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An Extraction and Accuracy Assessment of Dead Tree using Object-Based Classification

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1 Introduction

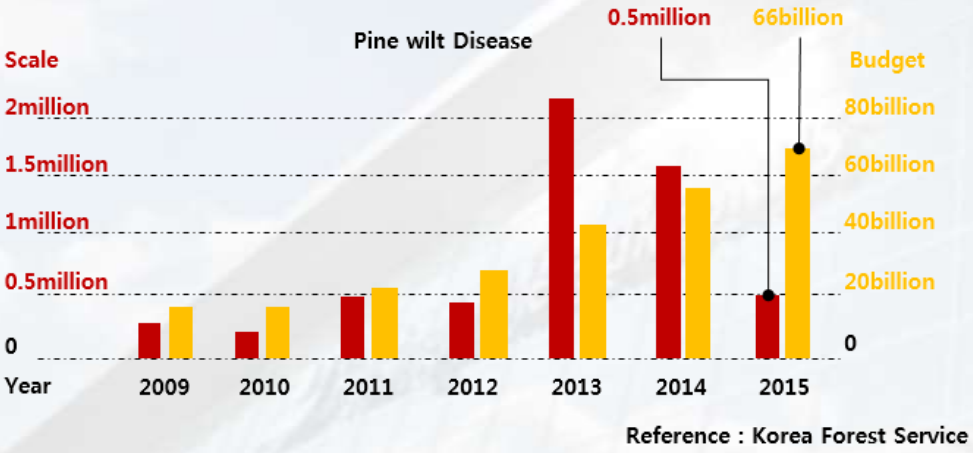
2 Purpose

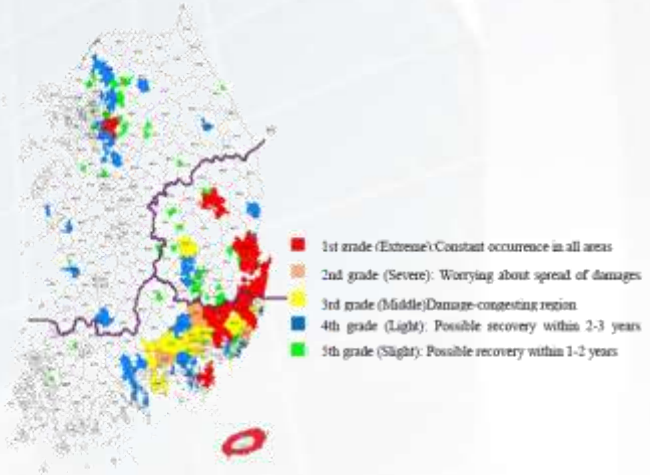
3 Experiment And Results

4 Conclusion

Introduction

- Diverse types of forest disaster – forest fire, landslide, infection by disease and pest
- Huge timely and economic efforts are needed to recover forest damaged by disasters
- Particularly, disease and pest like pine wilt disease have a great possibility to spread to the whole forest, it is crucial to establish countermeasure to conserve the forest after pest control.





