A Fragile Watermarking Approach for Earth Observation Data Integrity Protection

Maikel Lazaro Pérez Gort

Outline

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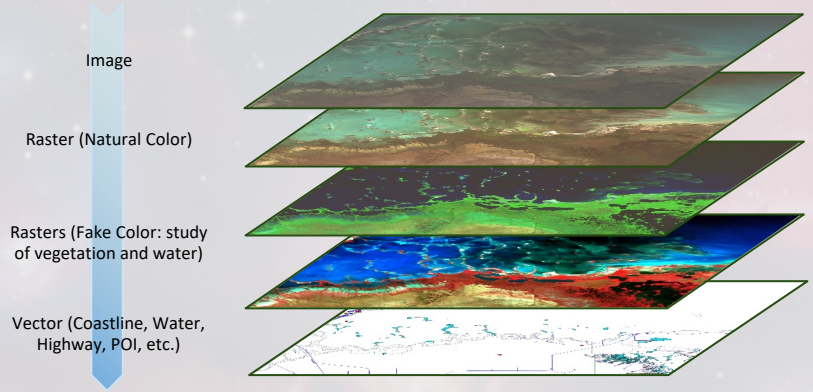
  - Access and deployment
- Proposal
  - Watermark Synchronization
  - Fragile and Robust Watermarking
  - Proposed Architecture
- Experimental Validation
  - EO Data Applications
  - Tampering Detection
- Conclusions

