

# The compositional dot map: a visualization of spatial data

Martijn Tennekes en Edwin de Jonge



Statistics  
Netherlands

# Dot Map

A **dot map** shows the **geographic distribution** of units, e.g. persons, companies, or events.



Deaths per  
address

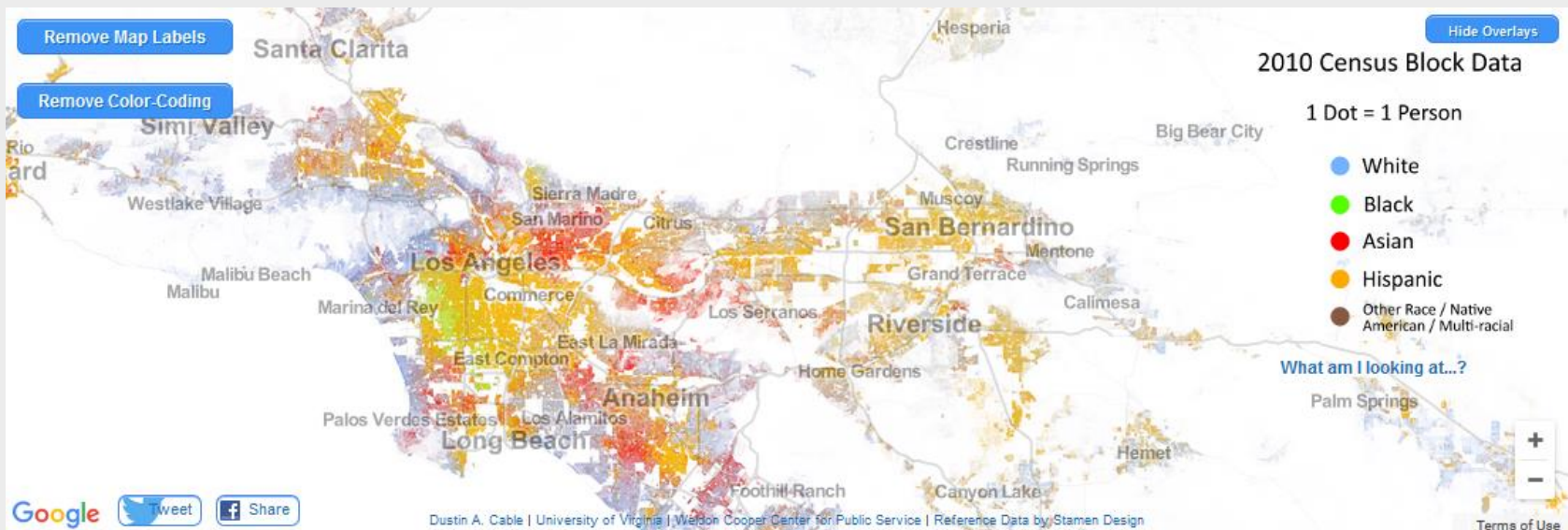