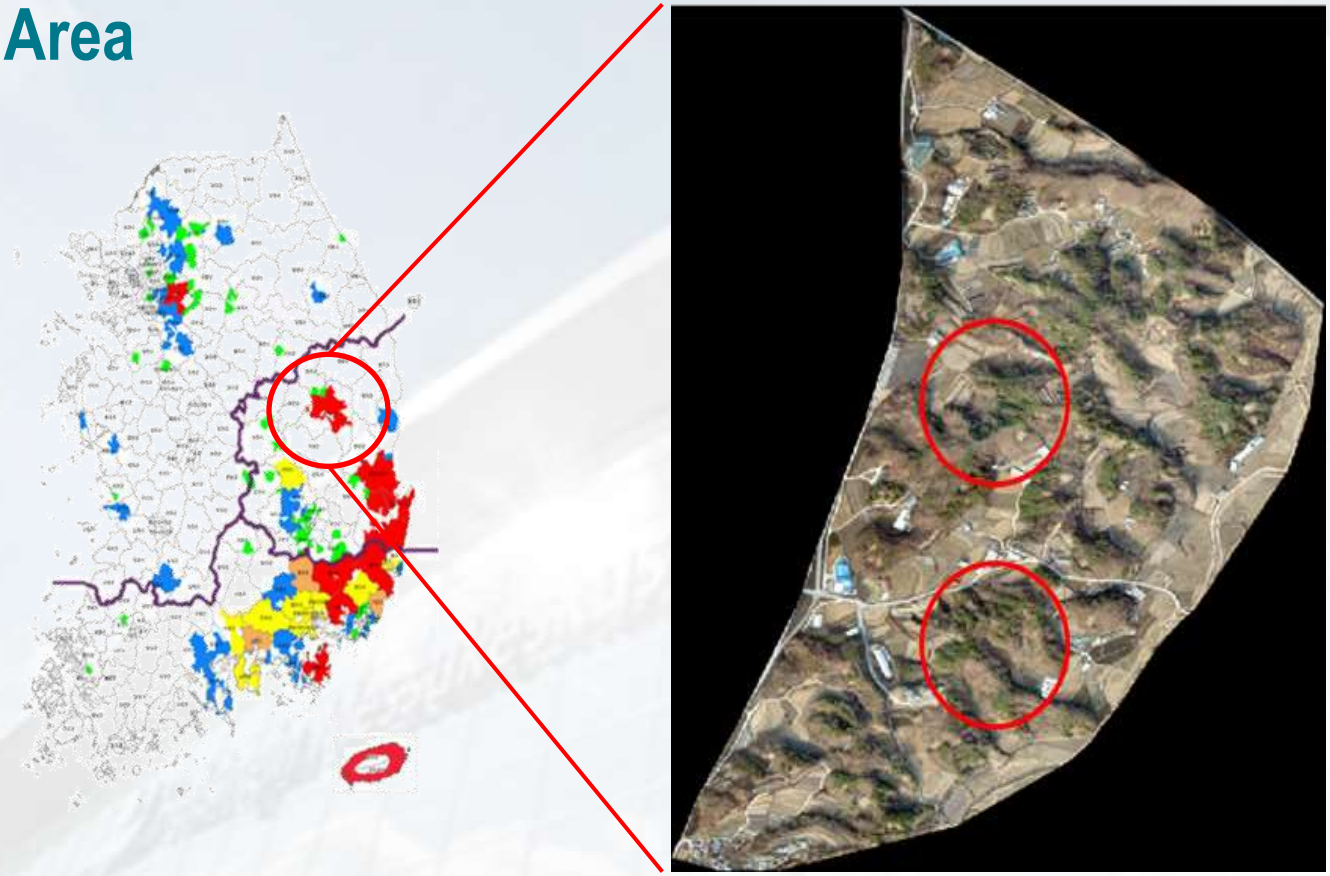
Current Issue

- Currently in Korea, Korea Forest Service and Korea Forestry Promotion Institute conduct and manage field works for Korean forests based on aerial image and satellite image.
- Aerial images are taken every 2 years.
- In case of satellite image, it is hard to get high-quality images
- Recent establishment of monitoring center and UAV adoption

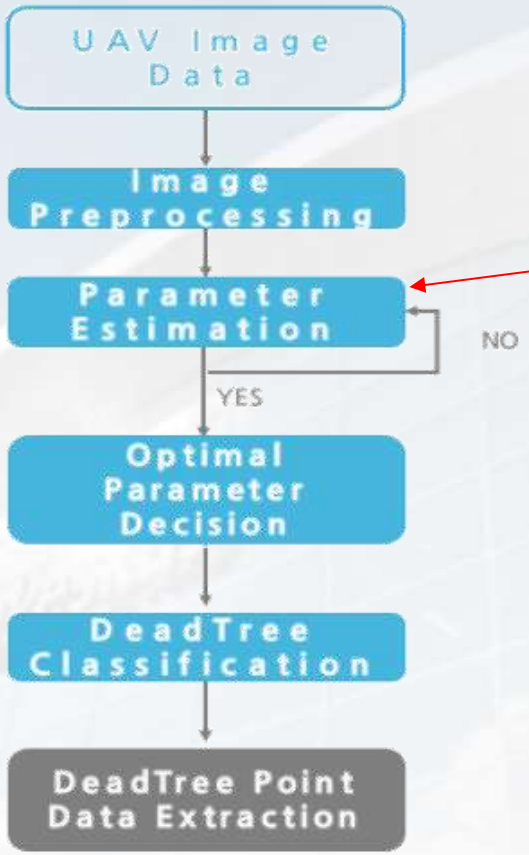
Purpose

- Acquisition of updated data for effective control and prevention plan on dead trees which can cause infection and spread
- Suggestion of parameter method of calculation and implementation of accuracy assessment in study area and period with achievable UAV images for dead tree identification