Motivation

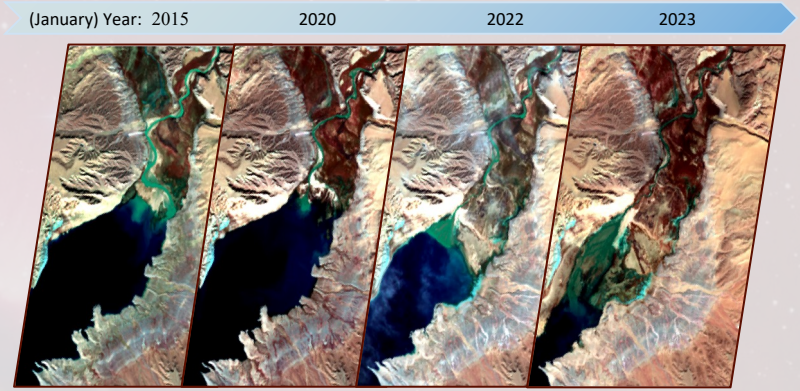
EO Data Capabilities

EO Data capabilities

Space

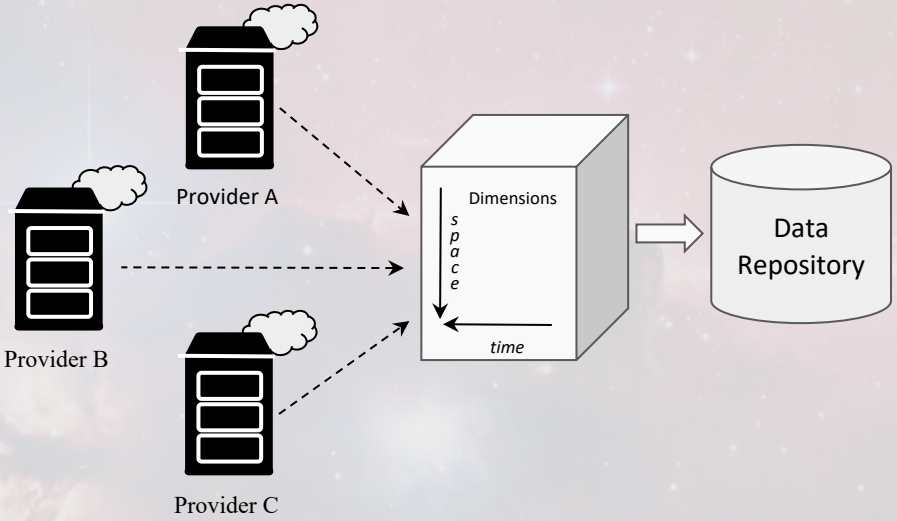


Time

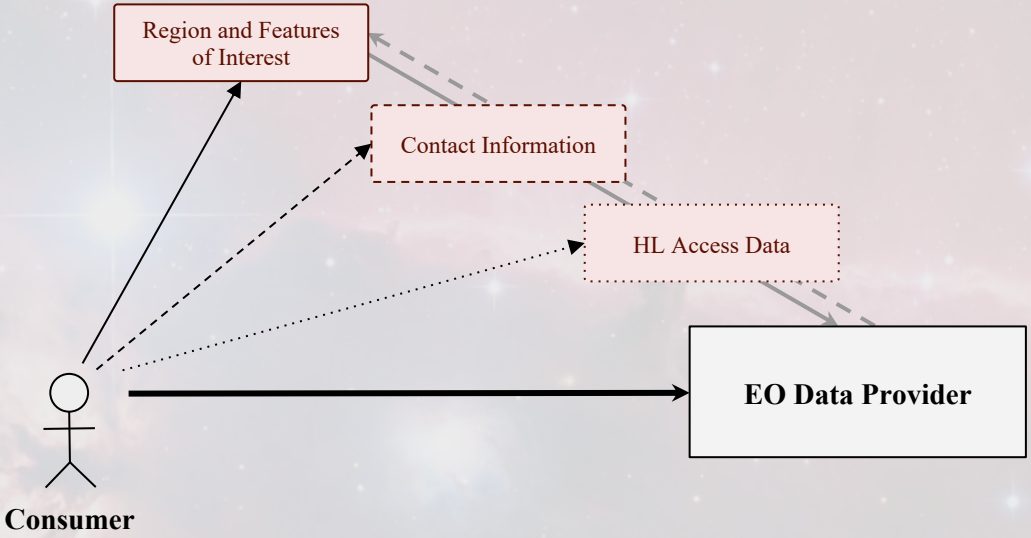


Possibility of express the same information through (and in) different data types

