

基于分层聚类的老龄化趋势下城市居住空间演变

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摘要:

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The Evolution of the Urban Residential Space under the Aging Trend Based on Hierarchical Clustering Analysis

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Abstract: Population aging is a long-time various trend in the city, which plays an important effect on the evolution of the urban residential space. This paper studied that whether happened "urban local space agglomeration process" or "urban local space concentration process" based on the hierarchical clustering method and analyzed the functional process of the aging trend towards the internal evolution mechanism of urban residential space. The results showed that with the elders passing away and migrating away the above "agglomeration process" or "concentration process" of urban residential space would gradually translate into "discrete process".

Keywords: Hierarchical clustering analysis; population aging; urban residential space

[1,2]

[3]

1 老龄化趋势下城市居住空间演变的作用机理

“ ” [4] “ ” [5]

“ ” [6] “ ”

“ ” [7,8]

“ ” [9]

[10] “ ” “ ”

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”

“ ”[11] “ ” “ ”

“ ”

“ ” “ ” [12]

“ ”

2 基于分层聚类模型的分析框架

“ ” “ ”

| | | | |
|-----------|------|----|------|
| | [13] | | [14] |
| <i>LH</i> | | 60 | |
| <i>LC</i> | | | |
| <i>GL</i> | | 80 | |
| <i>PD</i> | | | |

2.1 指标选取的原因及内涵的说明

LH

LH LC

LH

LH

LC

LH

LH LC

“ ”

LC

LH

“ ”

“ ”

GL

GL

“ ”

GL

“ ” “ ” “ ”

“ ”

PD

PD

PD

2.2 构建分层聚类分析框架

... N

1

表 1 数据结构矩阵

Table 1 Matrix of data structure

| | LC | LH | GL | PD |
|-------|-----------------|-----------------|-----|-----------------|
| | X ₁₁ | X ₁₂ | ... | X ₁₄ |
| | X ₂₁ | X ₂₂ | ... | X ₂₄ |
| | ... | ... | ... | ... |
| N | X _{n1} | X _{n2} | ... | X _{n4} |

2

表 2 对象间的相似矩阵

Table 2 Matrix between similar objects

| | Local | Local | | N Local N |
|-------|-----------------|-------|-------|--------------|
| | r ₂₁ | 22 | ... | 24 |
| | 21 | 22 | ... | 24 |
| | ... | ... | ... | ... |
| N | n1 | n2 | ... | n4 |

SPSS V17

$$r_{ij} = \sqrt{\frac{1}{n} \sum_{k=1}^n (x_{ik} - x_{jk})^2}$$

$$r_{ij} = \frac{\sum (x_{ik} - \bar{x}_{i\cdot})(x_{jk} - \bar{x}_{j\cdot})}{\sqrt{\sum (x_{ik} - \bar{x}_{i\cdot})^2} \sqrt{\sum (x_{jk} - \bar{x}_{j\cdot})^2}}$$

Minkowski $r_{ij} = \sqrt[p]{\sum |x_{ik} - x_{jk}|^p}$

CHEBYCHEV Minkowski $p \rightarrow \infty$ $r_{ij} = \max_k |x_{ik} - x_{jk}|$

[15]

“ ” “ ”

“

”

3 基于分层聚类的老龄化趋势下的城市居住空间演变实证分析

SPSS V17

— R

LH LC GL PD

PD

LH LC PD

3.1 关于聚类方法和类间距计算方式的选取

“ ” “ ”

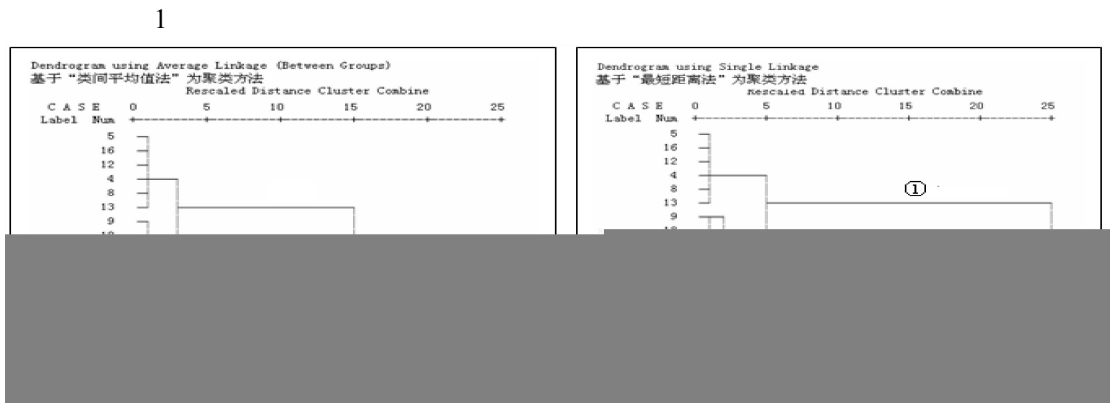


图 1 基于“最短距离法”和基于“类间平均值法”聚类树状图

Fig.1 The clustering tree figure based the methods of the shortest distance and the average value among kinds

注: 1 闸北; 2 杨浦; 3 徐汇; 4 松江; 5 青浦; 6 普陀; 7 浦东; 8 原南汇; 9 闵行; 10 卢 ; 11 ; 12 ; 13 ; 14 浦; 15 ; 16 ; 17 ; 18

Note: 1 Zhabei; 2 Yangpu; 3 Xuhui; 4 Songjiang; 5 Qingpu; 6 Putuo; 7 Pudong; 8 Nanhui; 9 Minhang; 10 Luwan; 11 Jingan; 12 Jinshan; 13 Jiading; 14 Huangpu; 15 Hongkou; 16 Fengxian; 17 Changning; 18 Baoshan.

