多信息融合的云检测方法研究

毕业答辩

张继元

2013217498

电信科13-01

指导教师：李春华

云量

- 视野所及天空被云遮蔽的比例
- 气象观测重要数据
- 人眼观测的局限性

文献中的传统方法

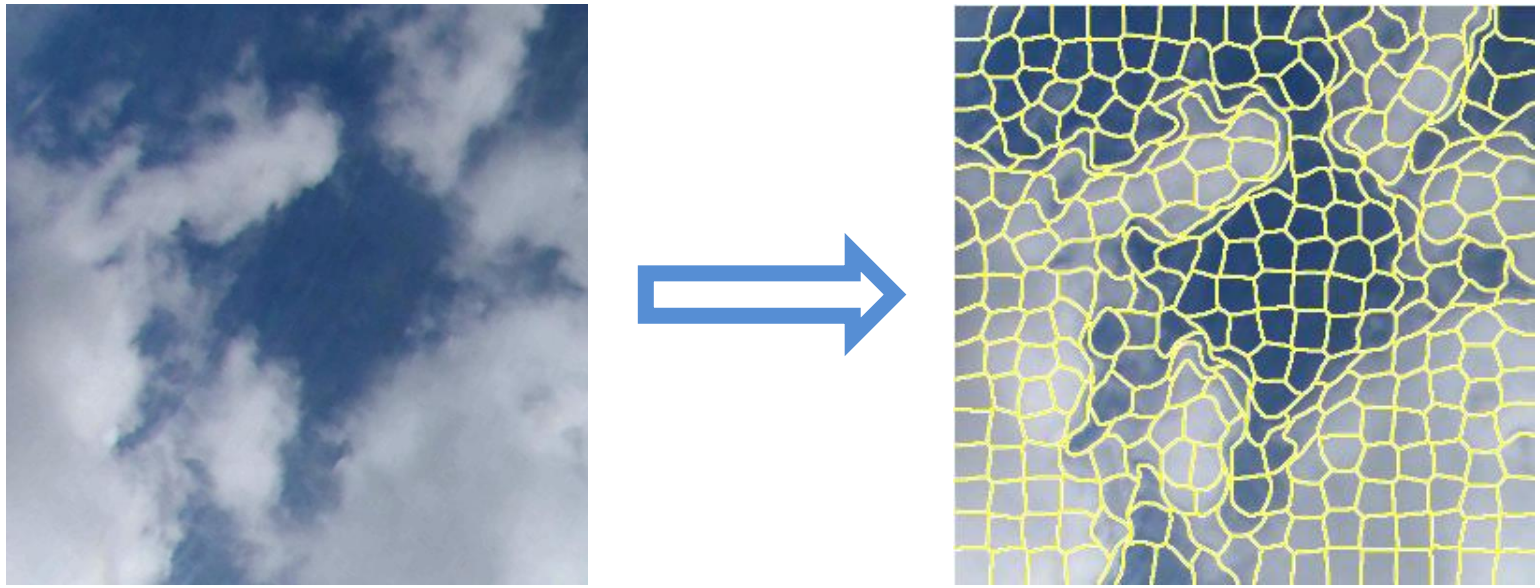
- 固定阈值法
  - ✓ RGB色彩通道
  - ✓ 人工经验确定阈值
  - ✓ 规则性强，适应性差
- 基于大津阈值法的自适应方法
  - ✓ 非均匀光照影响大
- 自动图割法
  - ✓ 最大流(max flow)/最小割(min cut)算法R/B
  - ✓ 运算量大，速度慢

