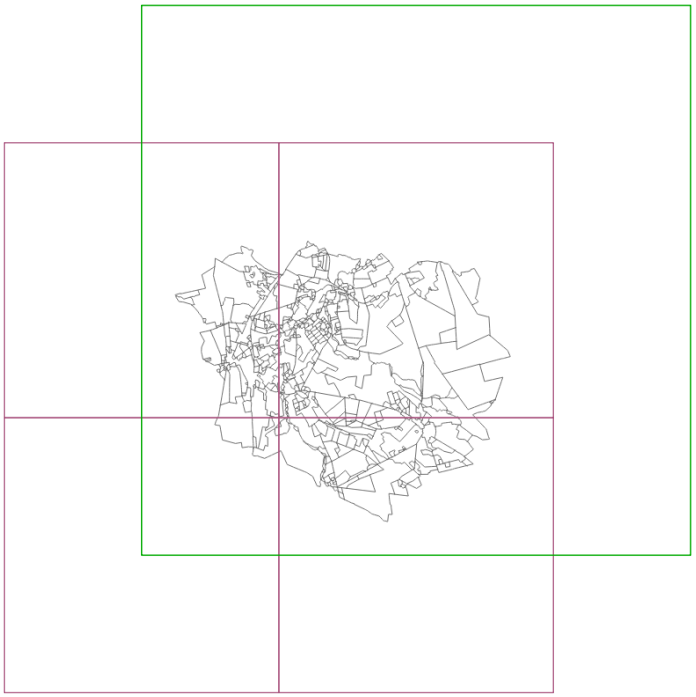
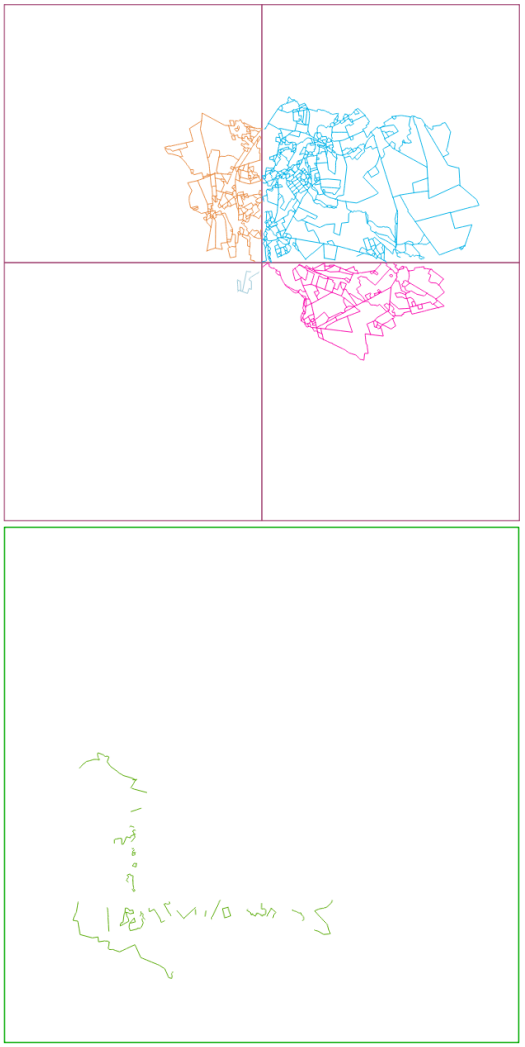
5. When field is processed a field contains less detailed data – input for parent field at next level

