AI for Climate Change
Laboratory 4

Rationale

In order to improve the initial experimental results, a more robust method was used. Instead of the SVM classifier used previously, a Random Forest classifier was implemented. Random Forest is an ensemble algorithm that combines multiple decision trees, reducing the risk of overfitting and improving the model's accuracy and generalization.

The choice of a Random Forest classifier aligns with the general trend in machine learning for remote sensing applications, as discussed in the provided articles. Both "Article 1: Predicting Ice Flow using Machine Learning" and "Article 2: Machine Learning for Sea Ice Monitoring From Satellites" employ machine learning techniques for analyzing satellite imagery, although with different specific algorithms and datasets.

Model Evaluation

Confusion Matrix

Training Set			
TARGET / OUTPUT	Class0	Class1	SUM
Class0	19 40.43%	1 2.13%	20 95.00% 5.00%
Class1	0 0.00%	27 57.45%	27 100.00% 0.00%
SUM	19 100.00% 0.00%	28 96.43% 3.57%	46 / 47 97.87% 2.13%

- **Accuracy**: 0.979

Comparison of Experiment 2 Results with Experiment 1 Results

The use of the Random Forest classifier in Experiment 2 significantly improved the accuracy to 0.979, compared to the 0.766 accuracy achieved with the SVM classifier in Experiment 1. This demonstrates the effectiveness of the Random Forest approach for this classification task.

Comparison of Experiment 2 Results with Results from Similar Approaches in the Literature

- The project utilizes Landsat 8 satellite images, similar to "Article 1: Predicting Ice Flow using Machine Learning" which also uses Landsat 8 data. However, the project focuses on snow classification, while Article 1 focuses on predicting ice flow. The high accuracy achieved by the Random Forest classifier in the project demonstrates the potential of this algorithm for effectively classifying snow cover in Landsat 8 imagery.
- "Article 2: Machine Learning for Sea Ice Monitoring From Satellites" uses Sentinel-1 SAR data and SVM for classification, achieving accuracies of 88% and 82% on April 17th and June 16th 2018, respectively. While this paper uses a different dataset and classification task (sea ice monitoring) and a different classifier (SVM), the project's Random Forest classifier outperforms the SVM classifier used in "Article 2".