超像素分割

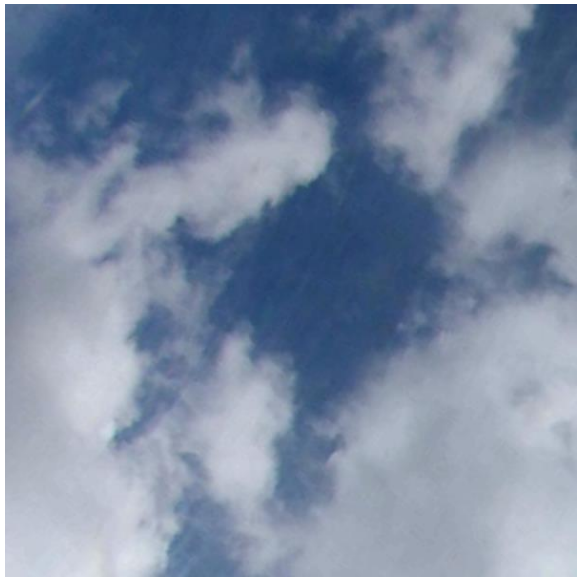
- 像素级 → 区域级

- 相似性
  - ✓ 颜色
  - ✓ 亮度
  - ✓ 纹理

- SLIC
  - ✓ LAB颜色空间
  - ✓ K-means聚类



Well



原图

R-B=30

R/B=0.6

B/R=1.3

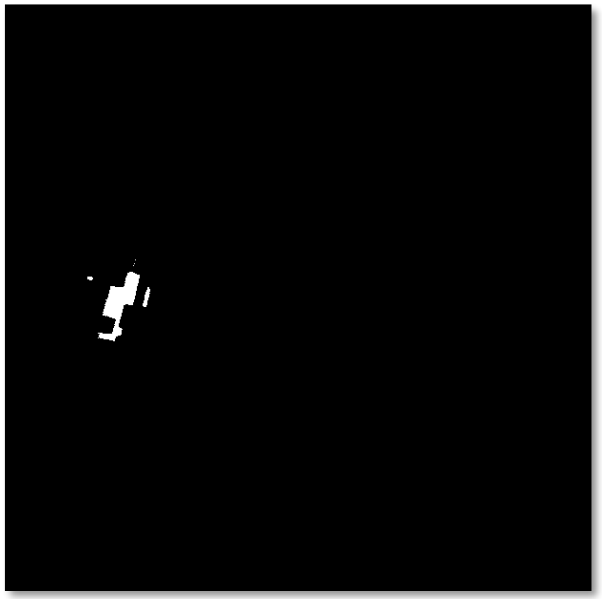
Ground Truth

Adaptive

Graph-cut

SLIC+B/R=1.4

原图



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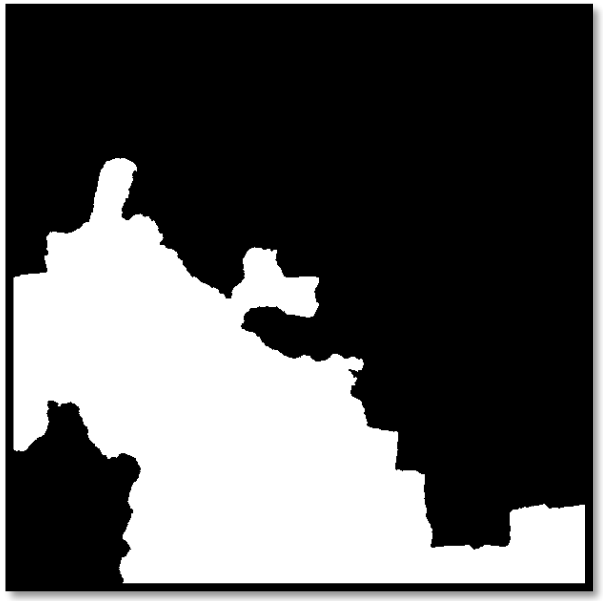
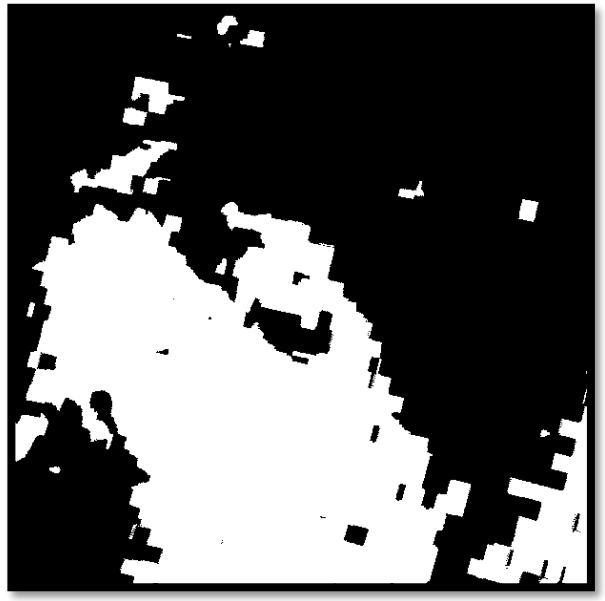
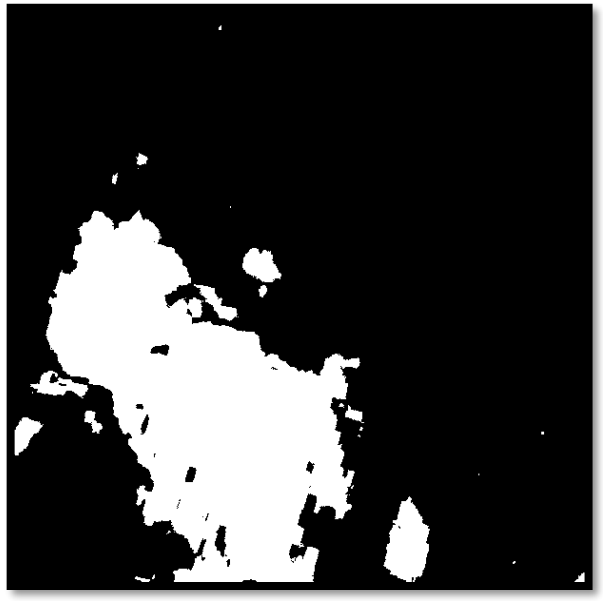