“ ” 5 15 PD
 PD
 “ ” “ ”
 ”
 SPSS V17 R
 Minkowski CHEBYCHEV

3.2 关于聚类结果的解释

“ ”(1)
 PD LC LH “ ”
 “ ” PD LC LH “ ”
 “ ” 15 20 “ LC ” LH “ LC ”
 LH LC
 “ ” “ ” 1
 “ ”
 LH LC
 “ ” “ ” “ ” “ ”
 ” “ ”
 LC LH
 “ ”(1)
 LC LH
 LC LH

LH LC

”

“ ”(1

PD PD PD

“ ” *LH LC*

“ ” *LH 0.1984 LC*

0.0927 0.1057 0.1008 0.0866

“ ”

3.3 将 *GL* 指标进入上述三指标构成四指标聚类

LH LC GL PD LH LC PD

“ ” *GL*

PD GL GL

PD

3.4 不包括 *PD* 指标的 *LH*、*LC* 和 *GL* 三指标聚类

PD LH LC GL “ ”

“ ”

LH LC GL “ ” :

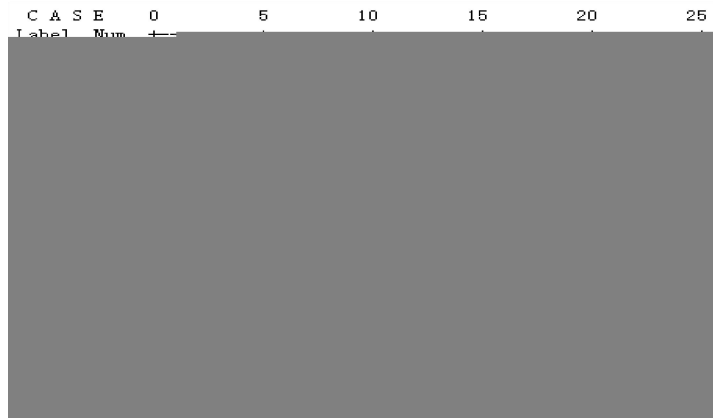


图2 基于“类间平均值法”的 *LH*、*LC* 和 *GL* 三指标聚类树状图

Fig.2 The clustering tree figure of *LH*, *LC* and *GL* based on the average value among kinds

LH LC GL LH LC PD PD

LH LC PD PD

GL “ ”(2 *GL*

4 进一步说明和结论

LH LC GL 4

表4 三层次 *LH*、*LC* 和 *GL* 均值表
Table 4 The average values of *LH*, *LC* and *GL* levels

| | <i>LH</i> | <i>LC</i> | <i>GL</i> |
|-----|-----------|-----------|-----------|
| “ ” | 0.2300 | 0.2726 | 0.2247 |
| “ ” | 0.2134 | 0.1952 | 0.1849 |
| “ ” | 0.1983 | 0.1234 | 0.1540 |

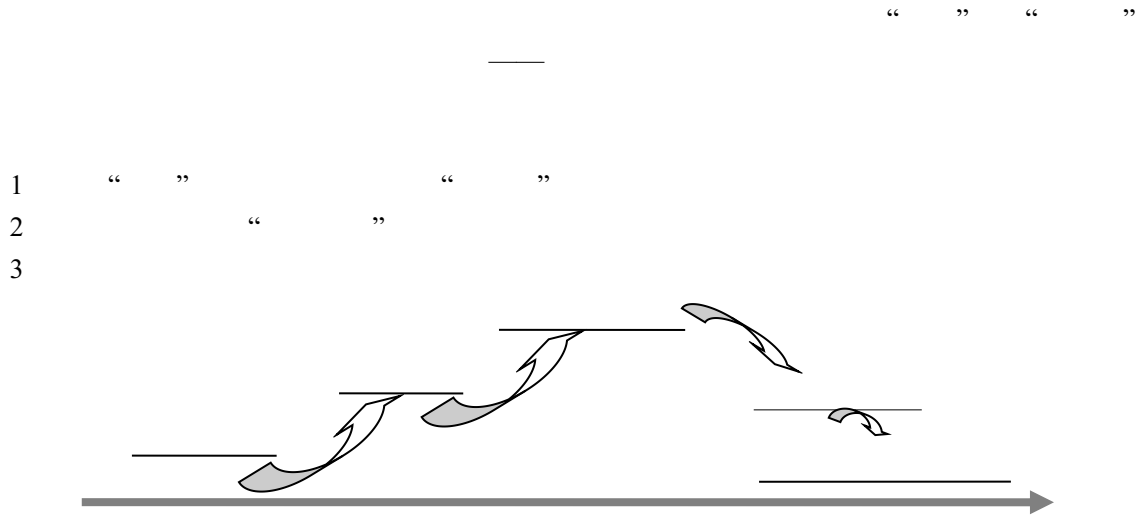


图3 城市社区“波浪式”演变过程
 Fig.3 The wavy evolution process in urban communities

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