Study Area



Study Flow



Object-Based Classification

Parameter

1. Scale Parameter
2. Color, Shape Parameter
3. Compactness, Smoothness

Color, Shape Parameter Estimation

Color and shape parameter values are determined according to what to consider in classification

Infected trees are displayed in red in images so spectral element has to be considered

Color 0.1 is considered to be appropriate since the objects are displayed in colors

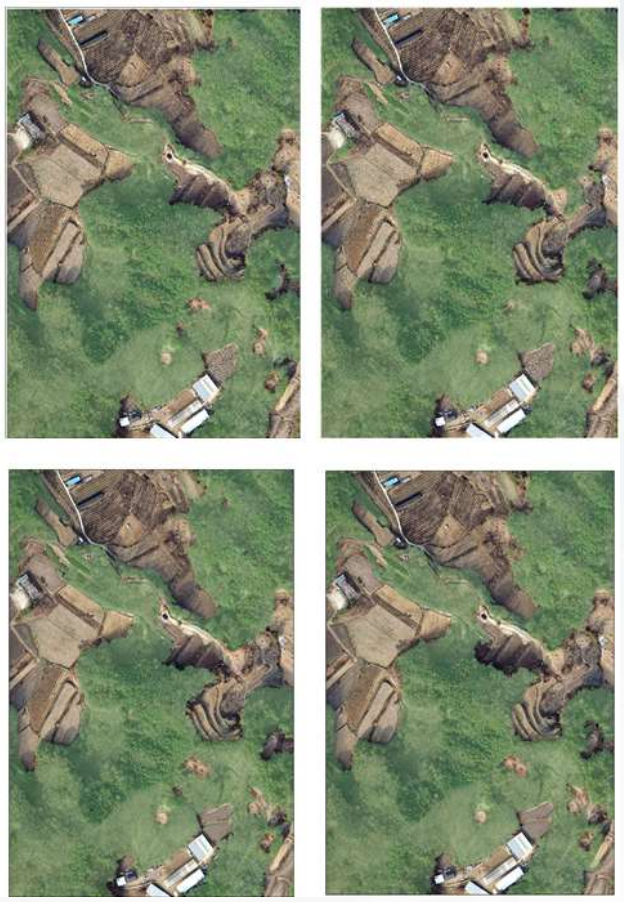
Color 0.9 Shape 0.1

Color 0.1 Shape 0.9

Scale Parameter Estimation

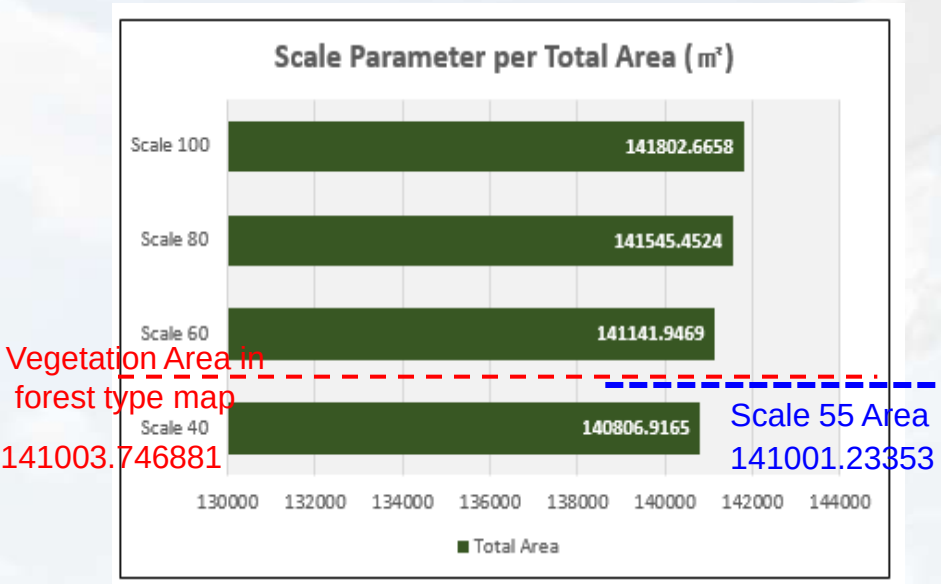
141003.746881m^2
(Forest Type map)

Scale 100 Scale 80



Scale 60 Scale 40

Experiment result: when comparing the area changes, the area of the forest type map is estimated to be between scale 40 and 60.