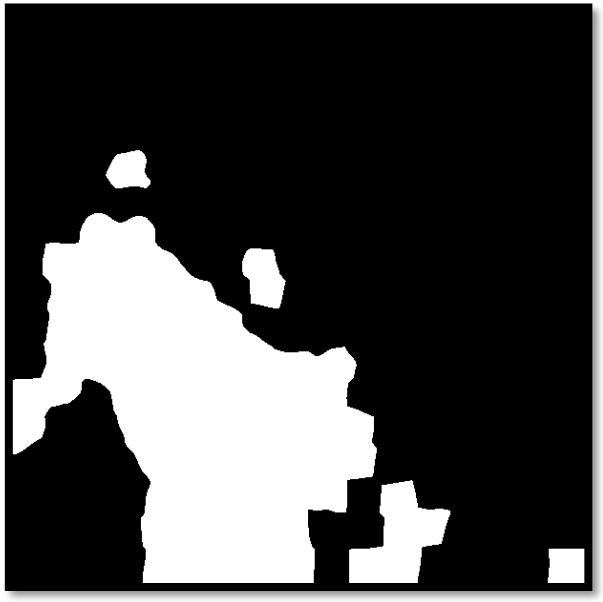
Ground Truth



Adaptive

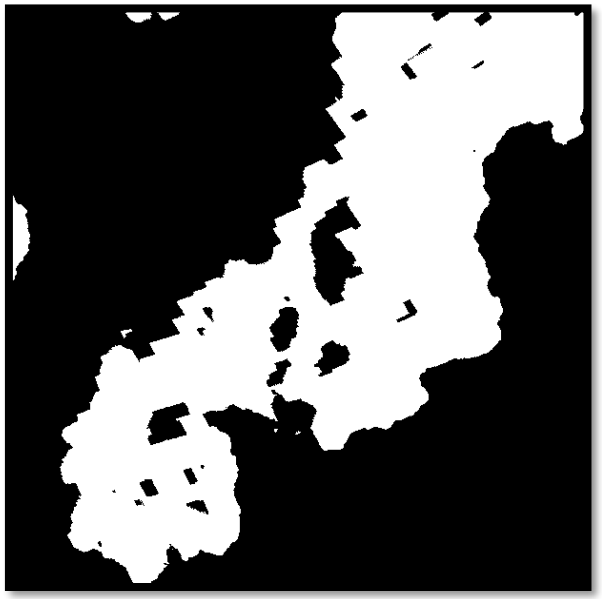


Graph-cut



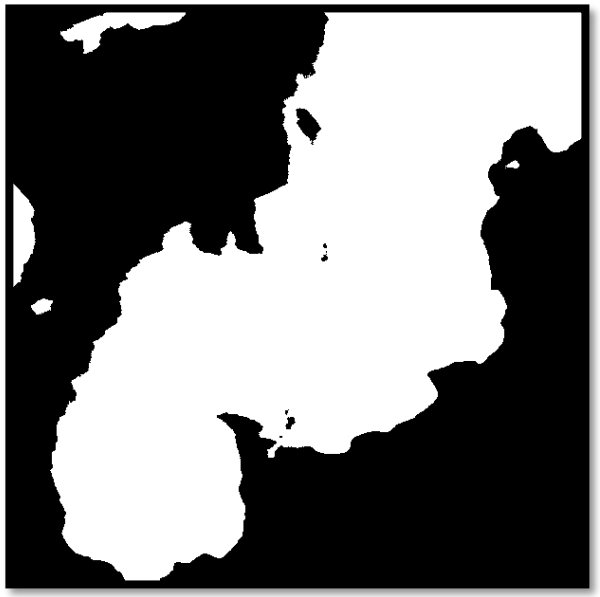
SLIC+B/R=1.4

原图

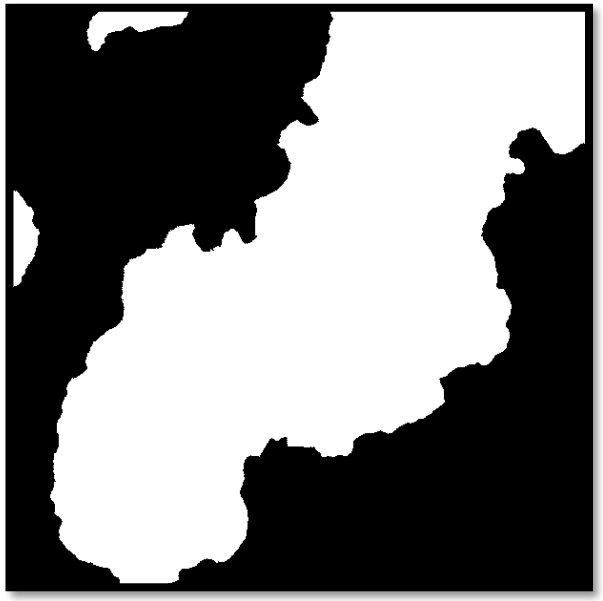


R-B=30

R/B=0.6



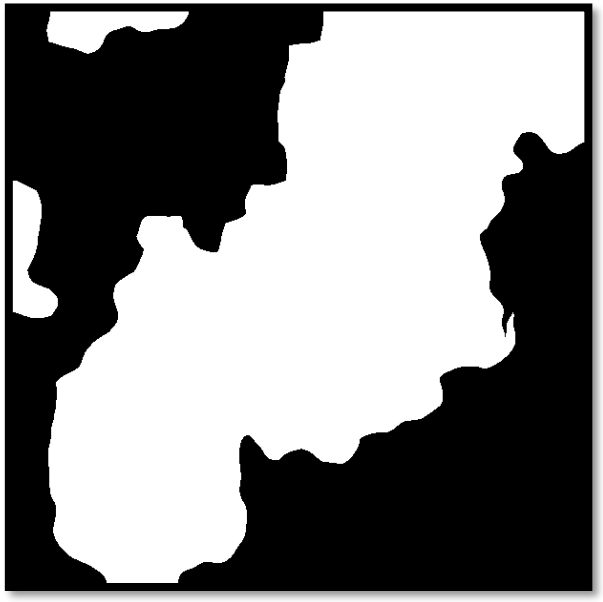
B/R=1.3



Ground Truth

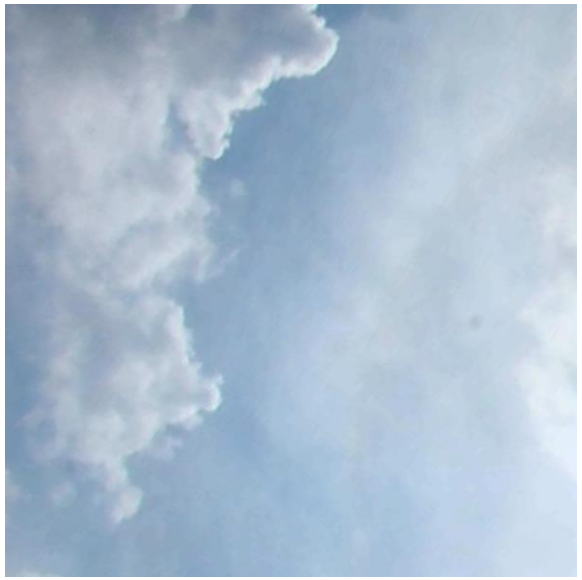
Adaptive

Graph-cut



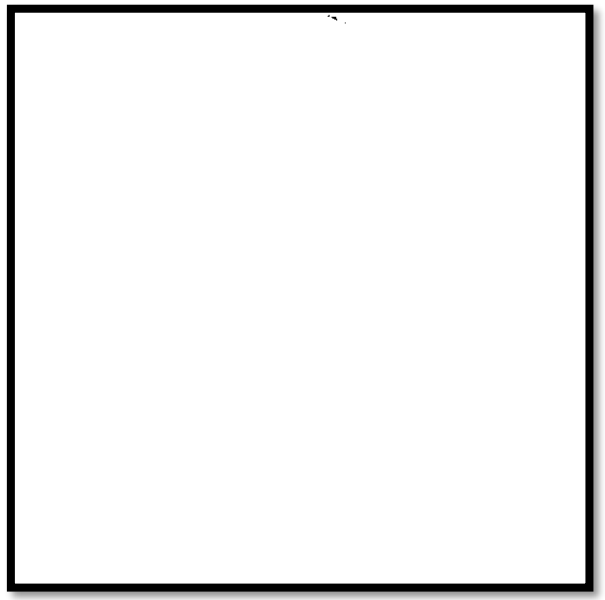
SLIC+B/R=1.4