EO Data capabilities

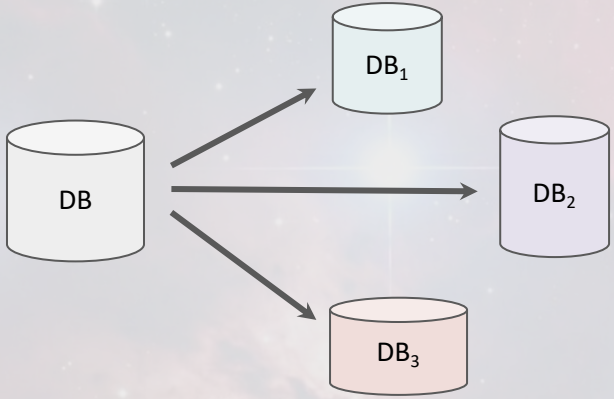


Access and deployment of EO Data

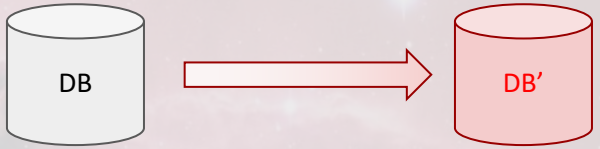


Risks faced by EO Data

Unauthorized Distribution



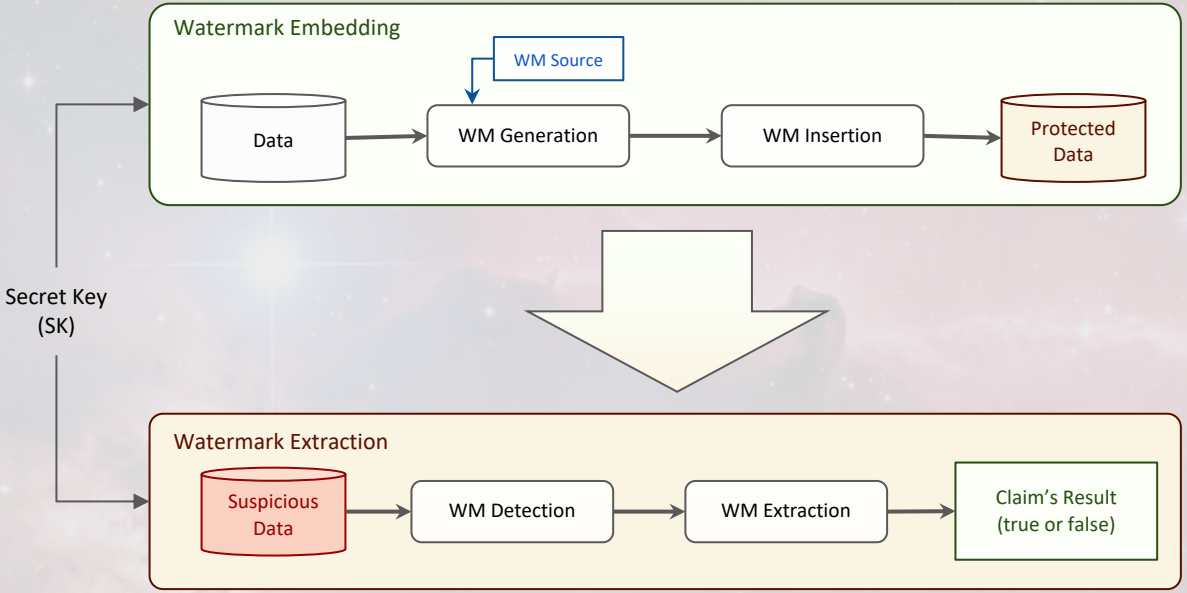
Data Tampering



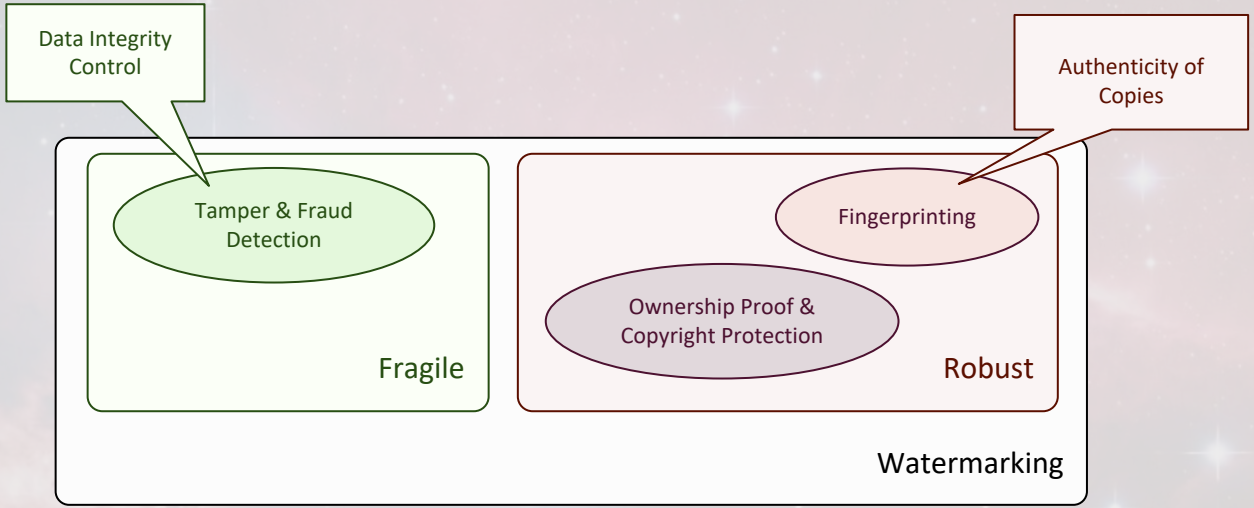
