

	1,2	2*	2	1	1	2	2
(1.			/				430079
2.			/				100081)

Logistic

2000—2010
0.76

F302.5 A 1000 3037(2016)10 1773 10
DOI 10.11849/zrzyxb.20151259

[1]

“ ” “ ”

[2]

[3-4]

[5]

e

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GDP

[8-9]

[10-11]

[12]

[13-14]

[6-7]

1

1.1

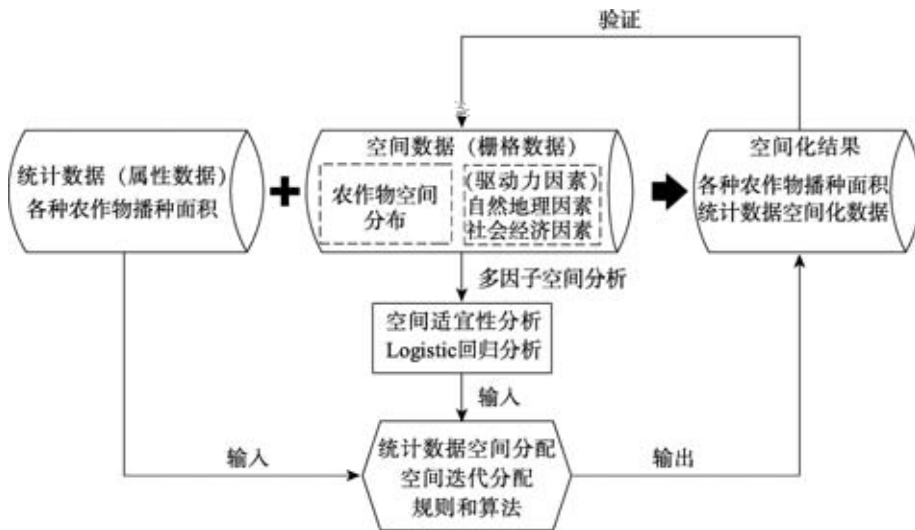
[15]

[16-17]

1

Lo-

gistic



1

Fig. 1 The flowchart of spatialization of statistic data

1.2

Logistic

$$\text{Log} \frac{1 - P_i}{P_i} = \beta_0 + \beta_1 \times X_{1i} + \beta_2 \times X_{2i} + \dots + \beta_n \times X_{ni} \quad (1)$$

P_i i X
 Logistic
 95% 0.05

[2] Logistic

1 1 0

1

Table 1 Conversion matrix of different crops

	0	1		
	1			
S_u	0	1	0	1
			1	
				$ELA-$
				1
				0
				0
				1
				1

$$TPROP_{i,u} = P_{i,u} + ELAS_u + ITER_u \quad (2)$$

$TPROP_{i,u}$ i u $P_{i,u}$ Logistic
 $ELAS_u$ u $ITER_u$ u

$ITER$

$TPROP$

$ITER$

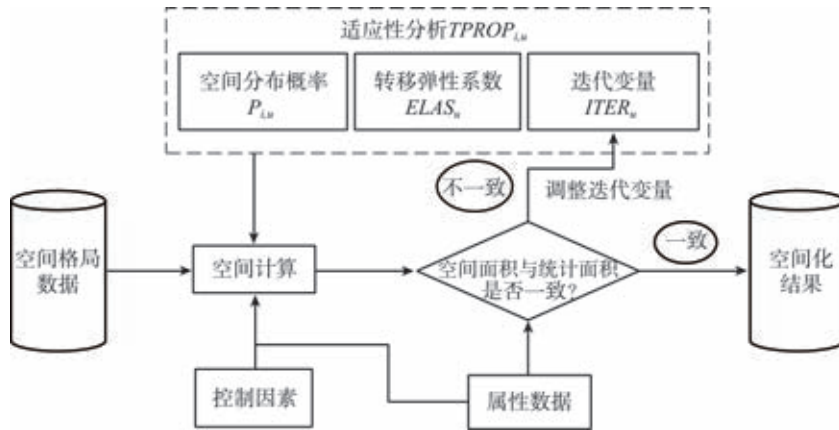
$ITER$

2

2

2.1

115°05'~135°02'E 38°40'~53°34'N



2

Fig. 2 Iterative allocation procedure of statistic data

79.18×10⁴ km²
[18-19]
 21
 " "