Bad



原图

R-B=30



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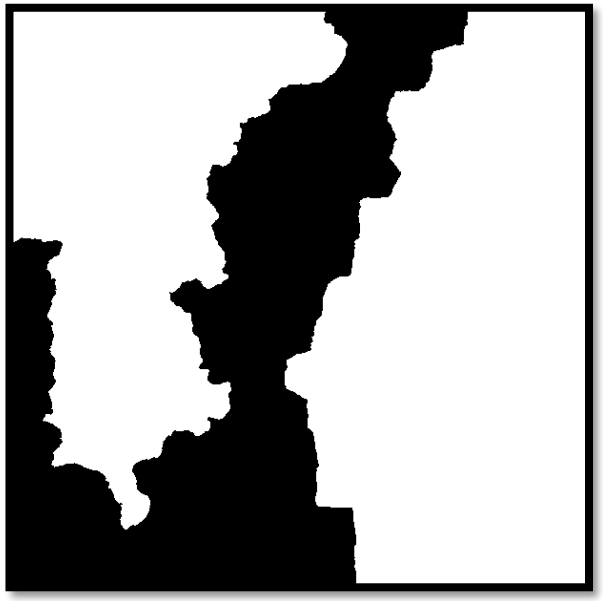

Ground Truth

Adaptive

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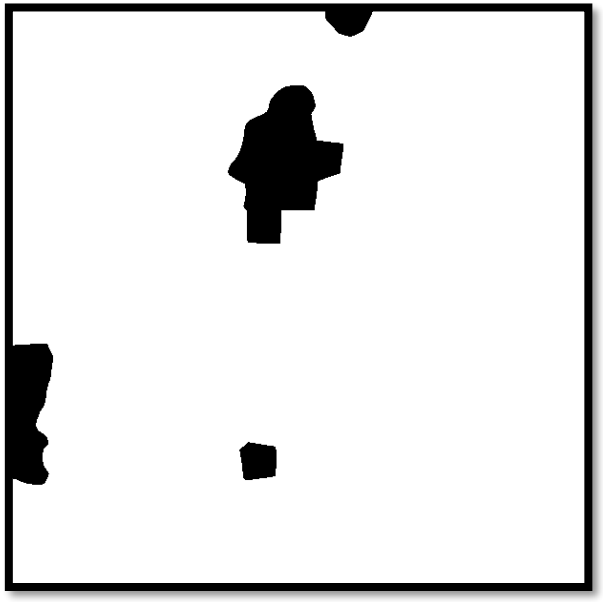

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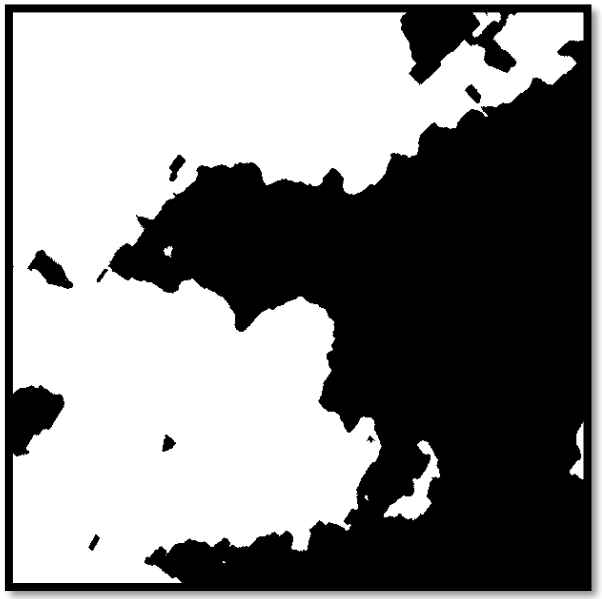

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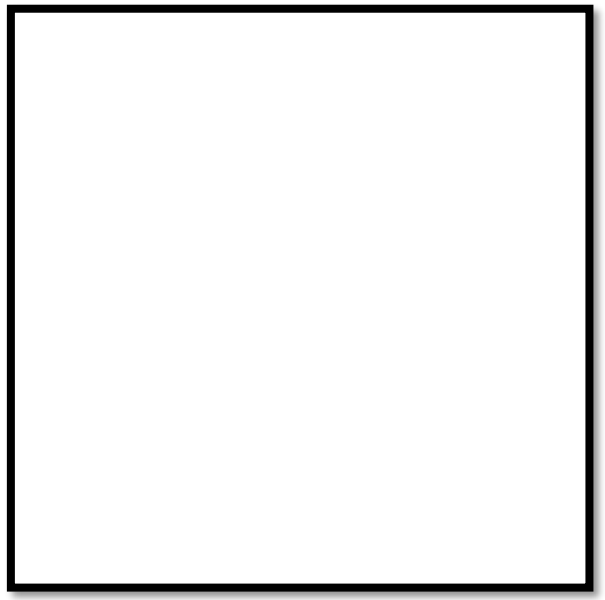