Proposed Approach

Digital Watermarking

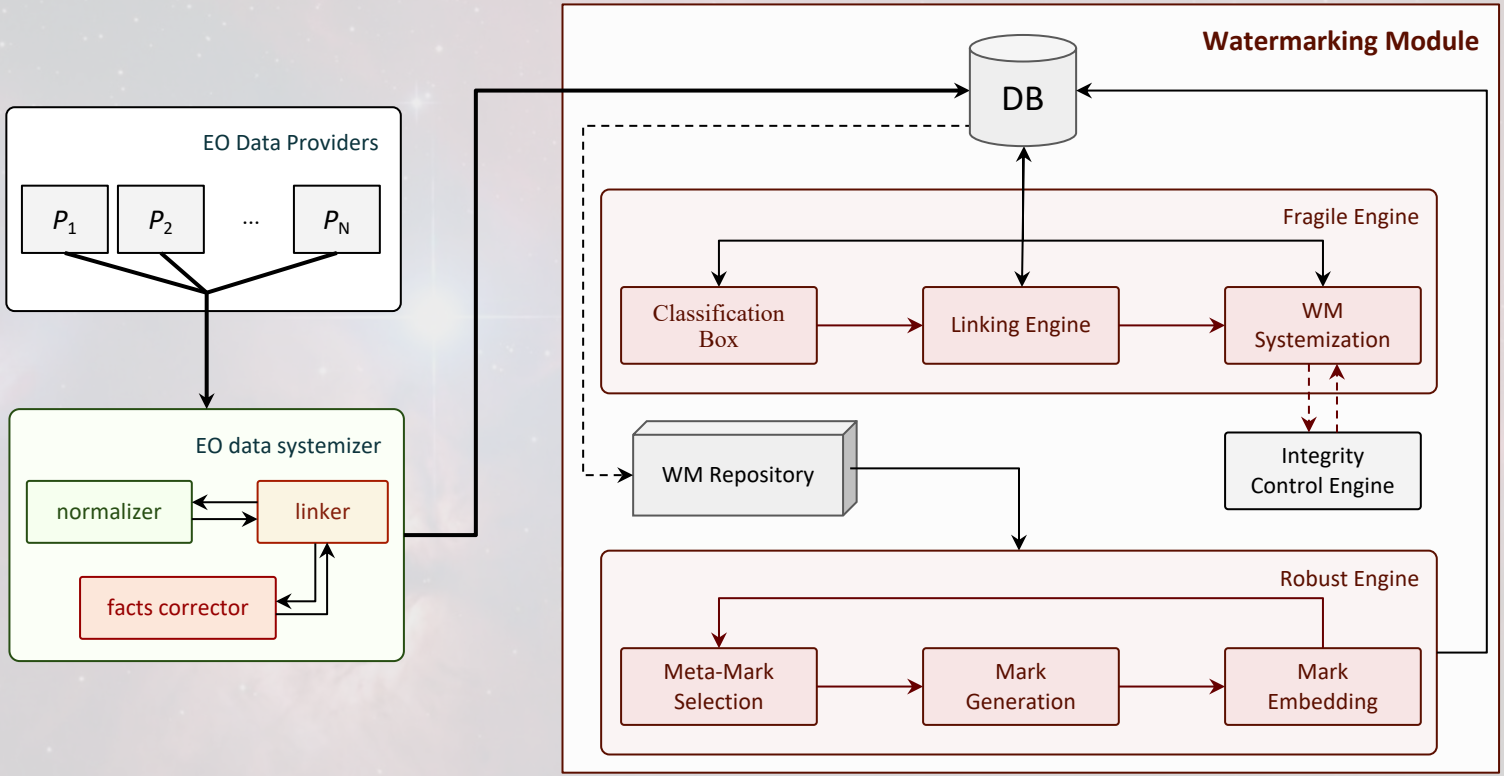
Watermark Synchronization



Fragile & Robust Watermarking



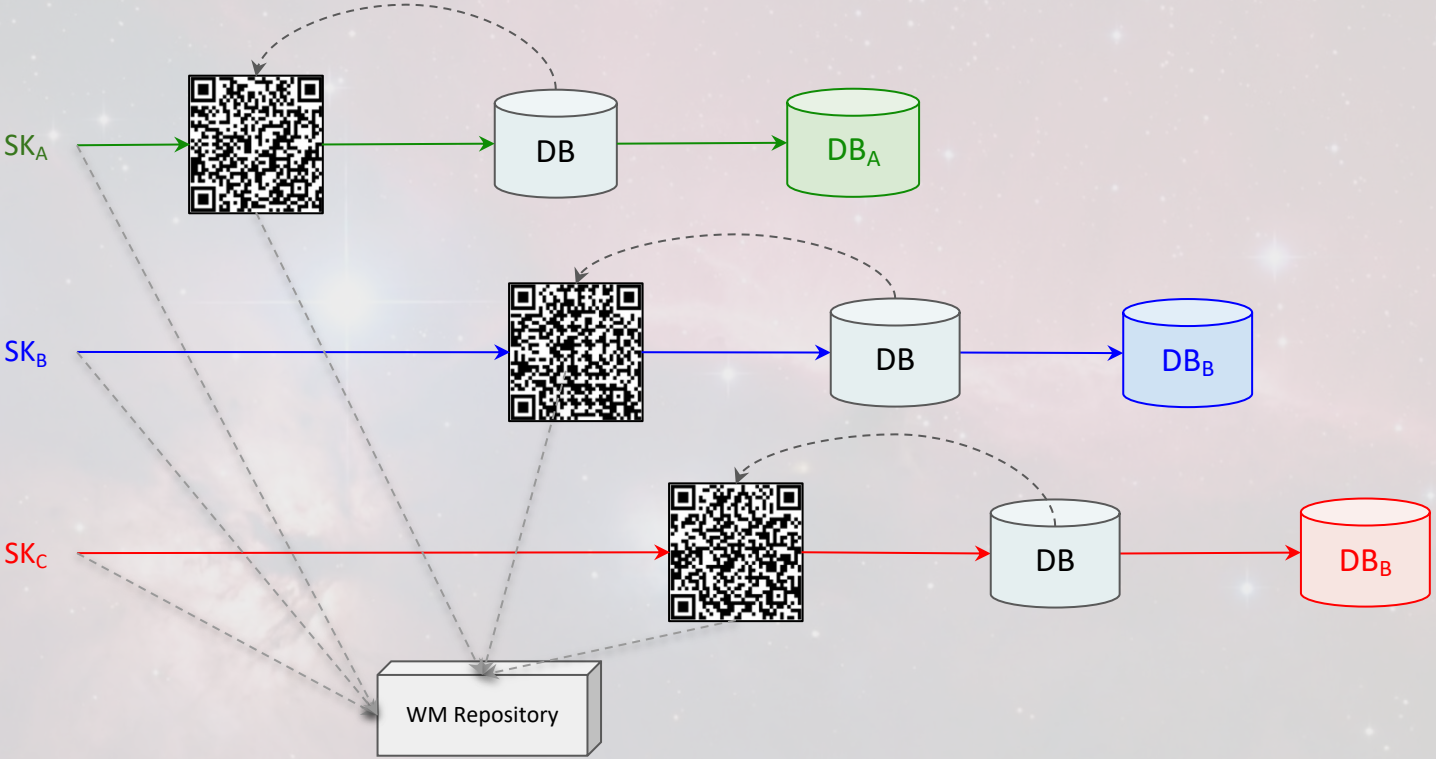
EO-DIPRE Architecture



Experimental Validation

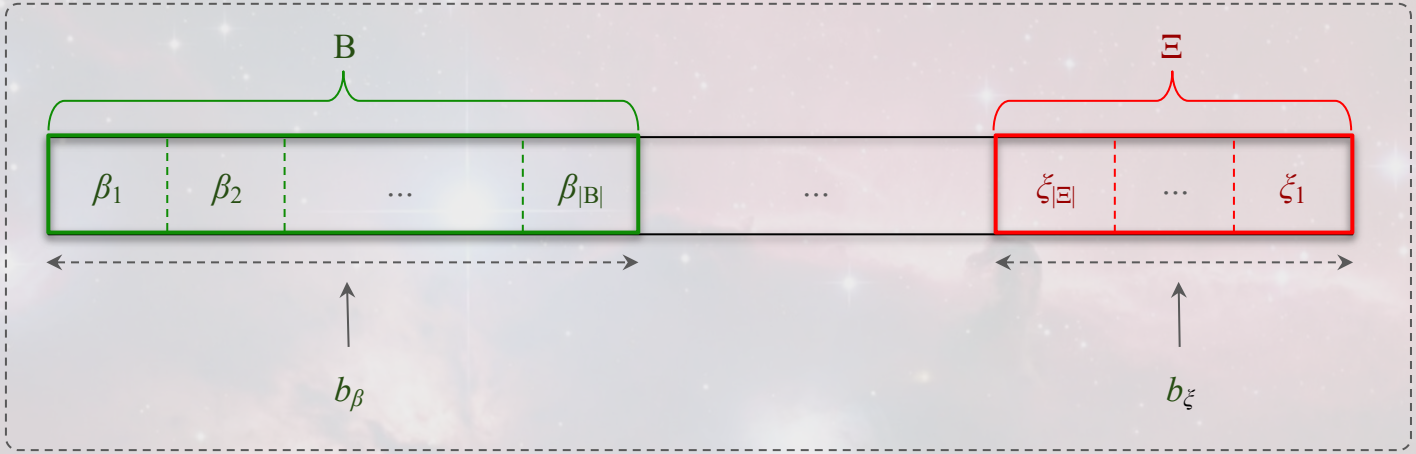
Tests & Results

