The economic value of nature

How far do Dutch people live from attractive nature?

An assessment using parallel computing with Python and FOSS4G libraries.

Bob Dröge, **Leon van der Meulen**, Govert Schoof

OSGeo.nl Nederlandstalige afdeling

university of groningen

@rug_geo
@leonmeulen

who are we?

VISUALISATION

We visualise so people will get a better understanding and gain insight from experiencing their data.

COMPUTING

We provide scientists and other interested parties with state-of-the-art High-Performance Computing and storage facilities.

GEO ANALYTICS

We encourage and support the use of spatial data analysis and visualisation techniques.

GEODIENST

team

Picture: ESRI NL

team

6 Students, 3 faculties, 2 dedicated to project

1 Coordinator

1 Functional Application Manager

1 IT & GIS Specialist

1 Geo-Technical Specialist

university of groningen

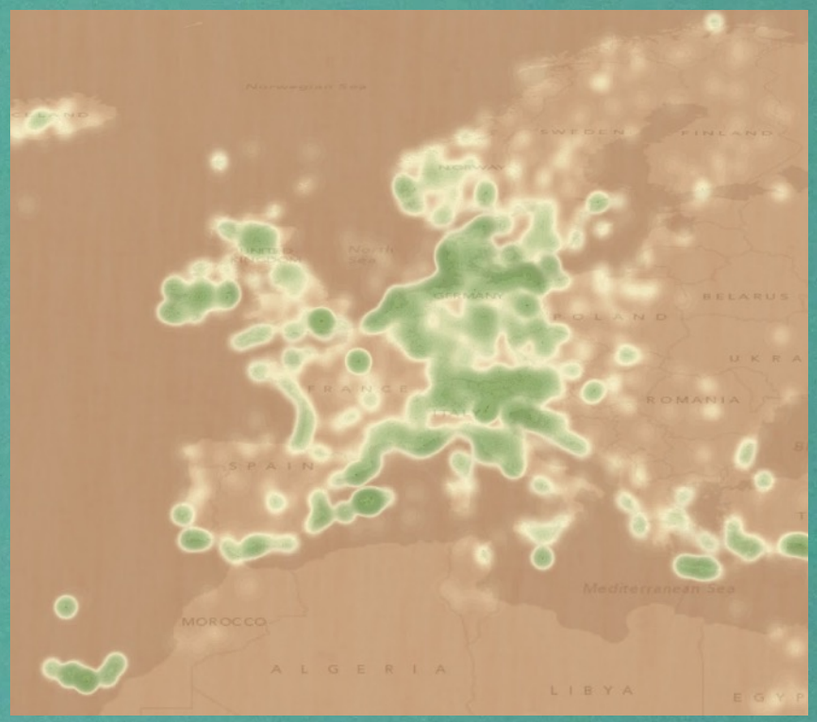
Date 26-06-2014 | 1

Highly valuable nature & Dutch property prices

Preliminary results

Daams, Van der Vlist, Sijtsma
Economic Geography

IT Kenniscafé
09/09/2014



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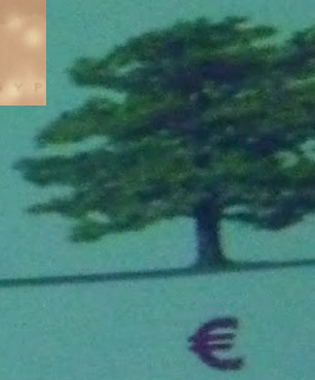

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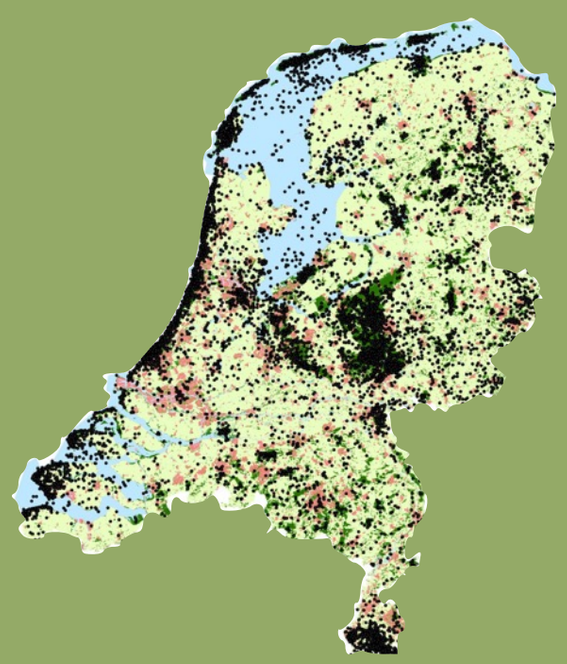
Initial input data