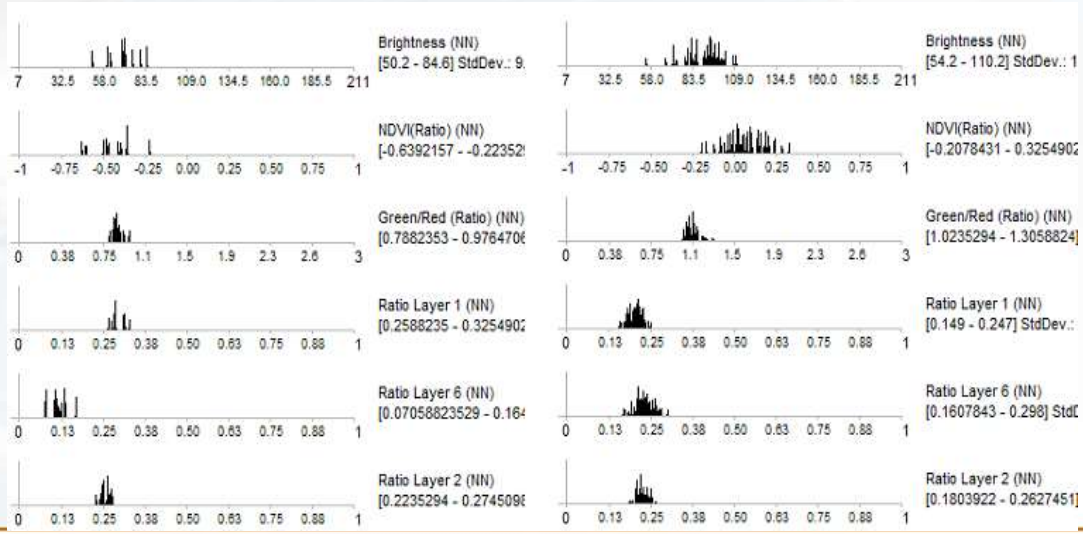


Scale 50

Scale 55

Dead Tree Classification

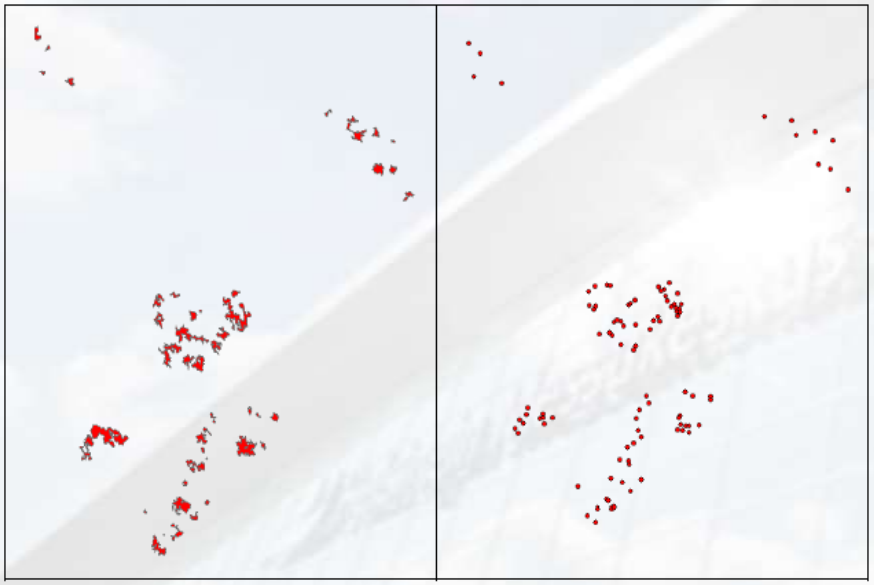
We select the sample that corresponds to each class, and through the histogram analysis, implement infected tree classification by using the threshold value that can distinguish the class from other classes.



Accuracy Evaluation of Classification

Objects created during image segmentation are stored in Polygon.

Convert the center of the object to a point for accuracy of classification and comparison of measured data.



Conclusion

More than 80% of classification accuracy were obtained, using the UAV image.

Based on the advantages of UAV, users can acquire data at the desired time,

which can be used as basic data for monitoring, control planning and post management of

dead trees.

Further Study

It is difficult to extract the data of dead trees when the infection was slight.

Parameters for image division change depending on achieved images, so study on universal

use is needed.

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