Authenticity of Copies



Reduction of Distortion

Values Marked

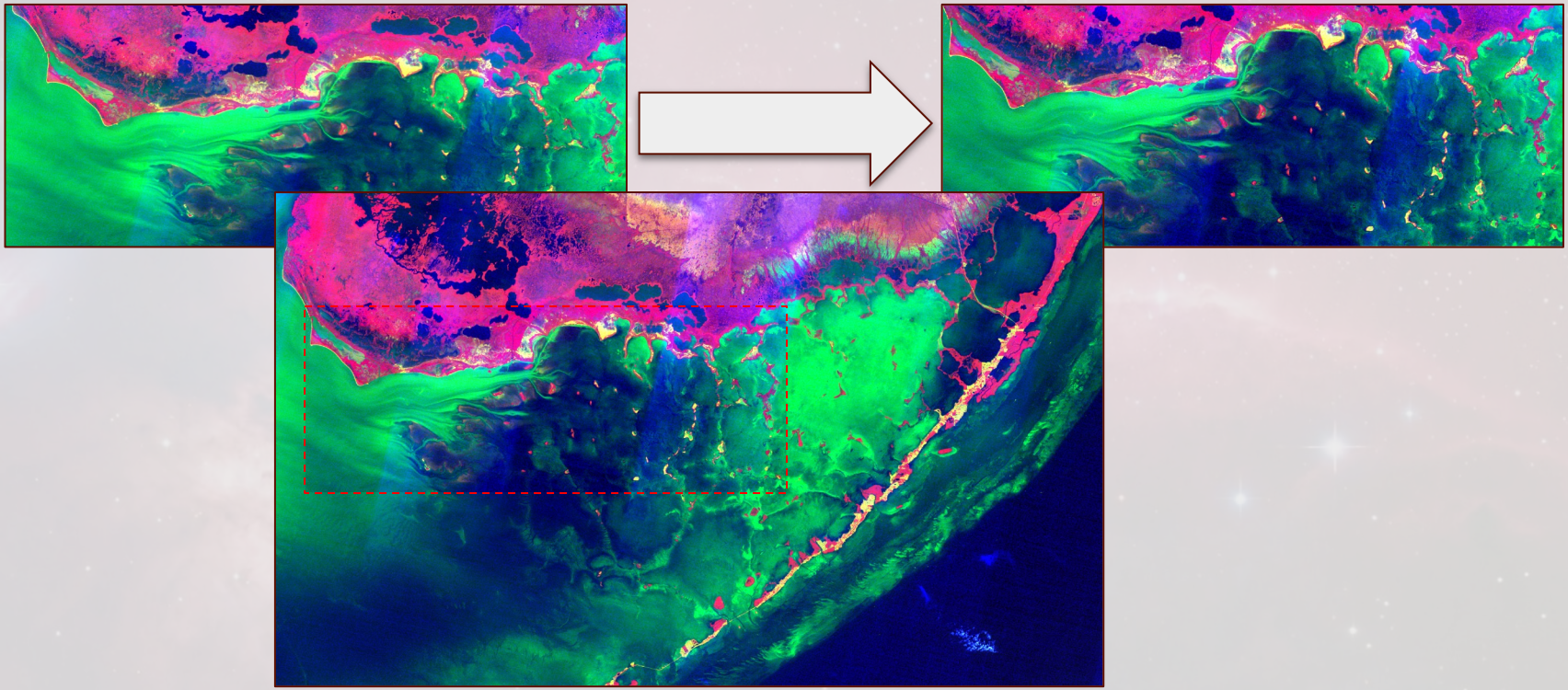


Watermark Size

Land cover classification variations

Original

Watermarked



Tampering Detection

Data
- 1186500 records
- 11 columns

Despite the lack of visual clues

$n = 37$

