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Application of J48 Decision Tree for the Identification of water bodies using Landsat 8 OLI Imagery

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CONTENTS

Introduction

- Water is essential component.
- It balances ecosystem as well as maintains climate variation, carbon cycle etc.
- Hence, identification of such water bodies are essential and can be useful in various ways such as estimation of water availability, demarcation of flooded regions, wetland inventory and so on.

Introduction

- With increased availability and improved quality of multi-temporal remote sensing data, identifying water bodies has been quite easier.

- In past decades, Landsat sensors have been used for land use classification using various unsupervised and supervise methods.

- With the introduction of new OLI sensor in Landsat 8 with improved qualities, the accuracy of classification has been much improved.

Introduction

- With the development of Geographic Information Science (GIS) and computer sciences, several contributions has been developed for automatic feature identification.

- Some well-known multiband water classification methods are:
  - Normalized Difference Water Index (NDWI)
  - Modified NDWI (MNDWI), and
  - Automated Water Extraction Index (AWEI.

Introduction

- With advancement in technology, the resolution of data are increasing, increasing in data size, and thus requiring more robust and faster methods of detection with high accuracy.

- For such problem, new data mining methods such as neural network, neurologic, decision tree, vector machines etc. are to be explored.

- These data mining techniques has been proposed, implemented and shown good identification capability in many other fields.

Objective

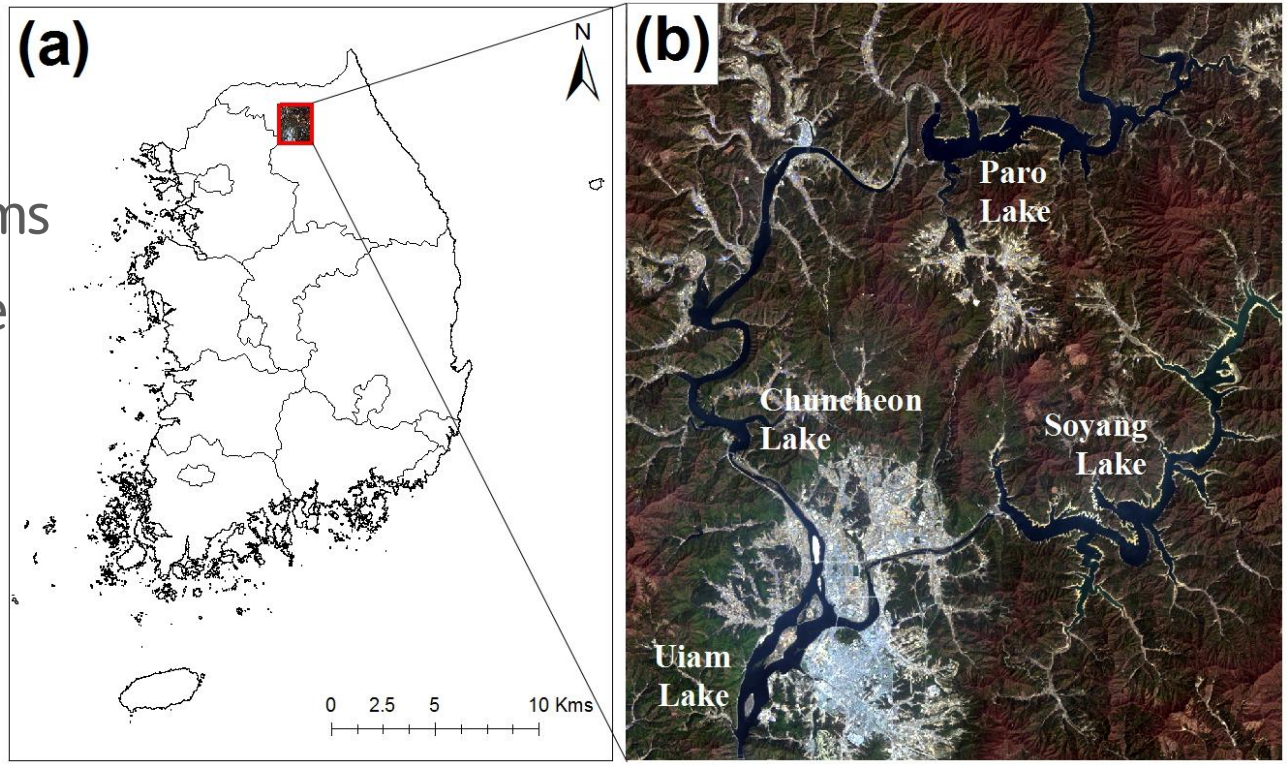
- The main objective of this study is to apply J48 decision tree (JDT) to identify water bodies using Landsat 8 OLI imagery.