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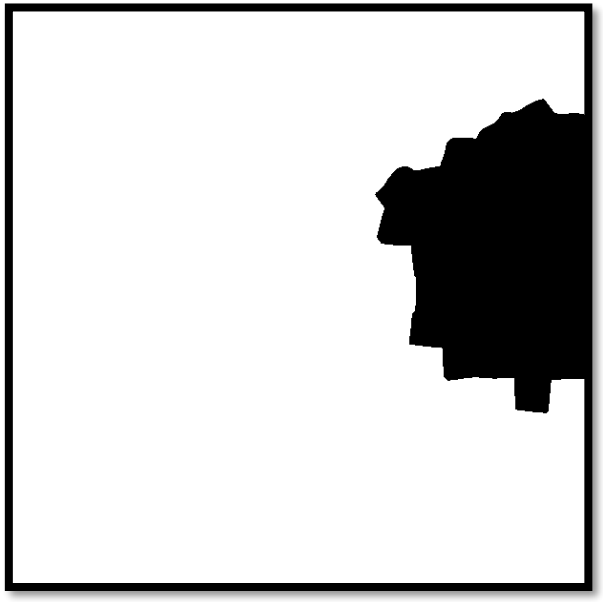
B/R=1.3

Ground Truth

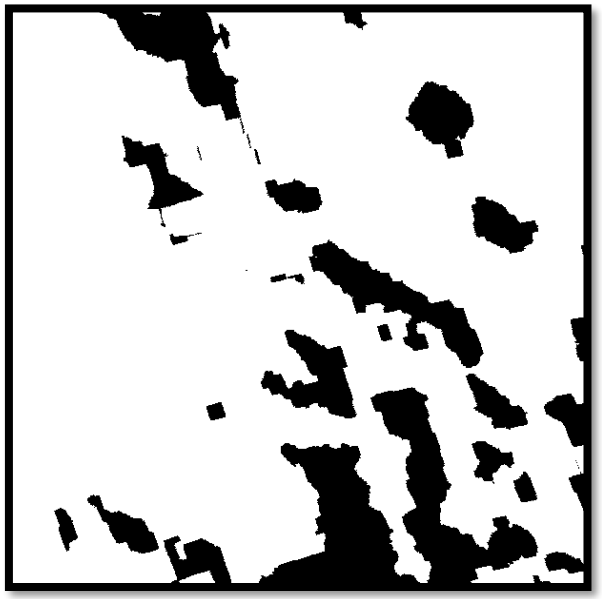
Adaptive

Graph-cut

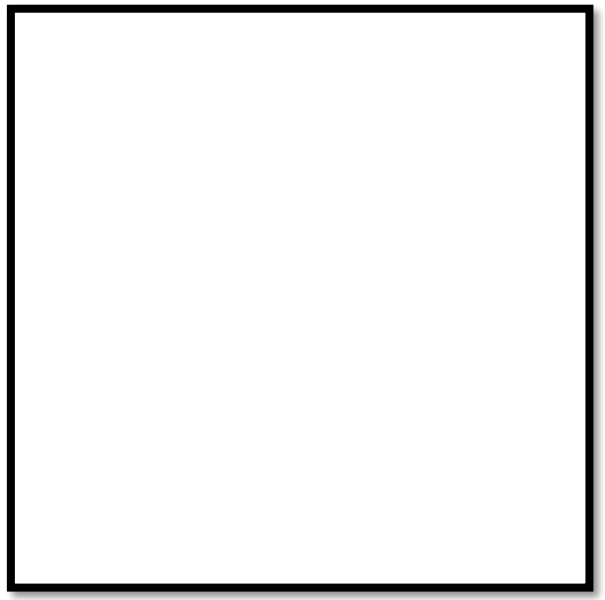


SLIC+B/R=1.4

原图



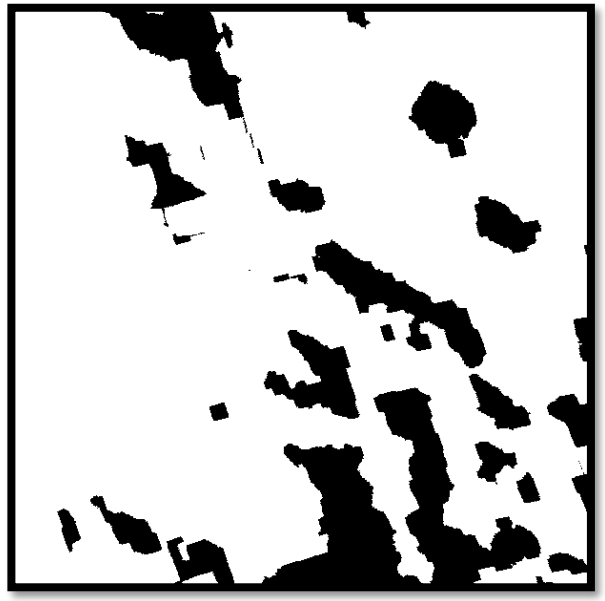
