A statistical representation of urban population and its evolution

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Summary

1. Urban detection using EU method

2. Urban / rural population and access to facilities

3. Go back in time : Evolution of urban population
The EU method

A new approach based on the population grid

Method described in a work paper of 2014

The density depends on the size of the territories: using a grid with the same size resolved this problem

The methodology

uses 1 km² population grid

principle of aggregation of contiguous cells: combination with population size and contiguity

a 3-way classification

densely populated (cities)
intermediate density area (towns and suburbs)
thinly populated area (rural area)
First step: rural grid cells

- Separate urban and rural cells

- Cells of 1 Km²
  - < 300 inhabitants: rural cells
  - > 300 inhabitants: urban cells

- Aggregation contiguous cells
  - < 5,000 inhabitants: rural cells
  - > 5,000 inhabitants: urban clusters
Second step: high-density clusters

separate high-density and intermediate cells

- Urban clusters
  - cells > 1,500 inhab
    - aggregation contiguous cells
      - < 50,000 inhab *intermediate*
      - > 50,000 inhab *high density clusters*
The EU typologie
The EU degree of urbanisation

In France, more than 90% of municipalities (LAU2) are classified in the level 3

Same result in other countries (south)

We decided to create a fourth level to complete the EU typologie
Creation of the fourth level of urbanisation

- cells < 25 inhab
- aggregation contiguous cells
  - < 300 inhab
    - *very thinly populated* (4)
  - > 300 inhab
    - *thinly populated* (3)
The four-way classification of LAU2s

1 Densely populated area (cities)
   • At least 50% living in high density clusters (urban centre)

2 Intermediate density area (towns and suburbs)
   • Less than 50% of population living in rural grid cells;
   • Less than 50% of population living in high density cluster

3 Thinly populated area (rural area)
   • Less than 50% living in urban cells (1 & 2)
   • Less than 50% living in very thinly cells

4 Very thinly area (deep rural area)
   • At least 50% living in very thinly density cluster
The four-way classification of LAU2s in France
2. How to use the degree of urbanisation

How to ensure territorial equity?

Where is it necessary to establish services?

To deal with this issue we need to calculate the distance between each cell and the different services (travel time to reach facilities or public amenities as retails, health services)
Travel time to reach facilities
accessibility and degree of urbanisation
The degree of urbanisation

The 4-way classification:

Identify rural areas and deep rural areas (for rural policy)

Identify territories which have a lack of facilities (target policy to this areas)
3. Evolution of the urban population

Go back in time to describe the « beginning » of cities
We use population of municipalities from 1800 up to now:

- we don’t have population at regular intervals
- we want to represent the major trends in a map and not every local variation

To deal with this issue we use 2 statistical tools :
- spatial smoothing to represent density
- time smoothing (spline function) to estimate population

And we choose videos to represent data
Making videos with density maps

- Use of data from 1800 up to now
- Time smoothing (spline functions)
- Spatial smoothing