Processing large datasets – Example

Split input data over fields





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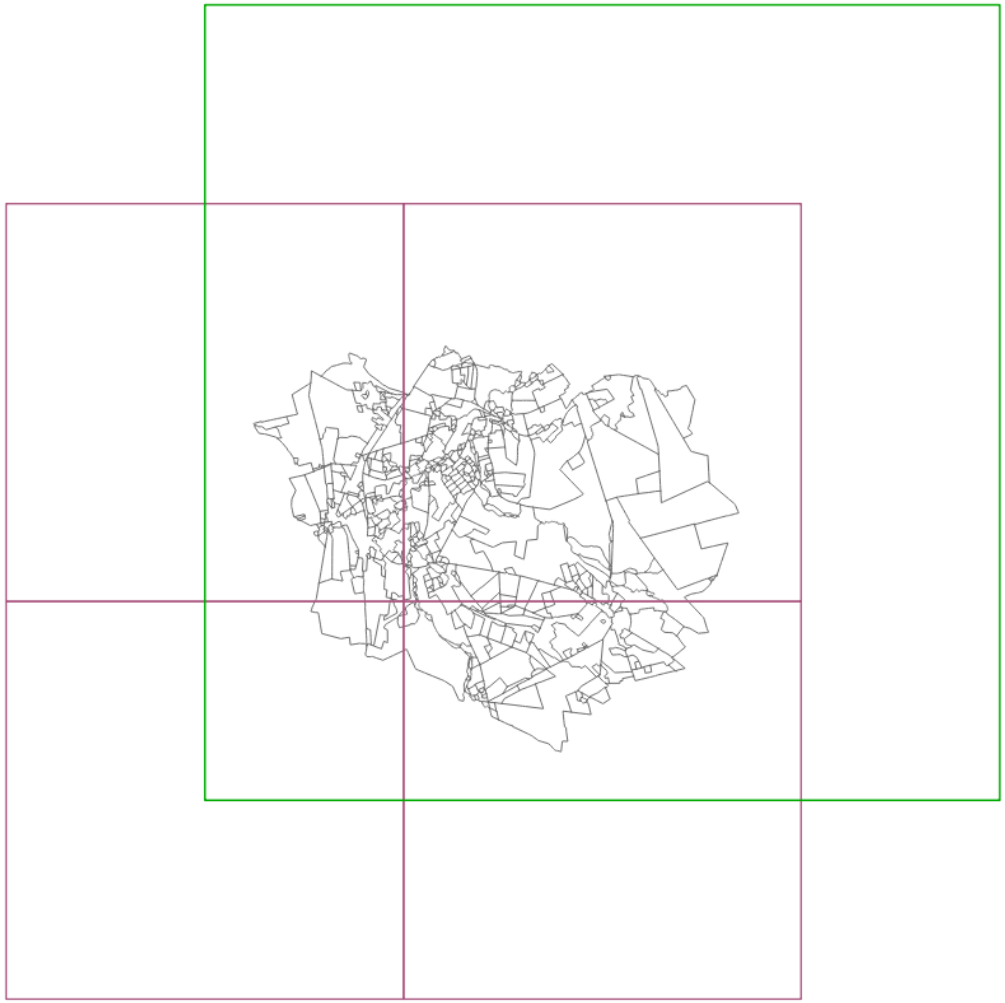

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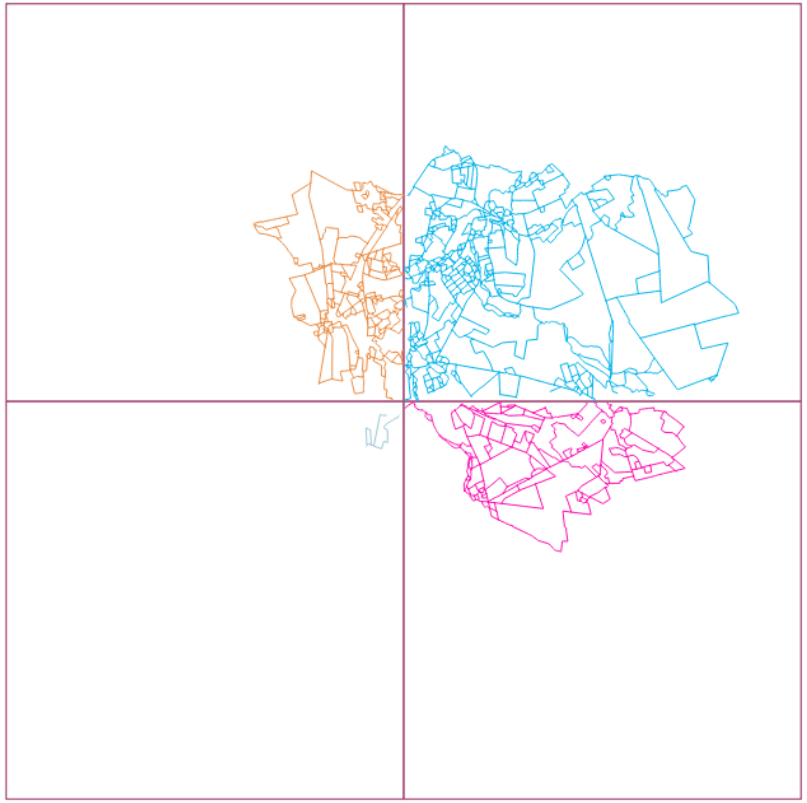