R-B=30



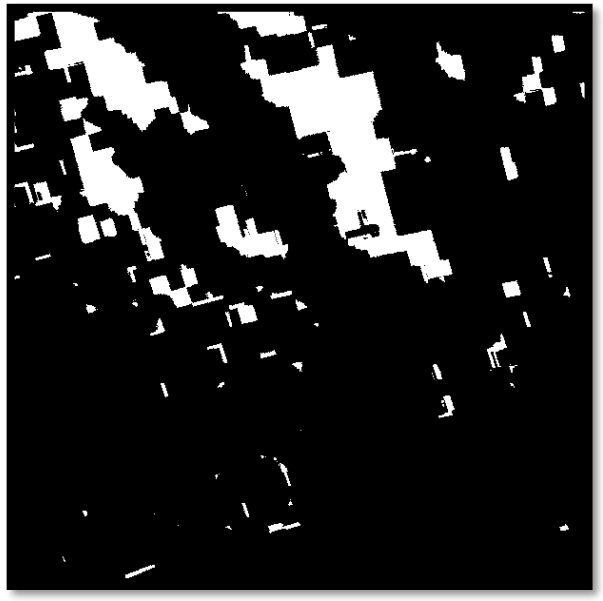
R/B=0.6

B/R=1.3

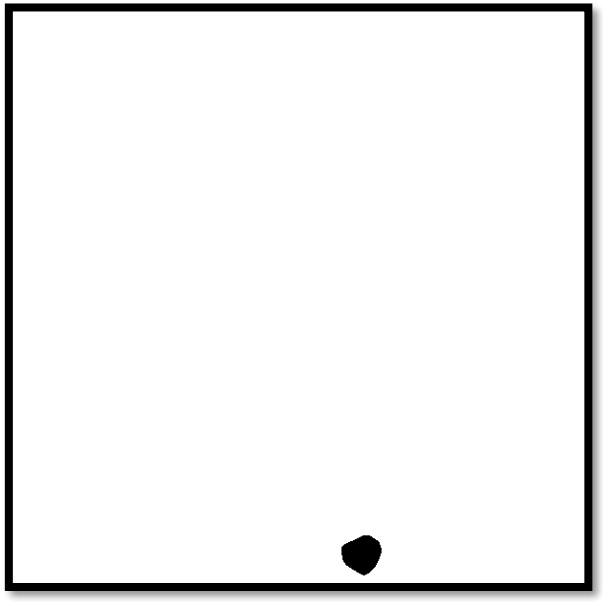
Ground Truth



Adaptive

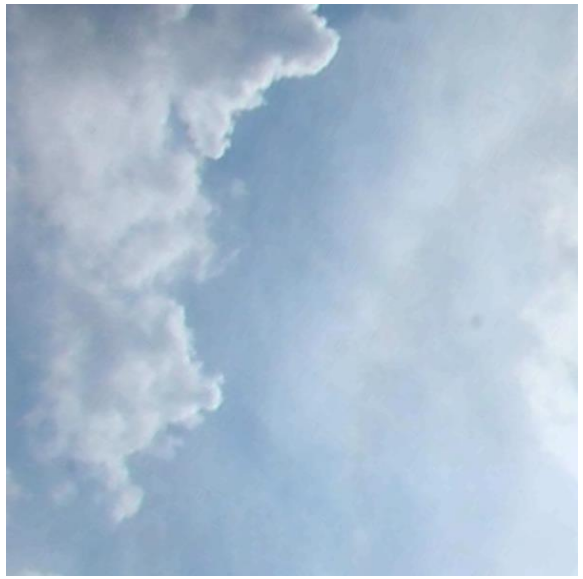


Graph-cut

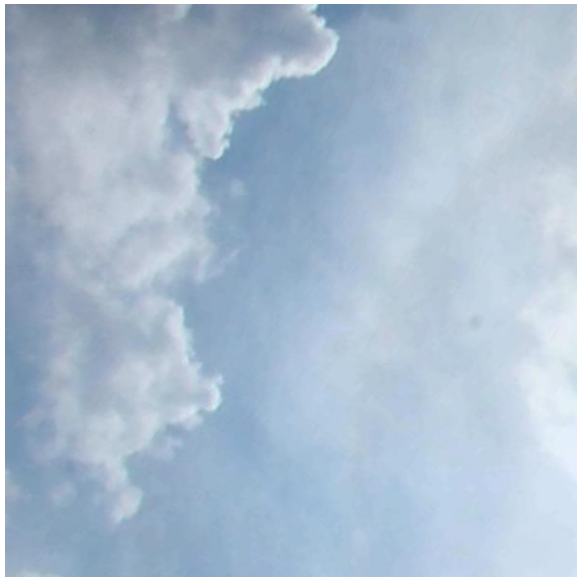


SLIC+B/R=1.4

Can we do it better ?



