Ensemble Sample-Based Area Estimation - An Overview

NFM Team
FAO Forestry Division

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Rome and online
Objective

• Support countries in accessing Carbon Finance
• **Reliable** estimates of Forest Change (High-integrity)
• **Consistency** over time
• Address **Uncertainty**
• Being **practical**
• **Manage** expectations

source: Olofsson et al 2020
Overview - Ensemble

- Dense systematic sampling grid
- Time-Series Extraction
- Probability of potential change

Ensemble of Change
- BFast
- CCDC
- CuSum
- EWMA
- Timescan
- Trend
- Global data
- Training data

Dalenius type of stratification

Potential Change Probability
Usage scenario I – Prioritization of interpretation

**Systematic grid**

- visually check a subset of points
- potentially HFLD countries, where huge parts are just stable (forest)
- e.g. strict rule-based selection could replace visual interpretation
Usage scenario I – Prioritization of interpretation

**Systematic grid**
- visually check a subset of points at the potentially HFLD countries, where huge parts are just stable (forest)
- e.g. strict rule-based selection could replace visual interpretation

**Stratified random**
- From existing maps
- Intensification of stable strata in case of omissions
- e.g. strict rule-based selection could replace visual interpretation
Usage scenario II - Stratification
Usage scenario II - Stratification

Kozak Neyman with 3 strata

<table>
<thead>
<tr>
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<th>2</th>
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<tr>
<td>nh</td>
<td>1071</td>
<td>1573</td>
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Potential Change Probability

No deforestation/omissions

No deforestation/omissions
Still want to have a wall-to-wall map?

→ Use the interpreted samples as training data
Usage scenario III – QA/QC

- Already interpreted data
- Use of “the machine” as an independent interpreter
- Using the ensemble to re-classify the samples
- Samples with disagreement between visual and re-classified results are prioritized

<table>
<thead>
<tr>
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Wrap-up

• How do we avoid bias and get to low uncertainties without having to interpret 100 of thousands of points?
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• Can we use a combination of algorithms to avoid huge interpretation campaigns in areas with very few forest (dynamics)
Wrap-up

- How do we avoid bias and get to low uncertainties without having to interpret 100 of thousands of points?
- Can we use a combination of algorithms to avoid huge interpretation campaigns in areas with very few forest (dynamics)
- What would be the best way forward in doing so?
Thank you!

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