More than 400,000 houses (80% of Market)

-Geocoded Points

More than 150,000 nature areas

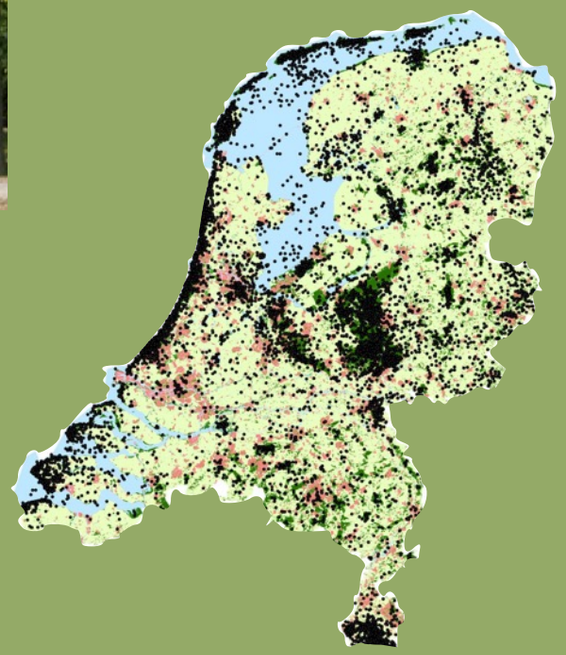


Sijtsma et al. (2012; 2012)
De Vries et al. (2013)
Daams and Sijtsma (2013)

Initial input data: Nature Areas

Most studies: ***land use types*** (forest, parks, wetland, etc.)

But: Same Landuse!