The Broad  
Street Well

Water pumps

Map of cholera outbreak in London (1854) by John Snow

# Compositional Dot Map

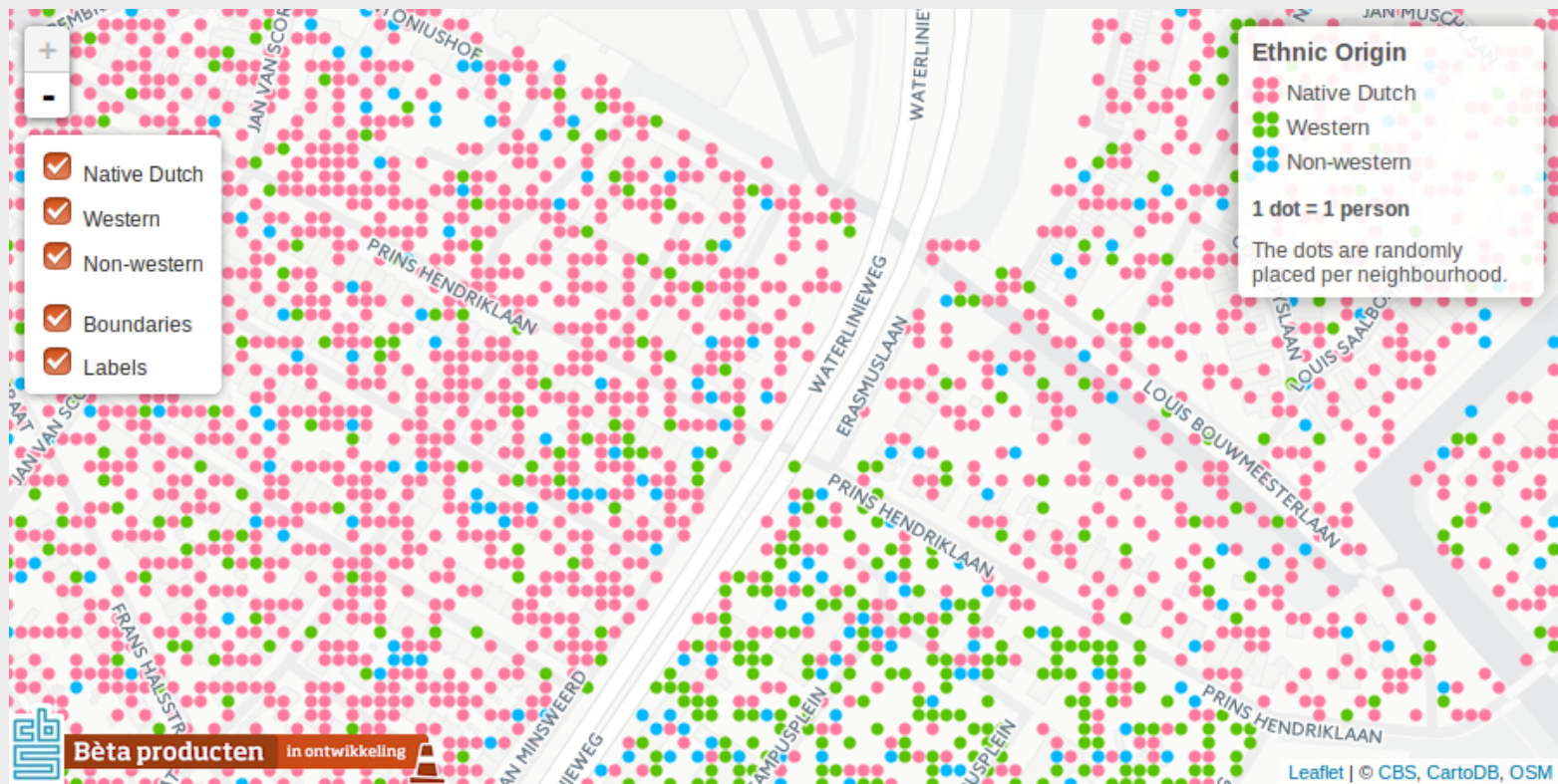
A **compositional dot map** shows both **distribution** and **composition** of a population. Composition is shown by color.