- 强光影响
- 整体偏亮

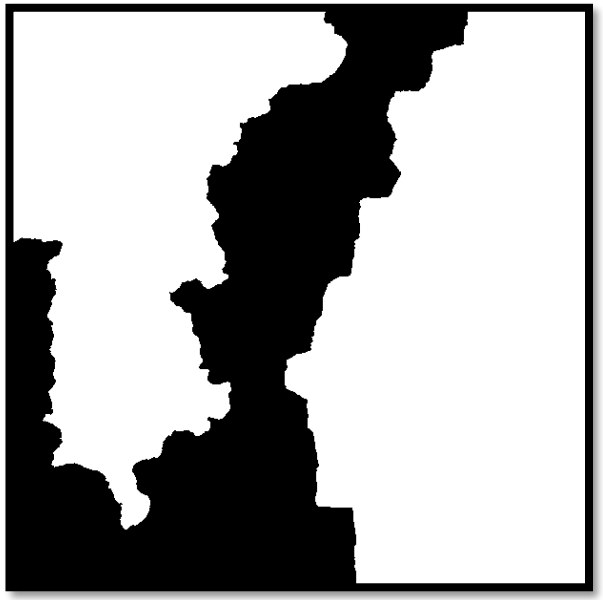


原图

B/R=1.2

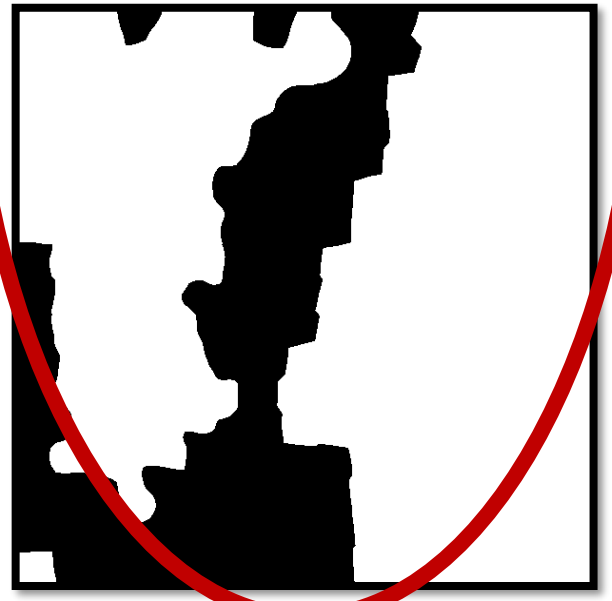
B/R=1.3

B/R=1.4

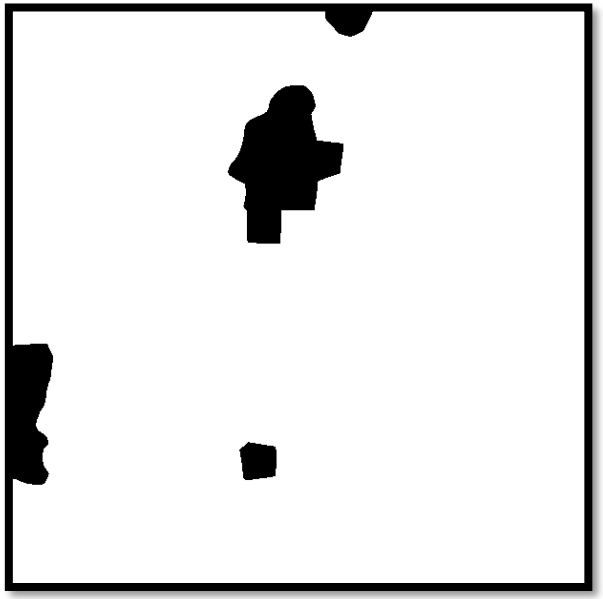


Ground Truth

SLIC+B/R=1.2



SLIC+B/R=1.3

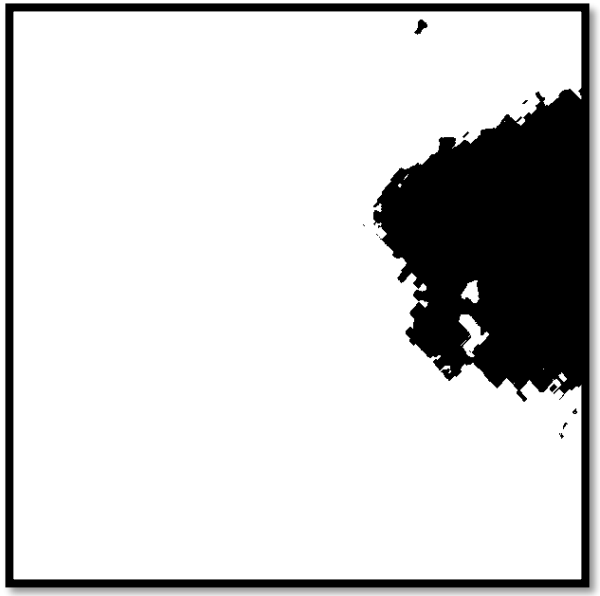


SLIC+B/R=1.4

原图

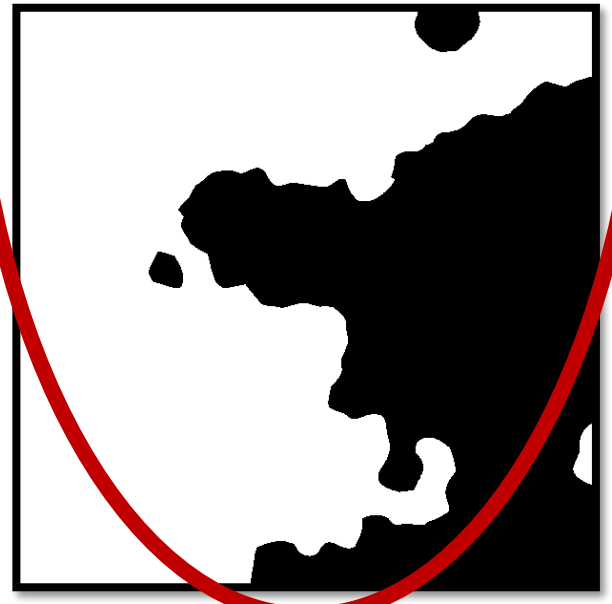
B/R=1.2

B/R=1.3



B/R=1.4

Ground Truth



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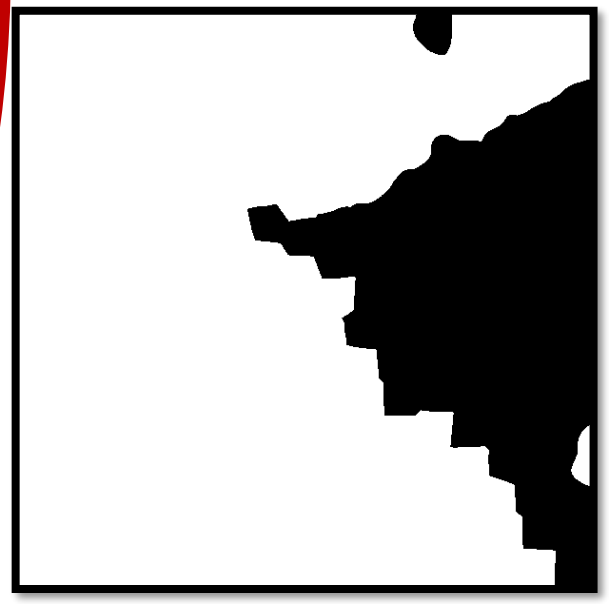