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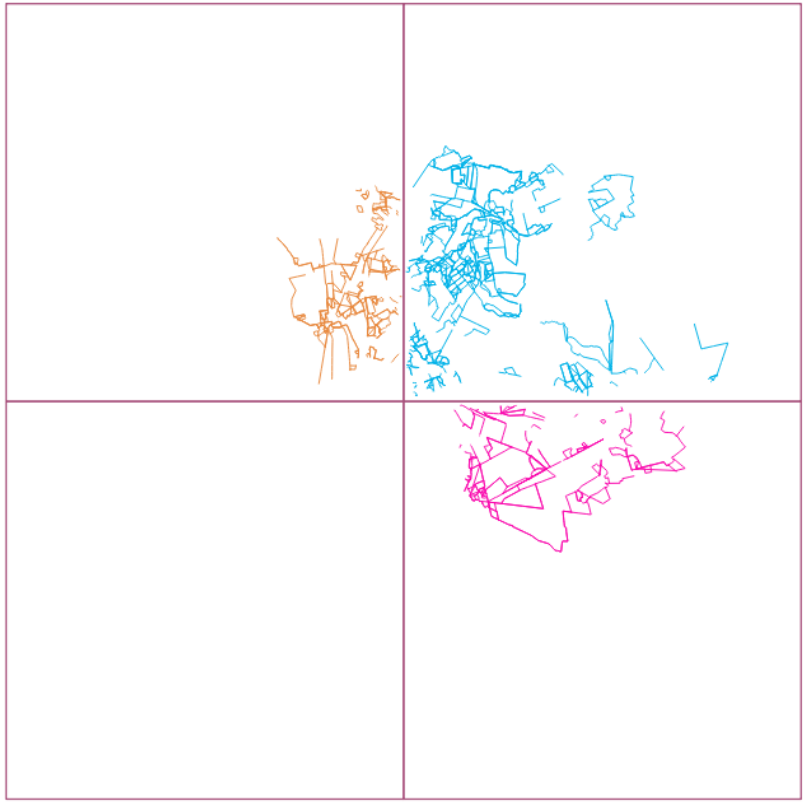

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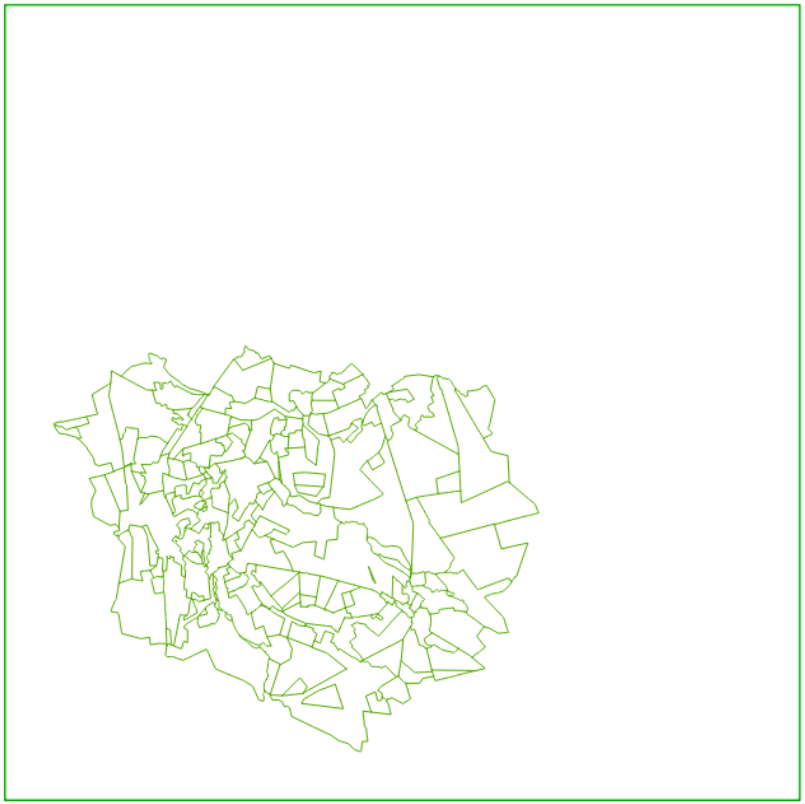