- JDT is an open source java implementation of C4.5 decision tree

- It is easy to understand and implement in GIS.

Test site

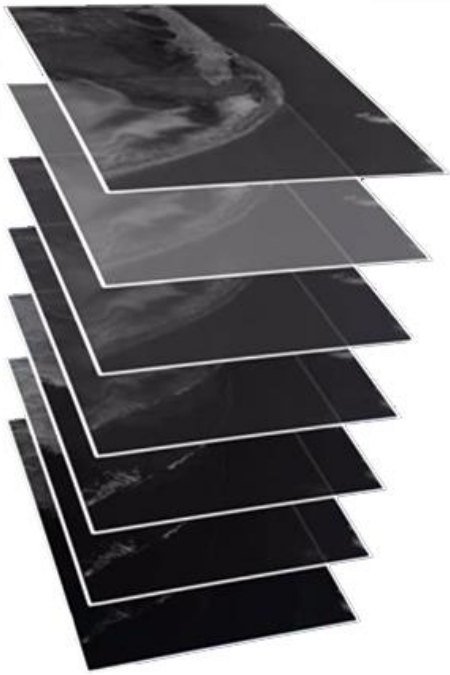
- Gangwon-do area
- Han River basin
- Lake formed by dams
- Large water surface
- Perfect for test site



(a) Location of the test site in Korea.
(b) Landsat natural colour composite imagery for the test site.