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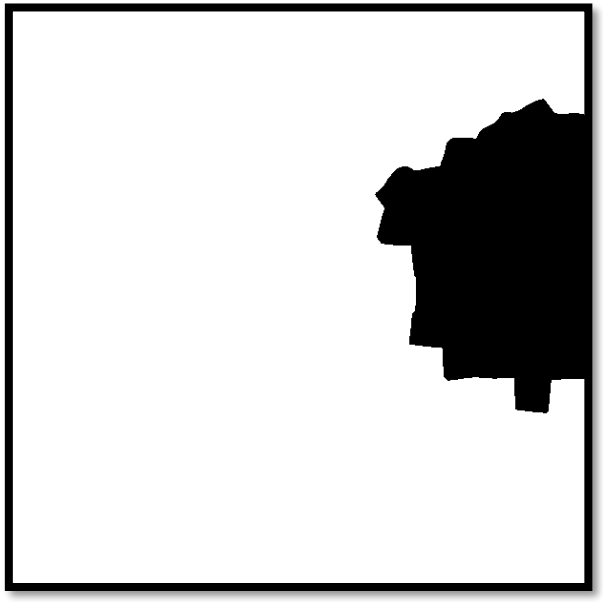
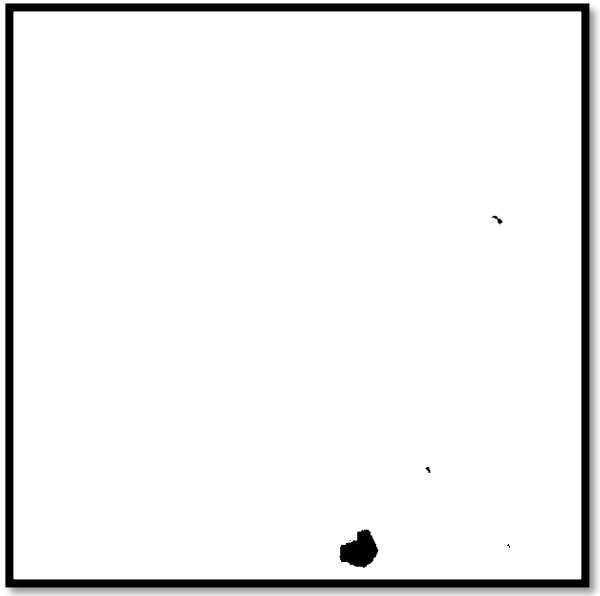


SLIC+B/R=1.4

原图

B/R=1.2

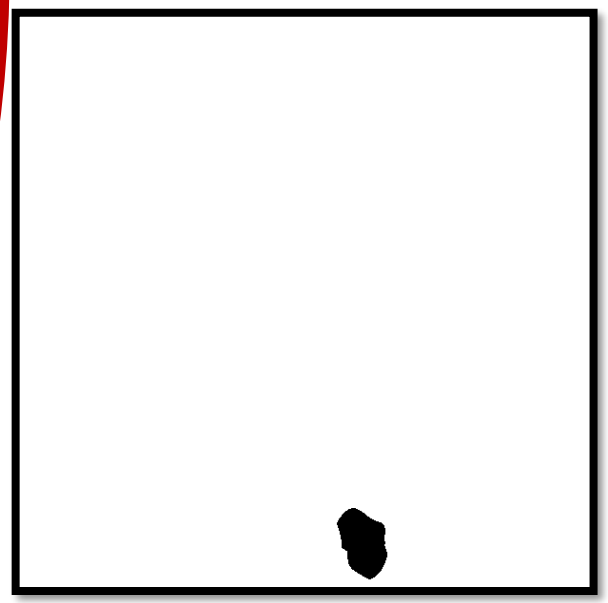
B/R=1.3



B/R=1.4

Ground Truth

SLIC+B/R=1.2



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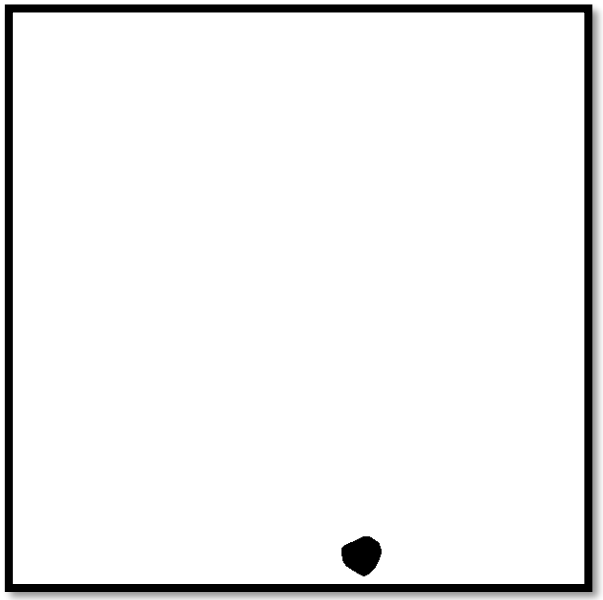

SLIC+B/R=1.4

数据分析

- 统计学方法分析数据

  - ✓ Precision
  - ✓ Recall
  - ✓ F-score
  - ✓ Misclassification rate

数据集	算法	精度（Accuracy）	查全率（precision）	查准率（recall）	F1值（F1 score）
SWIMSEG	B-R=30	0.735	0.979	0.475	0.580
	R/B=0.6	0.845	0.842	0.906	0.840
	B/R=1.3	0.826	0.971	0.672	0.743
	RatioAda	**0.889**	0.925	0.882	**0.883**
	DiffAda	0.887	0.912	0.818	0.866
	AGC	0.791	0.976	0.657	0.751
	SLIC+RatioAda	**0.899**	0.929	0.882	**0.885**
	SLIC+DiffAda	0.879	0.922	0.835	0.861
	SLIC 亮度分段	**0.960**	0.758	0.810	**0.867**
CASIA	B-R=30	0.835	0.984	0.674	0.767
	R/B=0.6	0.903	0.857	0.970	0.899
	B/R=1.3	0.892	0.983	0.795	0.858
	RatioAda	**0.904**	0.918	0.902	**0.899**
	DiffAda	0.888	0.973	0.836	0.892
	AGC	0.805	0.974	0.700	0.794
	SLIC+RatioAda	**0.913**	0.938	0.908	**0.913**
	SLIC+DiffAda	0.883	0.917	0.860	0.880
	SLIC 亮度分段	**0.918**	0.958	0.869	0.895

感谢聆听！