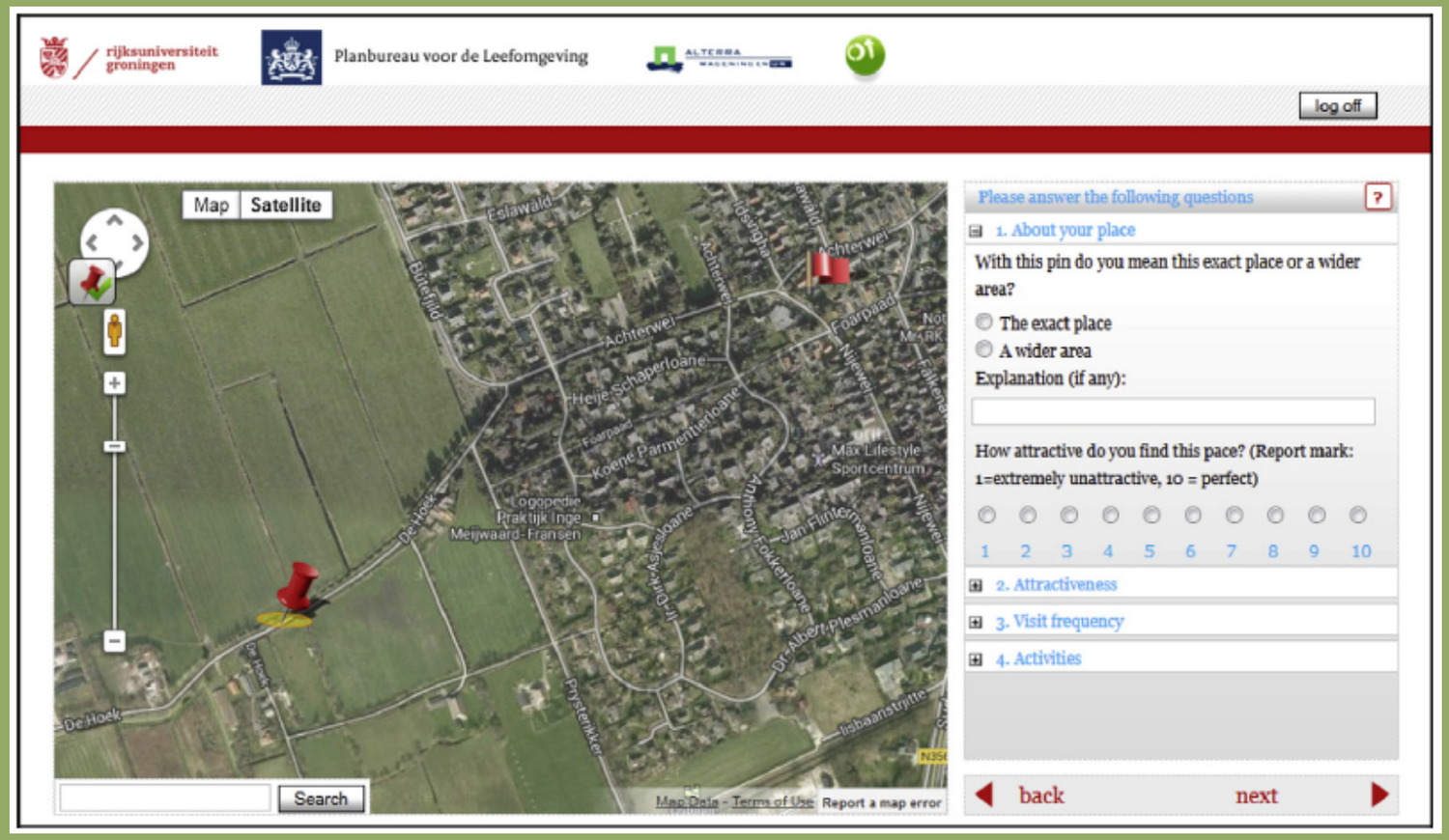


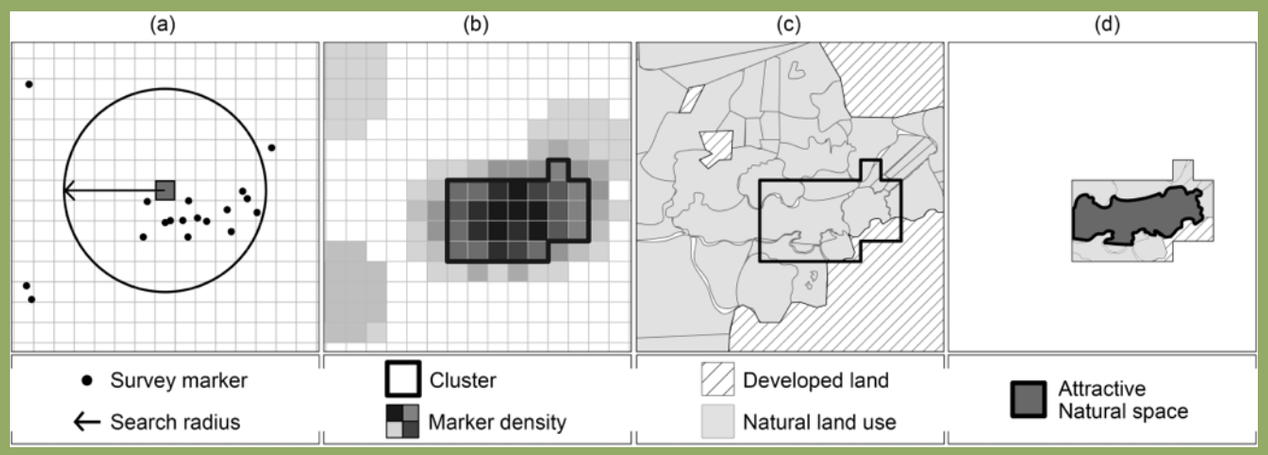
Initial input data: High Valued Nature Areas

Hostpotmonitor Markers!