$lsb = 1$
$msb = 4$
$tolerance \leq 10\%$

$\neq$

$n = 37$

$lsb > 1$
$msb = 4$
$changes > 10\%$

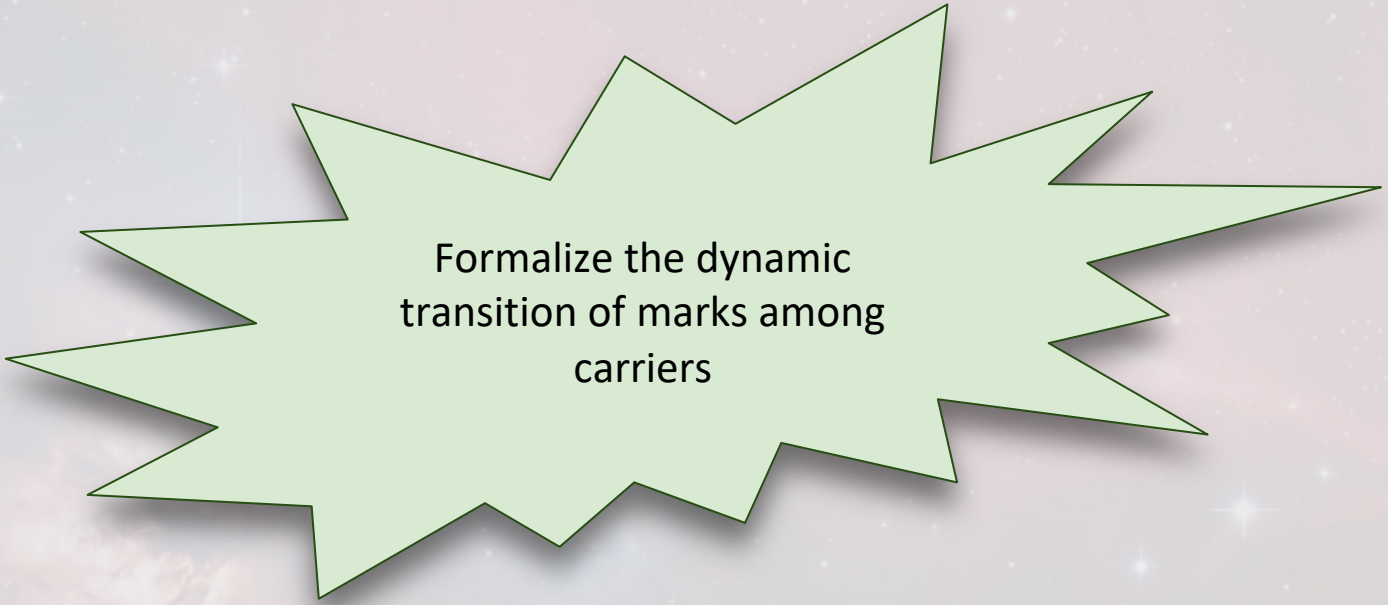
Conclusions

Closing Arguments & Future Work

Contributions

- Extenze cover for digital watermarking (fragile and robust)
  - Dimensions vs. facts (multiple facts)
  - Additional metrics for imperceptibility perception
- Variable Selection of components involved
  - Multiple-layers for tampering detection
  - Calibration of carriers
- Dynamic generation of WM sources

Future Work



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Thanks