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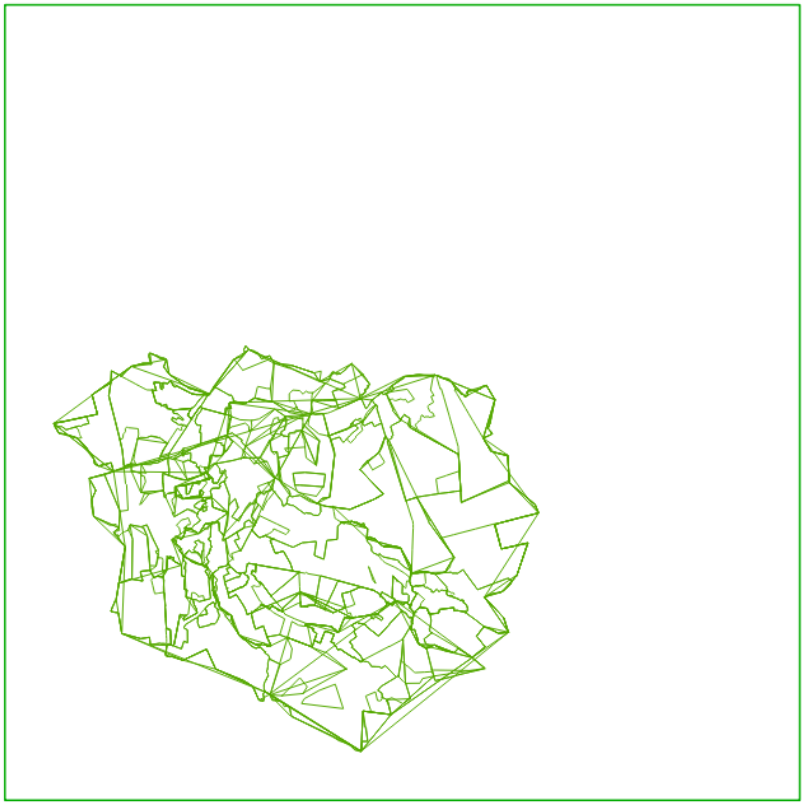
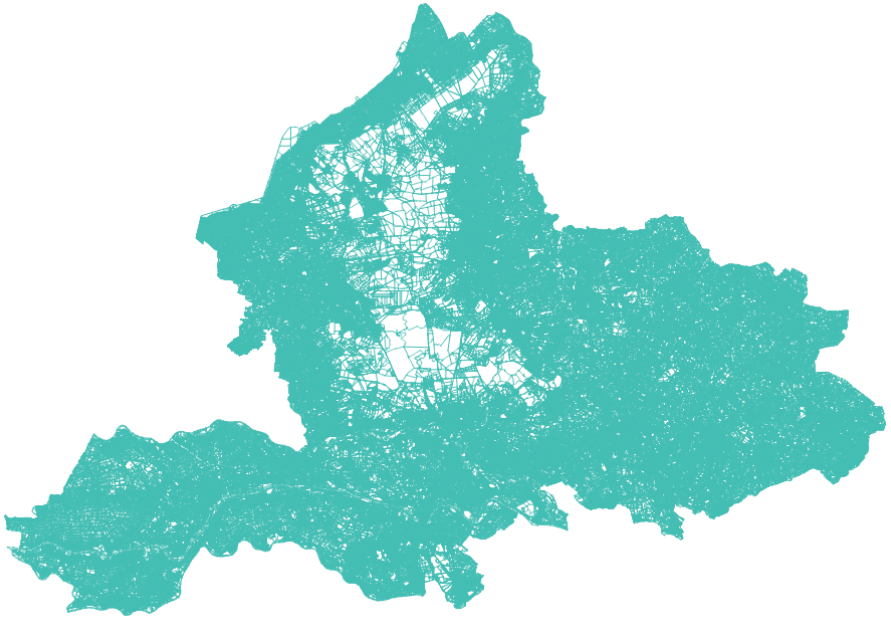