>13.000 Participants

Unique addition to study

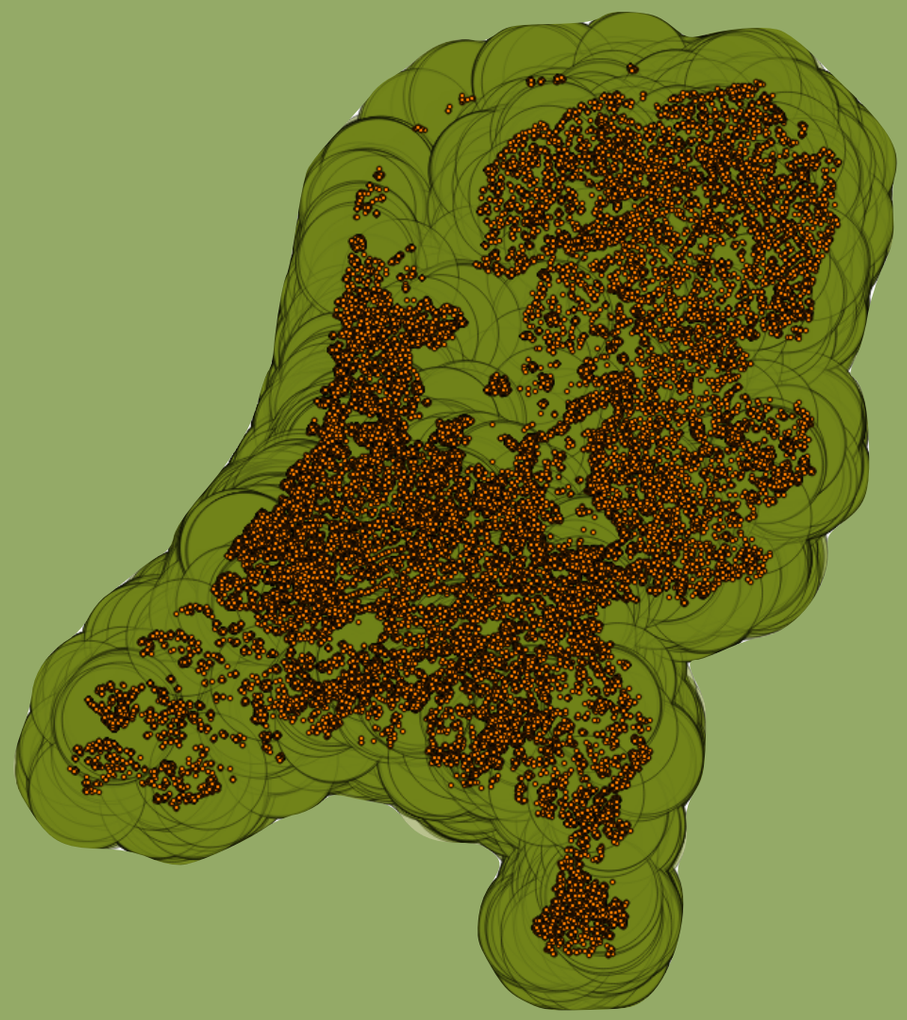




Sijtsma et al. (2012; 2012)
De Vries et al. (2013)
Daams and Sijtsma (2013)

Analysis

1. Cluster Hotspotmonitor
2. Select nature areas by score
3. Buffer around houses 50m-20km!
4. Count sum of intersecting area



