

基于决策树分类的土地覆盖信息提取研究

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摘要:

ETM+ DEM
NDVI NDWI SAVI NDBI

86.49% Kappa 0.8367

关键词: ; ETM+;

中图法分类号: S159.2

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Study on Soil Cover Information Extraction Based on Decision Tree Classification

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Abstract: To get a lot of information from land cover extraction at a convenience, celerity and accuracy, this paper fully used the characteristics of ETM + multispectral data, the DEM elevation information and the relevant knowledge about a slope, orientation etc. combining with each index of NDVI, NDWI, SAVI, NDBI to establish the decision tree model of land cover information extraction and verify its precision. The result showed that it was suitable enough for the extraction of land cover information and its precision wet up to 86.49%, the Kappa coefficient was 0.8367.

Keywords: Soil cover; ETM+; decision tree classification; information extraction

[1]

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[2-3]

ISODATA

K-

[7]

[4]

[5]

[6]

[7,8]

[9]

Landsat7 ETM+

ENVI

NDVI NDBI NDWI SAVI

DEM

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1 研究区概况及数据来源

1

1.1187×108 km²

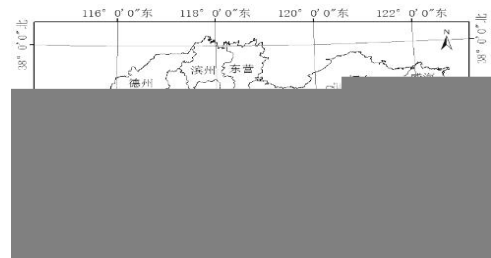


图 1 研究区地理位置图

Fig.1 Geographical location of the study area

[10]

ETM+	SRTM	DEM	Landsat	ETM+		
ETM+			Landsat7		+	16 d
30 m	ETM+		7	1	(450~515 nm)	2
(525~605 nm)	3		(630~690 nm)	4	(760~900 nm)	5
(1550~1750 nm)		6		(10400~12500 nm)	7	
(2090~2350 nm)						
					ETM+	
6	8					2000
6	8	ETM+				2002

2 研究方法

/

IGBP

[9]

8

1

表 1 分类体系标准

Table 1 Standards of classification system

NO.	Type	Description
1		
2		>60% 2 m
3	>60%	2 m
4		
5		
6		
7		
8		

2.1 光谱特征分析

8 Landsat ETM+

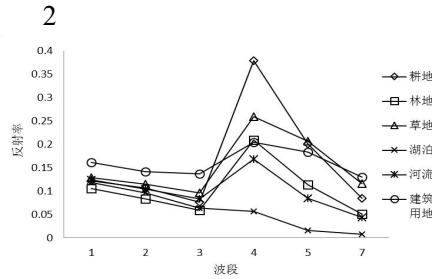


图 2 土地覆盖类型波谱曲线 Fig.2 Spectral curves of land cover types

2 4 1 2 3

2.2 土地覆盖信息提取

[12] NDVI [13]

$$NDVI = (b_4 - b_3) / (b_4 + b_3) \quad (1)$$

b₃ ETM+ 3 b₄ 4 NDVI

NDVI

MeFeeters (NDWI) [14]

$$MNDWI = (b_2 - b_7) / (b_2 + b_7) \quad (2)$$

(MNDWI) 2 b₂ ETM+ 2 b₇ 7 MNDWI

[17] GNDWI GNDWI 0

$$GMNDWI = \frac{MNDWI - \overline{MNDWI}}{\sigma} \quad (3)$$

NDWI \overline{MNDWI} MNDWI σ MNDWI

GMNDWI Gauss Modified

DEM 1984

[18]

$\leq 2^\circ$

$> 6^\circ$

NDVI 0.2 NDVI SAVI [19] Huete 4

$$SAVI = [(b_4 - b_3) (1 + L)] / (b_4 + b_3 + L) \quad (4)$$

b₃ ETM+ 3 b₄ 4 L

0~1 0.5 [20]

NDBI 5 NDBI = (b₅ - b₄) / (b₅ + b₄) [21] (5)

b₄ ETM+ 4 b₅ 5

NDBI [19]