Results

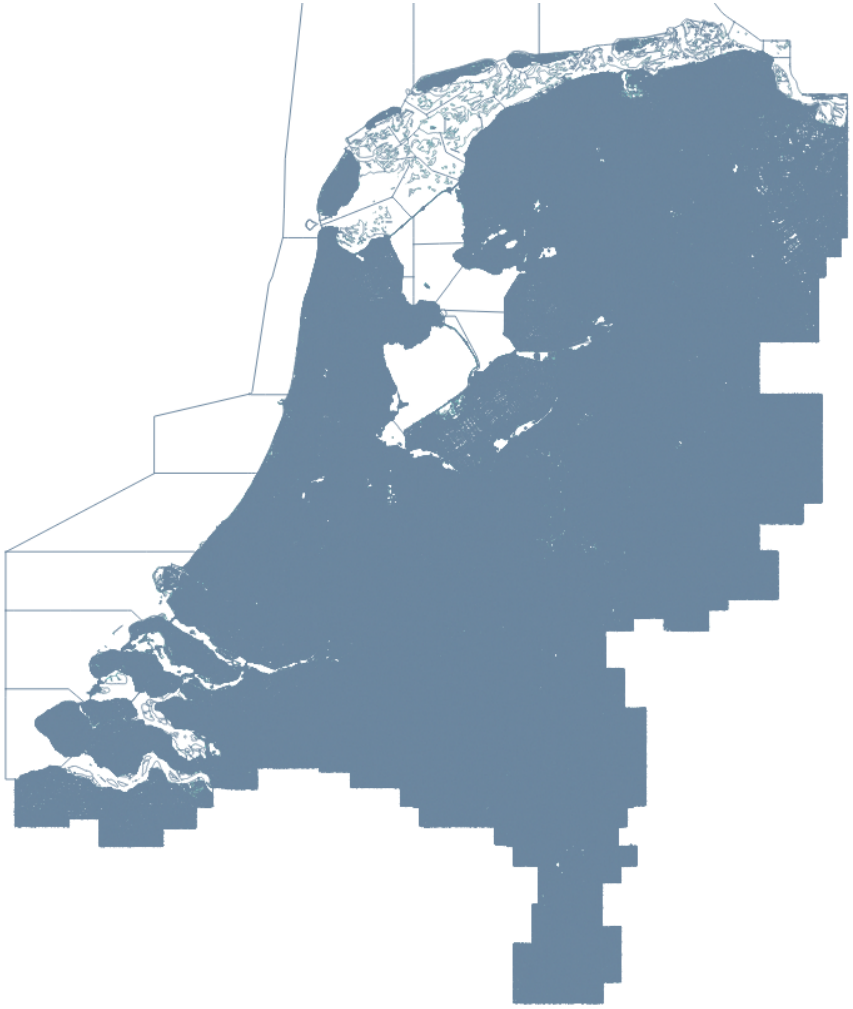
- Initial implementation finished (January 2014)
- Small bugs: at the borders of the fields and propagating to next level (setting scale range for primitives)
- Able to process dataset with 50 000 cadastral parcel polygons, trying with 300 000 & 800 000



Future work

Short term

- Fix issues
- Make work in parallel (multiple fields at same time)
- Make split/collapse operation work again
- Test with Top10NL (roads, water, terrain — 5.2 million area features)



Future work

Longer term

- Investigate use of fieldtree for:
  - Data retrieval with large dataset
  - Processing updates
- Integrate improvements of Radan/Lina (better quality maps/smooth transitions)

Thank you for your attention

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  OTB Research
  GIS Technology

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References

Frank, A. and Barrera, R. (1990). The Fieldtree: A data structure for geographic information systems. In Buchmann, A., Günther, O., Smith, T., and Wang, Y.-F., editors, *Design and Implementation of Large Spatial Databases*, pages 29–44. Springer Berlin / Heidelberg.