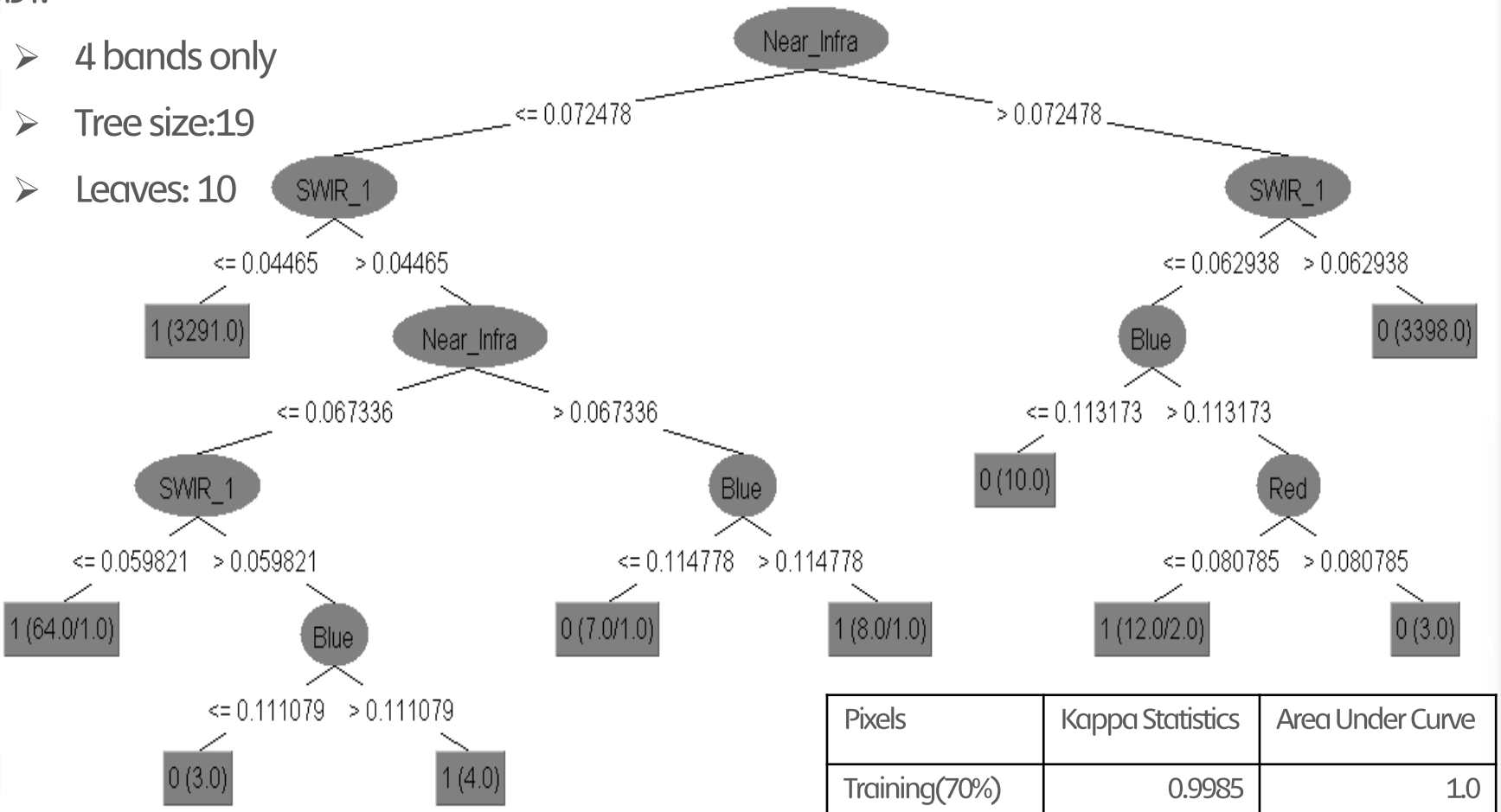
Data

- Data
  - LANDSAT 8 image
    - GloVis, http://glovis.usgs.gov
    - OLI bands
- Tools
  - ArcGIS
  - ENVI
  - Weka
  - Matlab



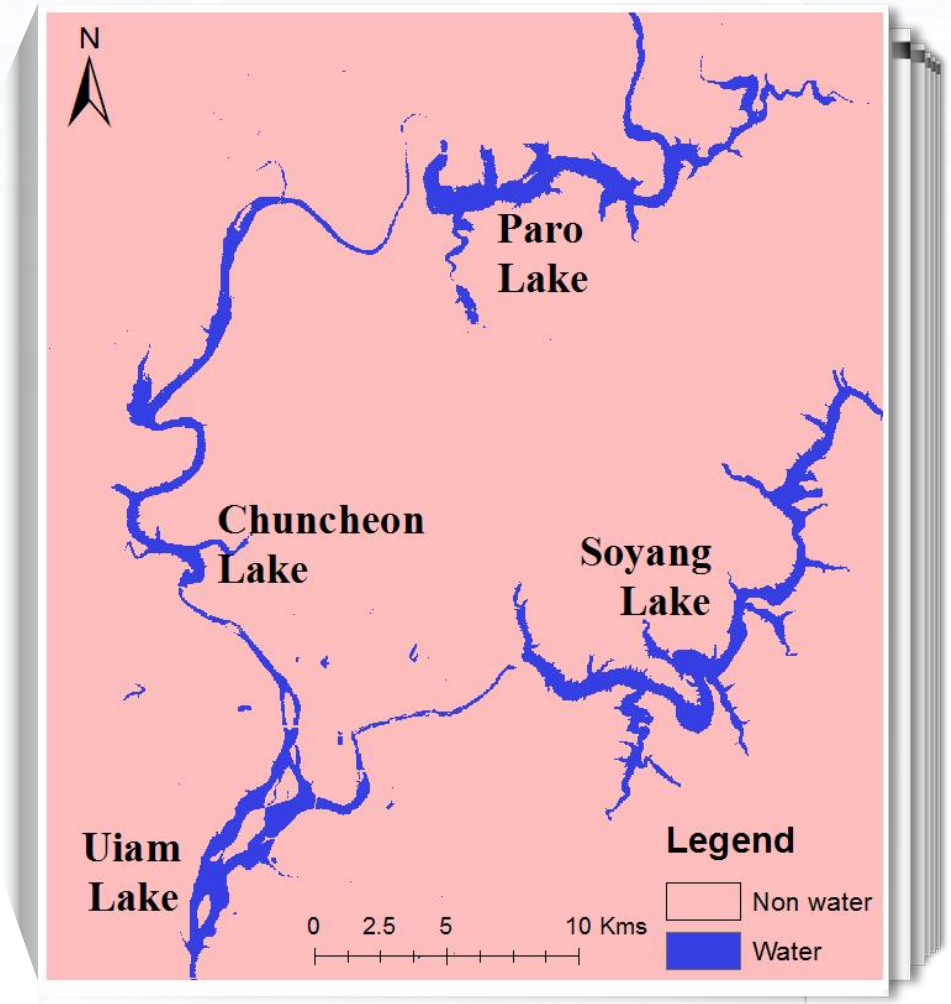
Results

- JDT:
  - 4 bands only
  - Tree size:19
  - Leaves: 10



Pixels	Kappa Statistics	Area Under Curve
Training(70%)	0.9985	1.0
Validation(30%)	0.9881	0.997

Results


N
Paro
Lake
Chuncheon
Lake
Soyang
Lake
Uiam
Lake
Legend
Non water
Water
0
2.5
5
10 Kms

Conclusion

- Water is an important part of the ecosystem.
- Identification of water is very important for various scientific estimation as well as social problem solving.
- In this current study, JDT shows very accurate and robust identification capability.
- The tool could be a good tool in cases like estimation of water availability, demarcation of flooded regions, wetland inventory and so on.