Solution nr. 1

Solution nr. 1

hmm…


explore
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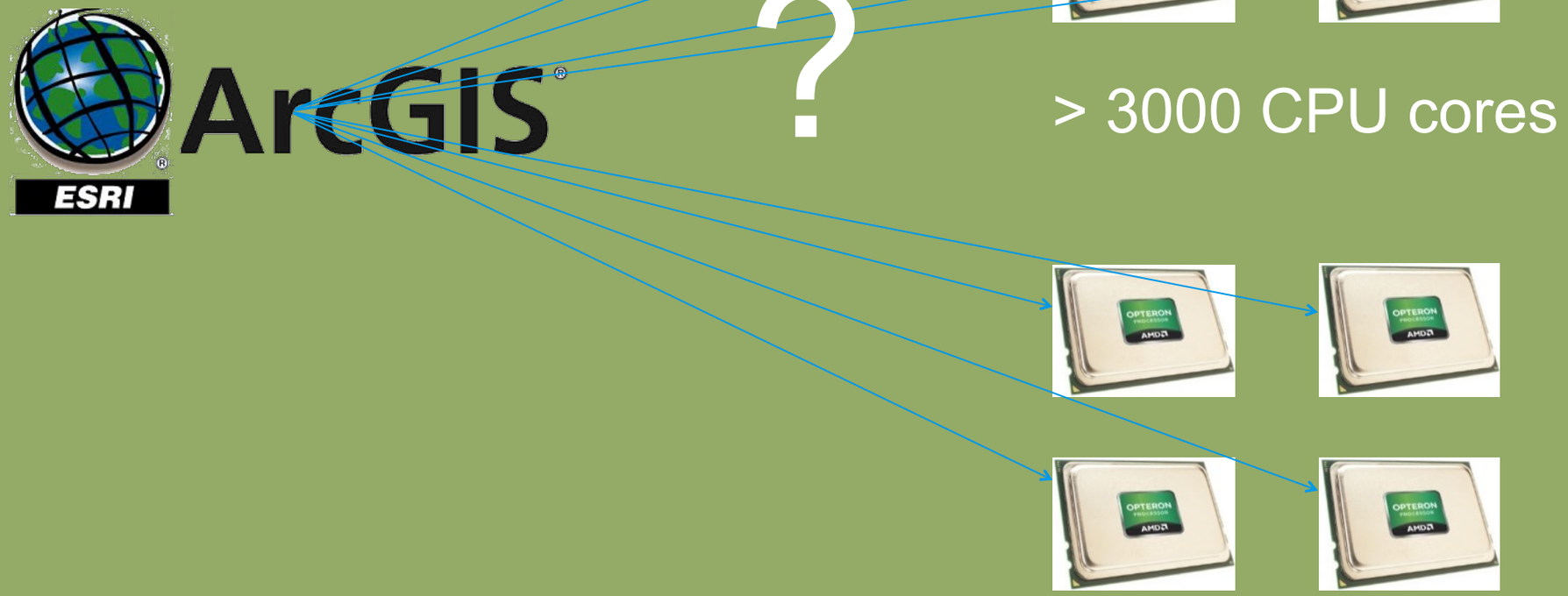
Solution nr. 2

