

Comparing Supervised Learning Techniques Using Google Earth Engine

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Introduction

This project looks at five different Supervised Learning techniques that Google Earth Engine (GEE) provides access to: Support Vector Machine (SVM), Classification and Regression Trees (CART), Minimum Distance, Naive Bayes, and Random Forest to determine which classification technique is the most accurate.

GEE's web-based JavaScript Integrated Development Environment (IDE) was used for this process. GEE uses cloud computing and parallel processing to process geospatial data.

The study area for this project is the Mississippi River Delta.

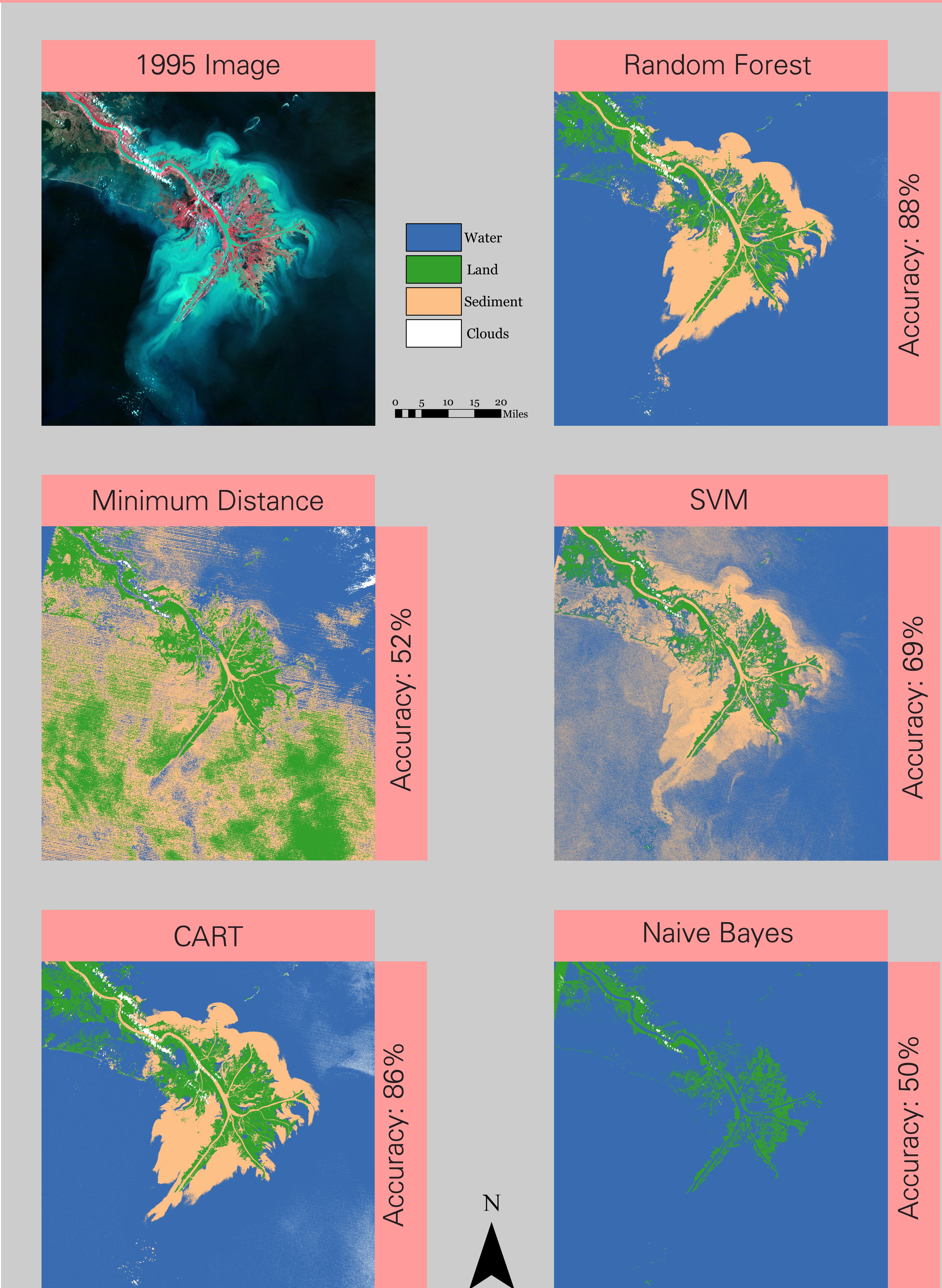
Methods

The images were classified into three classes; water, land, and sediment. Training samples were created by clicking on individual Landsat pixels in GEE and assigning them to a class.

Data

The satellite imagery used for this study is from Landsat 5 and Landsat 8. Landsat 5 and 8 both have a 30-meter spatial resolution. The images used are from April 24, 1988, July 19, 1995, June 17, 2001, and May 4, 2015.

The classifications shown on this poster are from the 1995 satellite image.



Accuracy Assessment

Accuracy assessment was completed using stratified random sampling. GEE has a function to create a stratified random sample of points. After these points are created each one is assigned to a class and the accuracy of these points is tested against the classified image.

Accuracy Results

Year	Random Forest	CART	SVM	Minimum Distance	Naive Bayes
1988	92%	90%	58%	74%	64%
1995	88%	86%	69%	52%	50%
2001	92%	82%	65%	66%	57%
2014	94%	95%	61%	92%	63%

Random Forest with 100 trees performed the best overall. CART also performed well. Naive Bayes and SVM failed to classify sediment in many of the images. Minimum Distance overclassified the sediment class.

Recommendations

Random Forest was the most accurate in this study area. It is recommended that Random Forest be used with GEE. If this method does not perform well, the user can try out other the other methods tested in this study.

Scan to see the classified images from 1988, 2001, and 2014.