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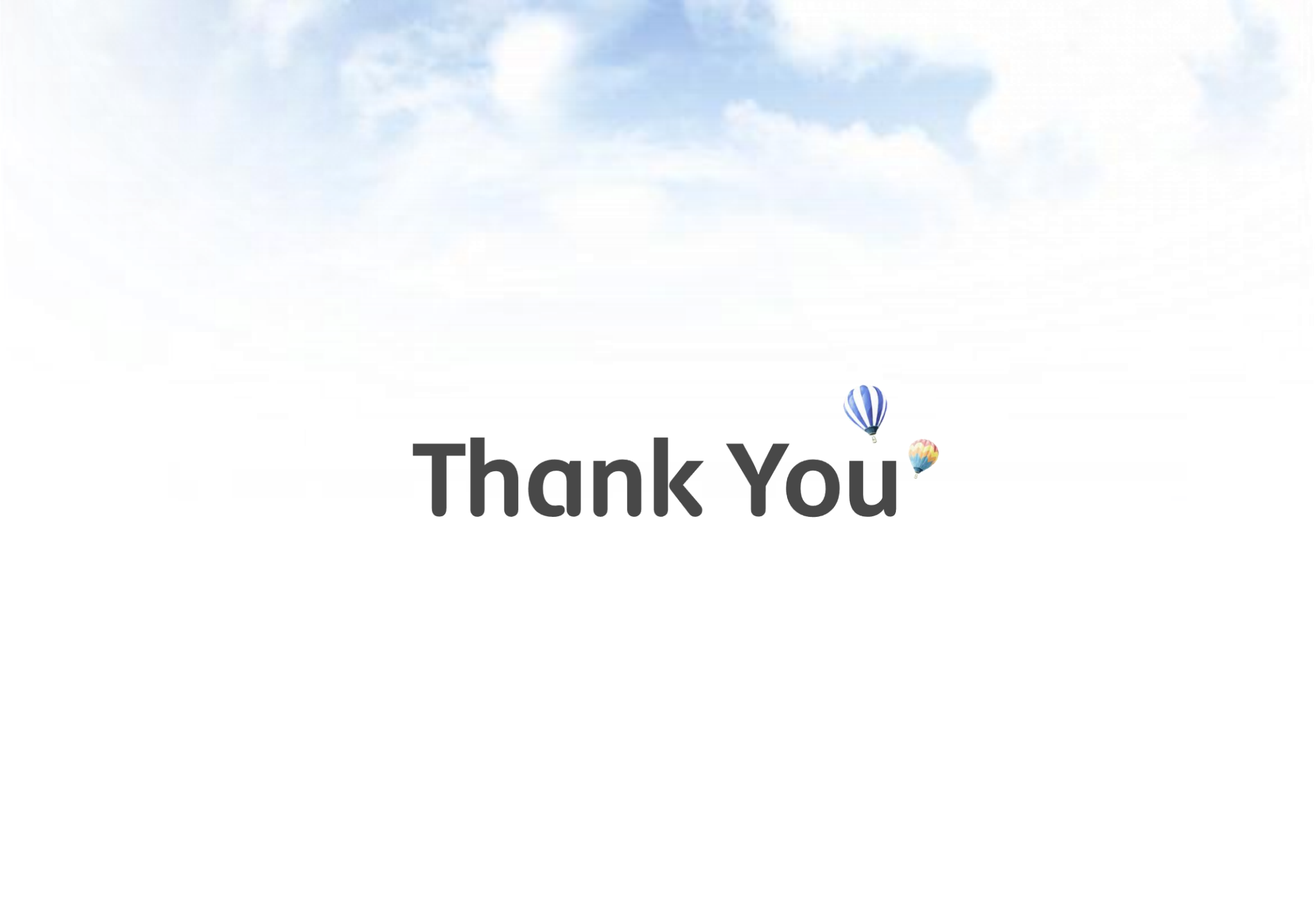
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