Solution nr. 2

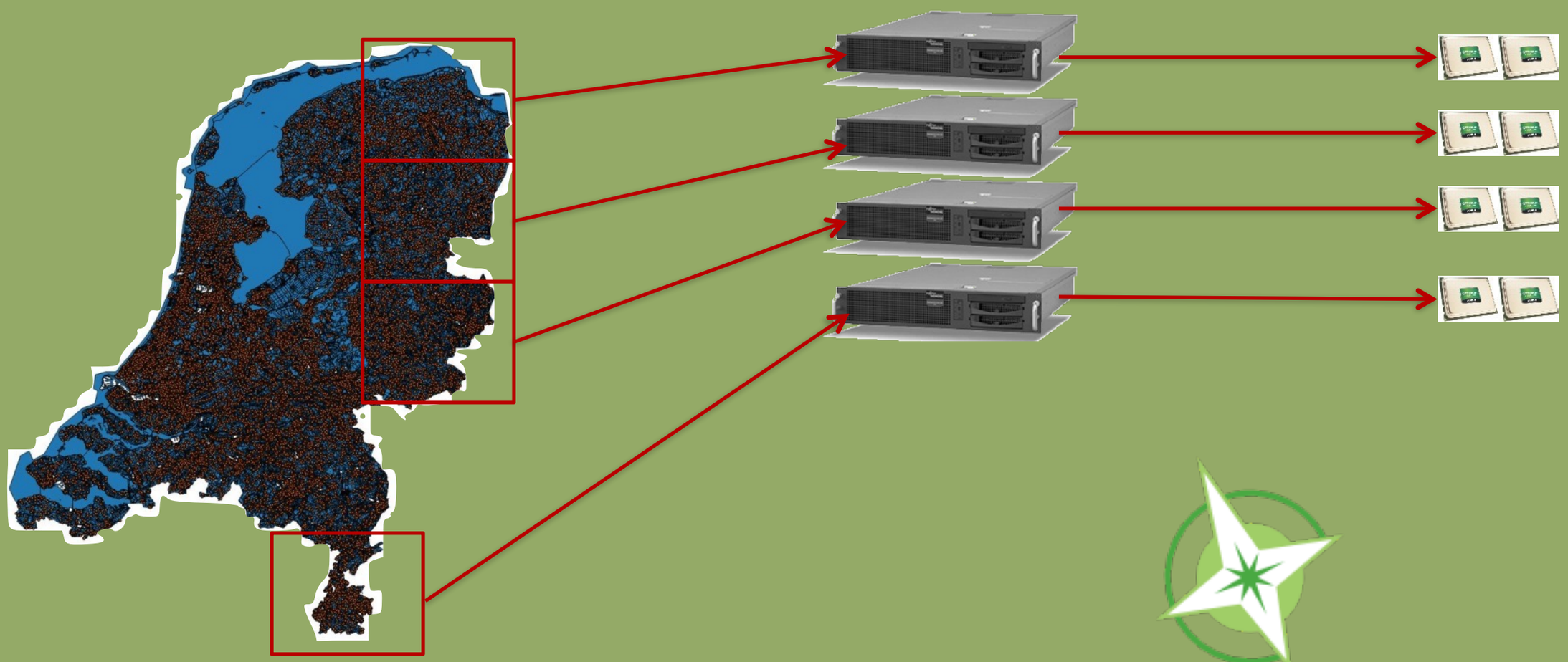


But… ArcGIS + HPC???

Solution nr. 2

Parallel runs

Python multiprocessing module



Python 2.7.4, Rtree 0.7.0, libspatialindex 1.8.1, Shapely 1.2.18, GEOS 3.4.2, pyshp 1.2.0

Solution nr. 2

Python script

Roughly 100 lines of code

Most interesting part:

```
# This function processes a single house by creating a buffer,
# finding all possibly (based on bounding boxes) intersecting polygons
# using the R-tree, checking whether there is indeed an intersection and,
# if so, adding the area of this intersection to the total area.
def process_house(house):
    area = 0
    house_buffer = house[1].buffer(BUFFER, ACCURACY)
    # Loop over all possible intersections.
    for poly_j in idx.intersection(house_buffer.bounds):
        # Check if there really is an intersection.
        if house_buffer.intersects(polygons[poly_j]):
            # Check the validity of the polygon, otherwise the intersection
            # function could raise an error.
            if polygons[poly_j].is_valid:
                area += house_buffer.intersection(polygons[poly_j]).area
            else:
                # "Fix" the polygon by adding a 0-distance buffer
                area += house_buffer.intersection(polygons[poly_j].buffer(0)).area
    return (house[0],area)
```