**Racial Dot Map:** one dot per person (USA)

<http://demographics.virginia.edu/DotMap/>

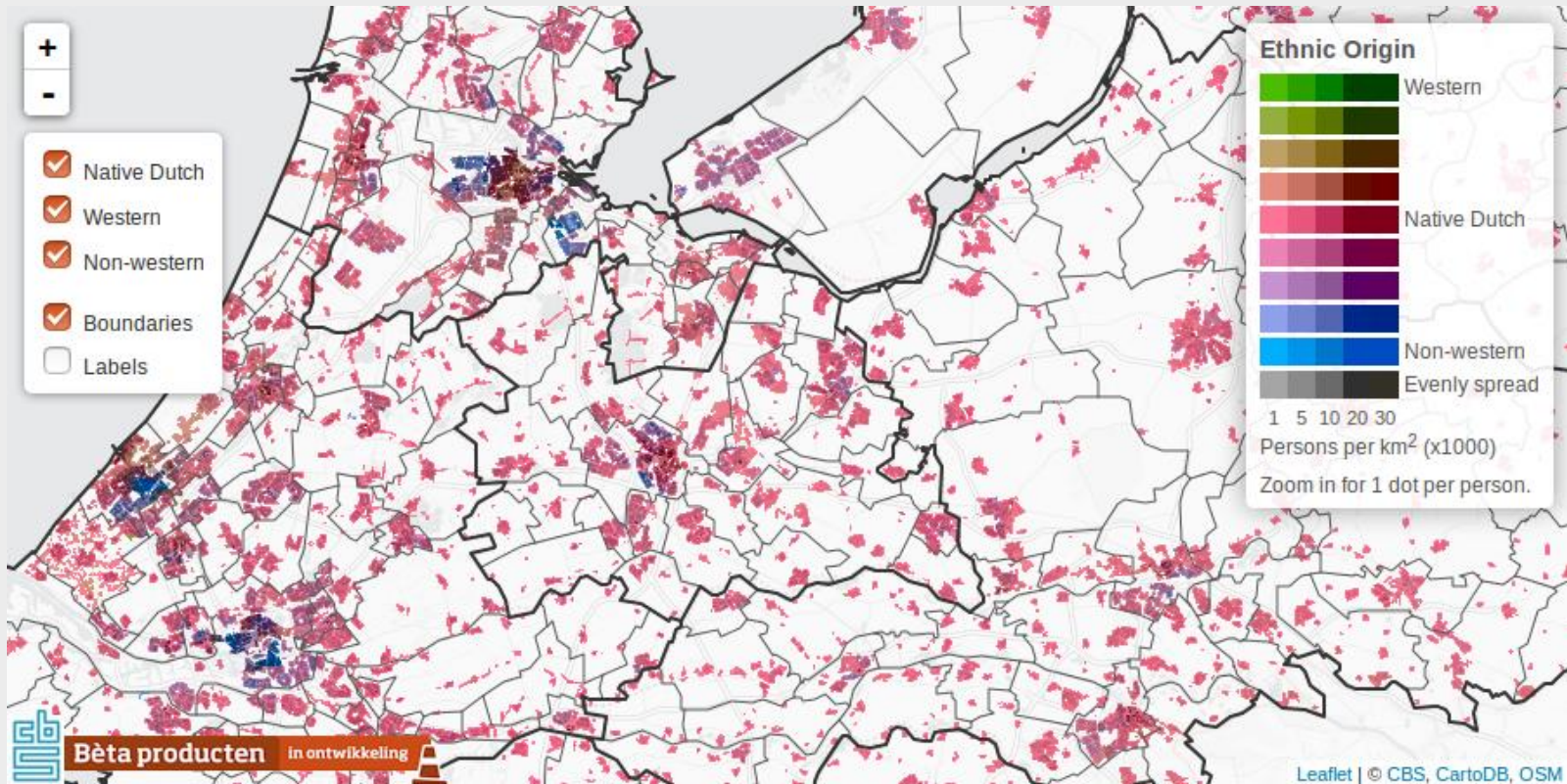
# Dutch Population by Ethnic Origin



Interactive map: <http://research.cbs.nl/colordotmap/EN/>

- One dot represents one person
- Dots are colored by ethnic origin
- To protect privacy, dots are distributed randomly per neighbourhood

# Dutch Population by Ethnic Origin

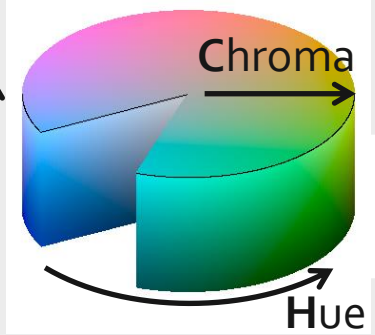


<http://research.cbs.nl/colordotmap/EN/>

Pixel colors are selected from the HCL color space:


- **Hue** for **composition**
- **Luminance** and **Chroma** for **density**

Luminance




# Software Implementation

## Tile Server:

- Technique commonly used, e.g. in Google Maps.
- Contains 1.3 million 256 x 256 png images (3GB)
- Created with , using **tmap**, **png**, **raster** and **doParallel** packages.

## Interactive map:

- Draft version only required a few code lines in , using **tmap** and **leaflet** package.
- Final map implemented in **HTML** and **JavaScript** (leaflet library).

# Further Research

- Conduct user tests to evaluate dot map.
- Use Basic Register of Addresses and Buildings (BAG) instead of Land Use to distribute the dots.
- Create dot maps for other data.
- How to visualize more than 3 categories?
- How to visualize two or more variables, e.g. level of education and income?



Current distribution  
using Land Use



Distribution using BAG  
Thanks to **Jan van der Laan**

# References



Statistics Netherlands (2017) CBS Experimenting with Dot Maps. Online article. <https://www.cbs.nl/en-gb/our-services/innovation/project/cbs-experimenting-with-dot-maps>. Statistics Netherlands, Heerlen, The Netherlands.

Tennekes, M., Jonge E. de (2016) Coloring interactive compositional dot maps. Poster paper presented at the 18<sup>th</sup> EG/VGTC Conference on Visualization (EuroVis 2016), Groningen, The Netherlands.