Change Event Dataset for Discovery from Spatio-temporal Remote Sensing Imagery

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Contributions
A self-supervised method to discover change events from spatio-temporal satellite imagery.
Two new benchmarks for change event retrieval and clustering created using this method.

Benchmarks
CaiRoad Benchmark
28015 Total Events
2256 Road Construction Events
Examples of Road Constructions

CalFire Benchmark
2172 Total Events
204 Forest Fire Events
Examples of Forest Fires

Applications
We learn a representation for change events using self-supervised methods.

Change Event Retrieval
This representation can be used to retrieve similar events.

Change Event Classification
It can also be used to train event classifiers.

References

Takeaways
Change events can be used to quantify interesting phenomena such as constructions or natural disasters.
More work is required in the future to accurately represent change events.

Problem
We need tools to discover and quantify interesting events.

Current practice is supervised learning, which is:
- Costly
- Application specific
- Cannot discover the unknown

Definitions:
- Spatio-temporal properties
- Visual features

We learn a representation for change events using self-supervised methods.
This representation can be used to retrieve similar events.
It can also be used to train event classifiers.

Events
- Road Construction
- Forest Fire
- Crop Cycles

Change Grouping
Grouping pixels using their:
- Spatio-temporal properties
- Visual features

Change Detection
Self-supervised Change Detection
Training:
- Learning pixel-level features
- Invariant to photometric transforms
- Equivariant to geometric transforms

Inference:
- Thresholding feature differences

Photometric Transform
Geometric Transform

Feature Grouping
Change Grouping into Events

Change Detection
Feature Extractor

Feature Difference
Thresholding

Change

Change Retrieval
This representation can be used to retrieve similar events.

Example of Road Constructions
Example of Forest Fires

References

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