

# Temporal Dual-polarization SAR Crop Classification Based on Coherence Optimization

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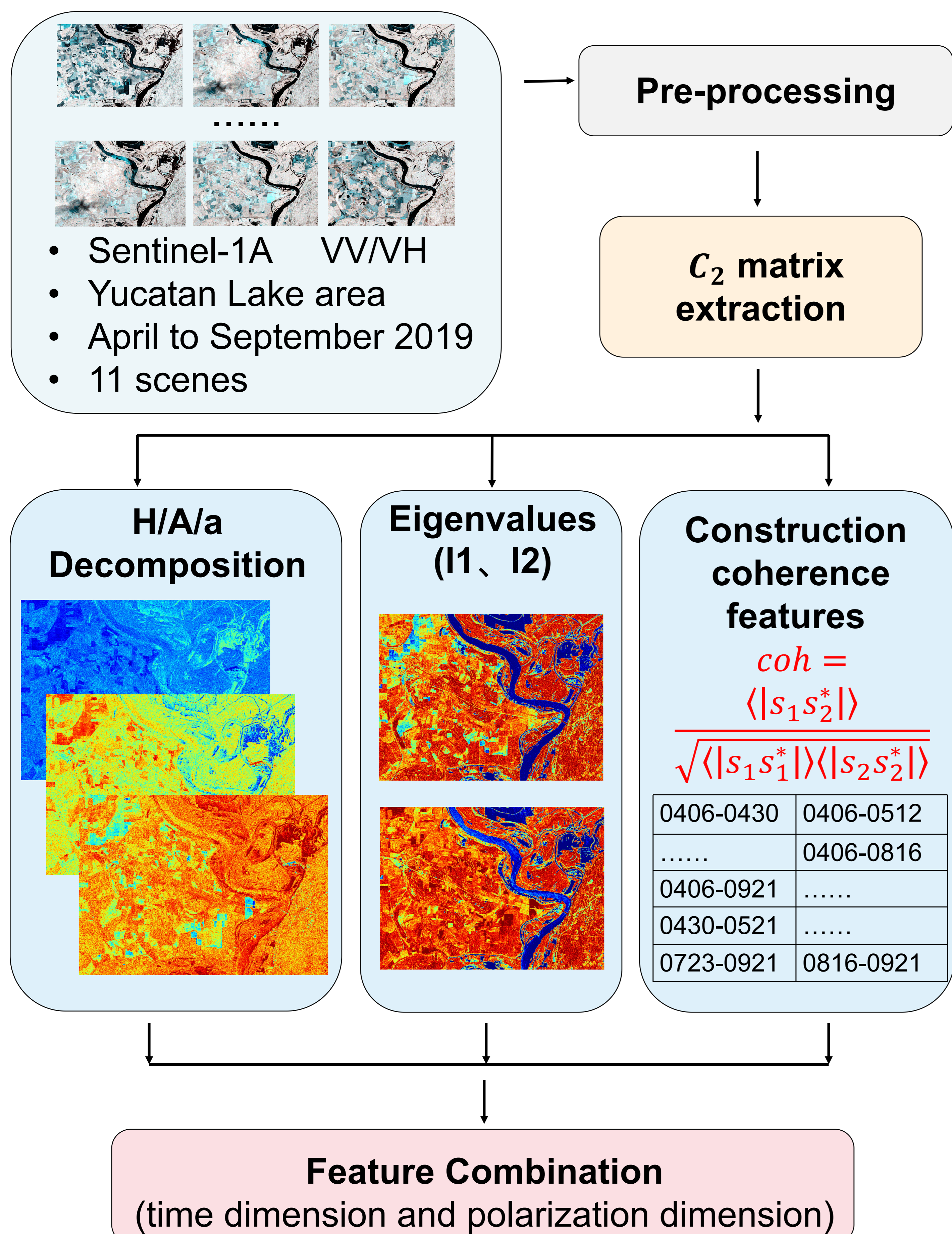
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## Introduction

- The aim of this paper is to construct temporal coherence such that coherence and polarisation features are combined to improve the classification accuracy of the dual-polarization.
- The classification result of experiment shows that combining the extracted eigenvalues I1, I2 and temporal coherence can get better accuracy.

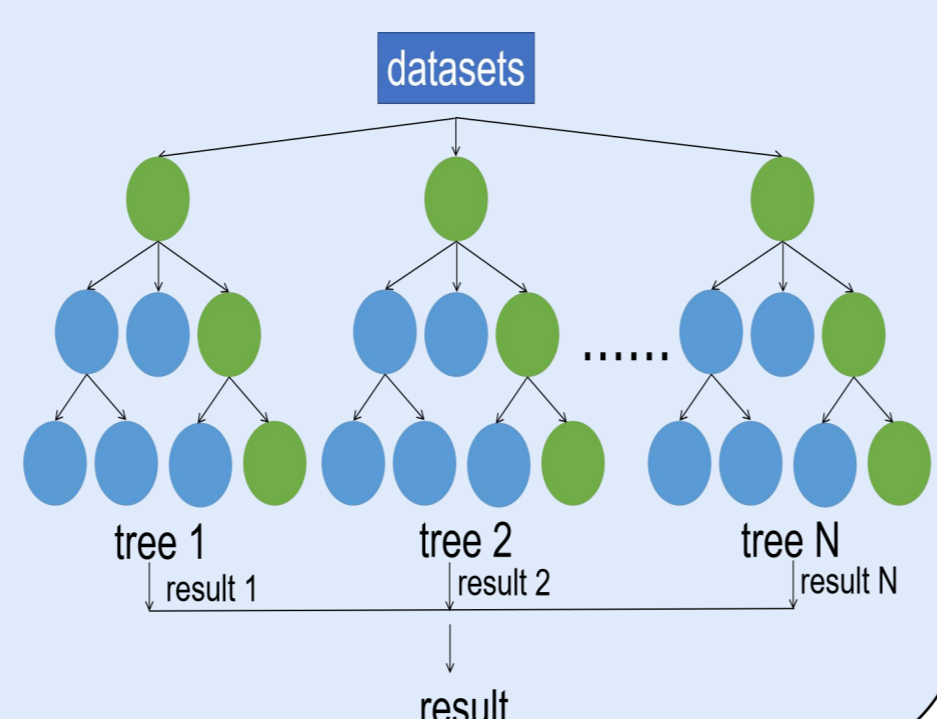
## Methods

The overall process is shown below:



## Random Forest Classification

- A total of 588,000 sample points were used to classify 12 crop types.
- The number of decision trees is 100, the random state is 42.



## Experiment

The classification results of different polarization features were observed, then temporal coherence was added to the polarization features.

Table 1 Adding coherence to polarization features

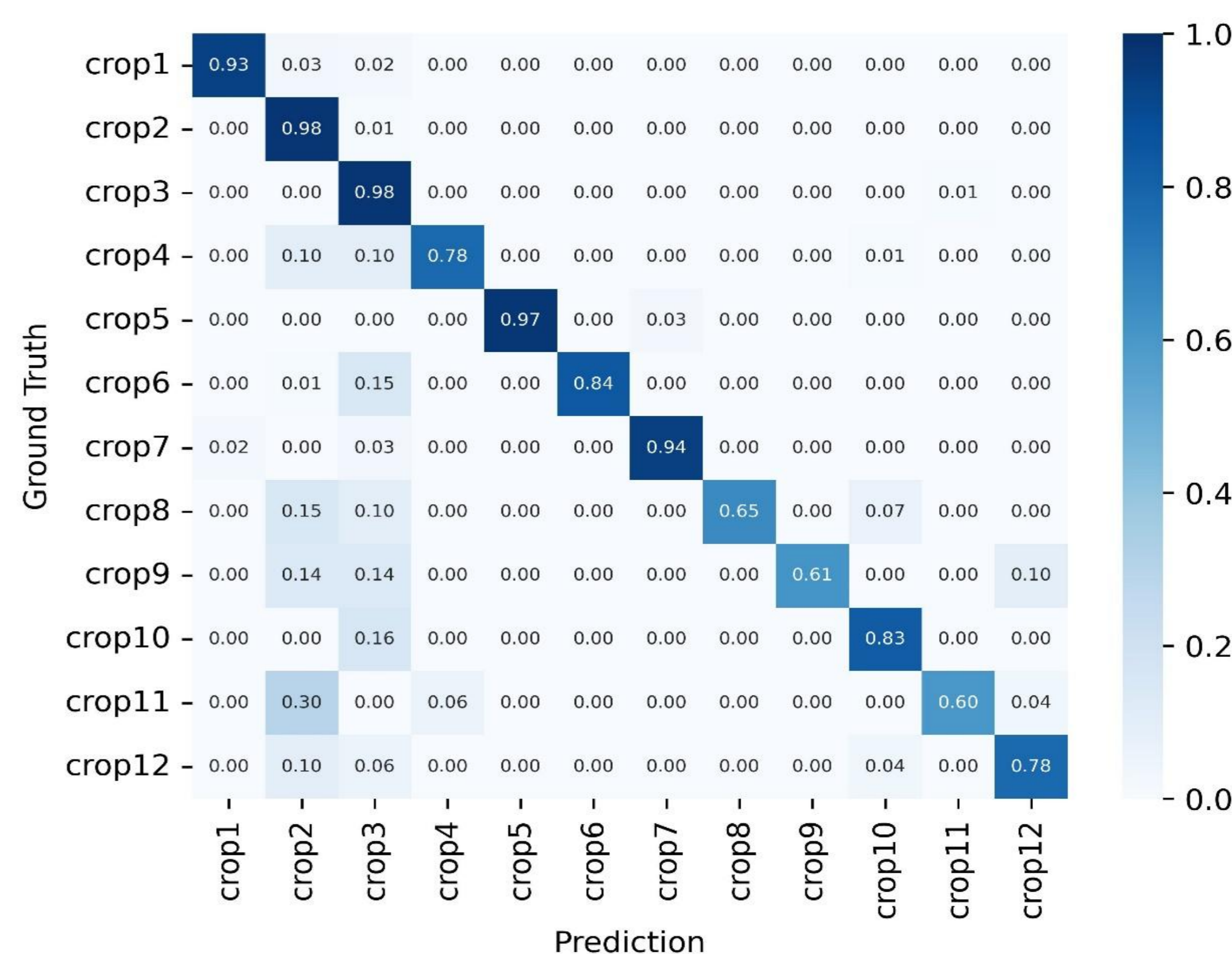
Features	Accuracy		Accuracy
H	48.68%	add	69.29%
A	49.87%		69.44%
alpha	46.25%	coherence	67.95%
I1	67.52%		81.38%
I2	56.91%		79.15%

Next, temporal and polarization features were combined to select the better feature combination.

Table 2 Feature combination

Feature combinations	Accuracy
H+A+alpha	51.95%
H+A+alpha+I1+I2	87.15%
I1+I2+coherence	90.65%
H+A+alpha+coherence	69.69%
I1+I2	86.74%

The classification accuracy of each crop in the optimal case is shown below:



## Conclusions

- The combination of temporal coherence and eigenvalues is optimal classification feature, which result can reach about 90% in this experiment.
- Comparing with traditional polarization features, added coherence for multi-crop classification all get better results. Temporal coherence is confirmed to be important for multi-crop time-series classification.