26.44×10⁴ km²
[20]
 43.1% 33.0% 14%
 2015

16.5%
 1×10⁸ t
[21]

2.2

4
 2
 MIRCA 2000
 4
 DEM 0 10 GDP
 1 km
 20 DEM

2.3

95% 0.05
 3
 ROC [22] ROC 0.5 1
 Logistic

2

Table 2 Data list and data sources

2000—2010				1 km
		MIRCA 2000		
DEM		1 km		
			500 m	
			1 km	
	0		500 m	
	10		500 m	
		FAO		
	1 3			
	1 3			
				1 km
			/km ²	
GDP				1 km
			10 ⁴ /km ²	

3

ROC 0.85~0.95

ROC 0.95

ROC 0.91 0.88

ROC 0.85

Logistic

Logistic

3

2000

Logistic

4 2000 2005 2010

2000

2005

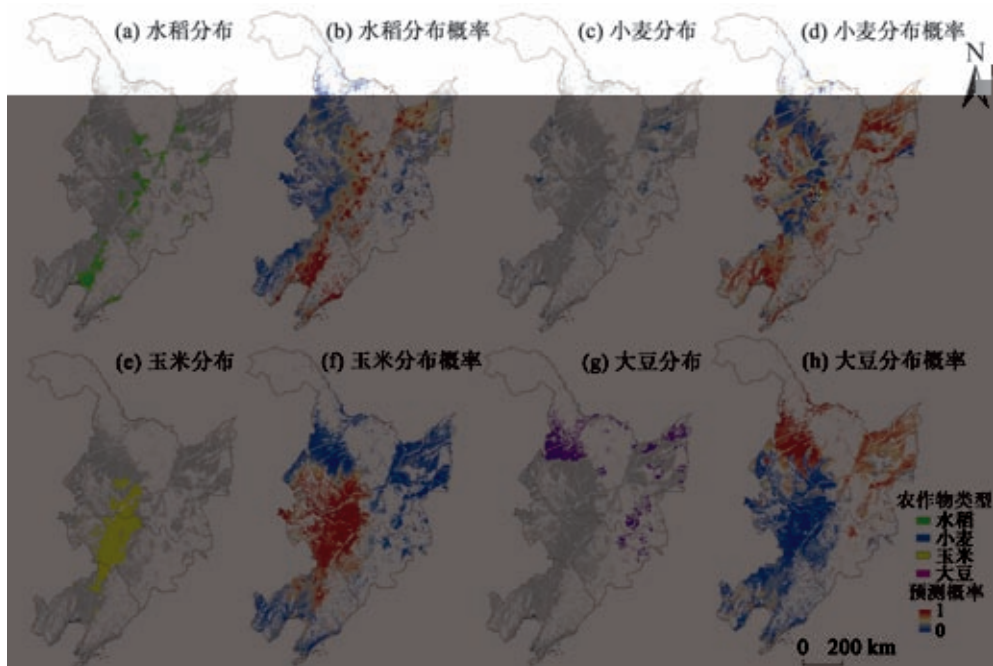
Costanza

[23] 2005

3

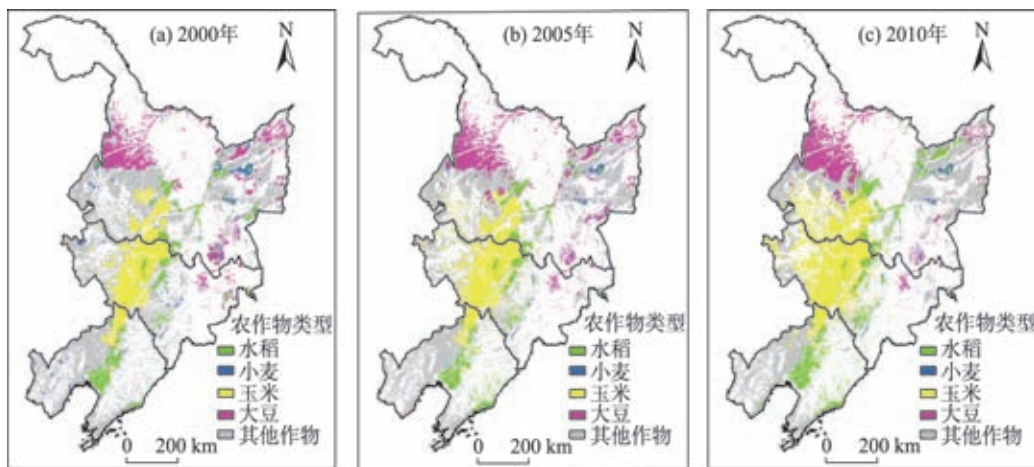
Table 3 Regression analysis of crops and driving factors