Solution nr. 2

CSV files

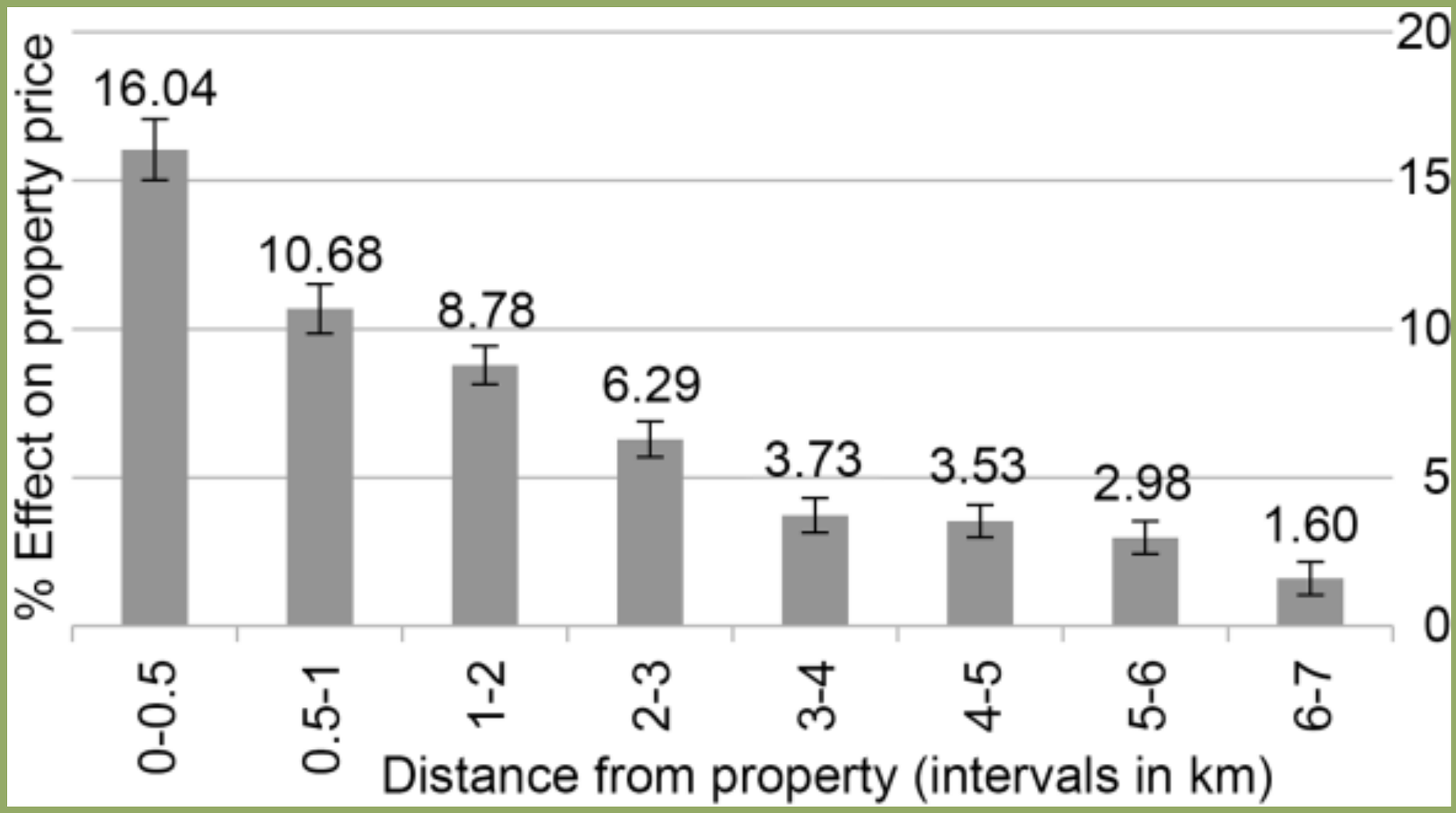
- House Ids
- Total area of (Highly Valued) nature within radius

Finished in couple of days

- Even more radii and datasets
- Would have taken at least months, probably years, on a desktop PC

Allowed unique research: never done at this scale before

Results



Note: 7 km **>** 3.2 km widest distance-effect in the literature

Daams, M.N., Sijtsma, F.J., and Van der Vlist, A.J. (in press). The effect of natural space on nearby property prices: accounting for perceived attractiveness. Land Economics.


alternatives
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Alternatives & improvements

- Postgis
- Arcgis Pro
- Simplify the analysis, less detail
- Other?

Questions or Ideas?

leon.van.der.meulen@rug.nl
rug.nl/geo
@leonmeulen @rug_geo

GEODIENST

university of groningen

References

Daams, M.N., Sijtsma, F.J., and Van der Vlist, A.J. (in press). The effect of natural space on nearby property prices: accounting for perceived attractiveness. Land Economics.

How far do Dutch people live from attractive nature?: An assessment using parallel computing with Python and FOSS4G libraries, Droge, B., van der Meulen, L. & Schoof, G. 12-Jul-2015 *Geomatics Workbooks : FOSS4G Europe Como 2015*