3 结果与分析

3.1 决策树模型构建

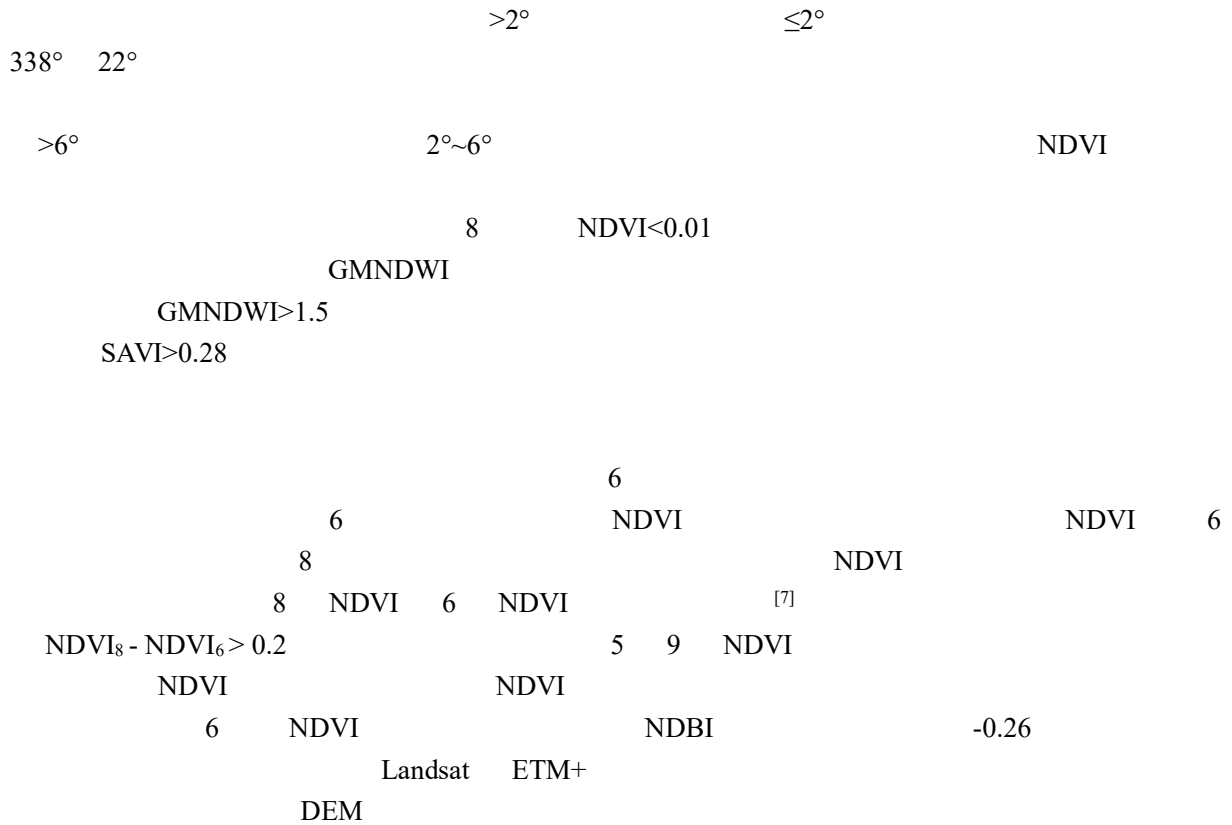


图 3 济宁市土地覆盖分类决策树

Fig.3 L and cover classification decision tree in Jining City

3.2 分类结果与精度验证

DEM

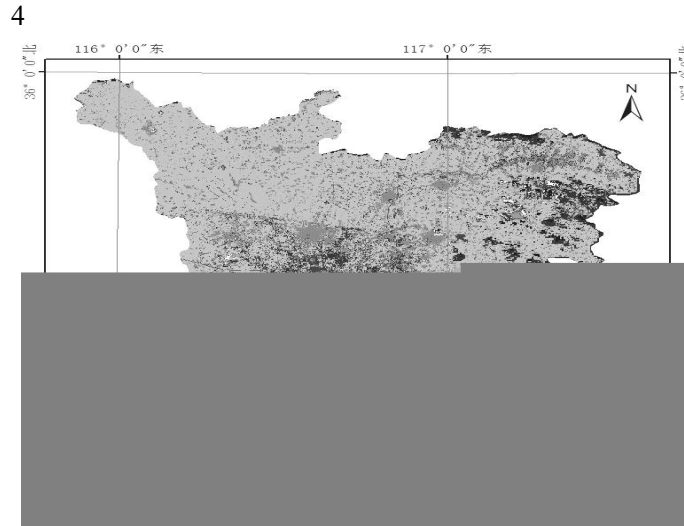


图 4 济宁市土地覆盖分类
Fig.4 Land cover classification in Jining City

4

2.5 m

SPOT
SPOT

Kappa

2

ETM+

表 2 决策树分类误差矩阵
Table 2 Error matrix of decision tree classification

Items	Lakes	Rivers	Farmland	Grassland	Forestland	Bare land	Architectural land	Total	Precision
	241	49						290	83.10
		111	11					138	80.43
		6	180					186	96.77
			39	63	29	8		139	45.32
					198	9		207	95.65
			2			77	18	97	79.38
			7				372	379	98.15

: =1242/1436= 86.4903%; Kappa =0.8367
Note: Overall classification precision was 86.4903%; Kappa coefficient was 0.8367.

3

kappa 0.8367 73.2651% 86.4903%

表 3 最大似然法与决策树分类法结果比较
Table 3 Comparison between maximum likelihood method and decision tree classification method

Methods of classification	% Precision							Total	Kappa coefficient
	Lakes	Rivers	Farmland	Grassland	Forestland	Architectural land	Bare land		
	88.97	74.21	97.34	78.95	50.14	70.92	50.88	73.2651	0.6831
	83.10	80.43	96.77	45.32	95.65	98.15	79.38	86.4903	0.8367

4 讨论

5 结论

ETM+
 DEM
 86.49% kappa
 0.8367
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