	19.599 0	45.132 0	802.484 0	268.845 0	50.763 0
	0.002 0	0.002 2			0.001 1
DEM	0.006 0	0.000 7	0.004 4	0.000 8	0.003 0
GDP	0.001 0	0.000 4	0.001 7	0.003 8	
	0.004 0	0.005 1	0.008 1	0.003 1	0.005 6
	0.001 0	0.000 3	0.000 4	0.000 6	0.000 3
	0.007 0	0.003 7	0.003 1	0.001 0	
			0.000 4		
		0.000 4	0.091 0		
0	0.093 0	0.022 6	1.383 3		0.015 9
	0.081 0			0.678 5	0.049 3
10	0.062 0	0.043 2	0.612 7	0.422 4	
	0.026 0	0.054 5	0.313 3	0.059 1	0.031 3
_1		0.845 3			0.702 0
_2		2.434 8			0.699 0
_3		1.182 2			0.857 6
_4		2.221 6			0.841 9
_5		1.753 0			0.860 0
_6					
_7		1.773 8			
_8		1.388 7		4.502 4	
_9					
_10					2.360 7
_11					
_12		0.546 0			
_13		0.679 4			
_14					2.005 9
_15		2.579 7			2.535 6
_16					0.188 5
_17		0.776 6			0.357 4
_18					2.356 2
_19		3.585 1			
_20					
_1		0.735 2		1.329 4	0.467 0
_2		2.848 9		0.451 4	
_3		3.101 2	2.318 0		
_4		1.530 3	1.600 0		
_5		1.803 1		1.180 3	0.414 1
_6			1.999 2	2.130 6	0.343 6
_7		1.941 6	1.268 9	1.372 4	
_8			1.812 9		
_9		1.028 7		3.131 9	
_10		0.790 9		1.456 3	1.215 3
ROC	0.91	0.88	0.95	0.91	0.85



3

Fig. 3 Comparison of real distribution and distribution probability of four crops



4 2000 2005 2010

Fig. 4 Spatialized crop patterns in the Northeast China in 2000, 2005 and 2010

Logistic

gistic

Lo-

CA 2000

2000 10 km
MIRCA

MIR-

0.76

(References):

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Spatialization of Statistical Crop Planting Area Based on Geographical Regression

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Abstract: The spatial pattern of crops reflects the planting structure and characteristics of crops, which is an important basis for understanding agricultural resource utilization and adjusting crop planting structure. This study aims to explore the method for specializing statistical data of crop planting area, and thus spatially express historical agricultural statistics data. This study used the traditional agricultural statistical survey data and remote sensing imagery data with geographic information technologies. The spatial probability distributions of suitabilities of crops are estimated using the Binary Logistic regression analysis that characterizes the relationships between the crop planting structure and the geographical factors as well as social-economic factors. Based on the spatial probability distribution, the statistical data of crop planting area were spatially distributed by using spatial iterative allocation. Northeast China was taken as the study area and the spatial expression of sown area in this area during 2000-2010 was completed. The spatial accuracy of 0.76 was achieved by using this multi-scale and multi-resolution analysis method, which demonstrated it is superior in spatially expressing statistical data of crop planting. The method can be taken as an effective complement for crop field survey and remote sensing-based crop interpretation, and thus provides novel technical means for enriching crop spatial data.

Key words: crop; planting area; statistical data; spatialization; geographical regression