WELCOME!
NetHope Solutions Center

Webinar

Using satellite imagery and AI in humanitarian contexts

March 23, 2021

Humanitarian OpenStreetMap Team

NETHOPE

NetHope Emerging Technologies Webinar Series

Host:

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NetHope

New Resource:

AI Ethics for Nonprofits Toolkit

In collaboration with USAID and MIT D-Lab, **NetHope's AI Working Group** developed a toolkit to build nonprofits' capacity to design and use AI responsibly and ethically.

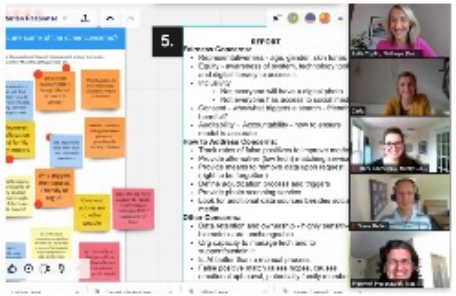
The first installment of the toolkit is available in a workshop format and it will help you **learn the fundamentals of AI ethics** and **practice** how to apply ethical considerations related to **the principle of Fairness** in the context of several nonprofit use cases.

AI Ethics for Nonprofits | Virtual Workshop

NETHOPE USAID FROM THE AMERICAN PEOPLE PLAN INTERNATIONAL MITD-Lab designing for a more equitable world

Toolkit includes: Workshop deck, Facilitators Guide, Supporting materials

https://solutionscenter.nethope.org/artificial-intelligence-ethics-for-nonprofits-toolkit



Why we're talking about satellite imagery and AI

- Growing number of emergencies and protracted crises.
- Some of the most promising innovations for the humanitarian sector are at the intersection of satellite imagery and AI.
- Growing gap between what is possible and what is actually used and implemented in the sector.
- Need for common approaches to ethical design and use, and cross-sector partnerships.

POLL

Please let us know about your work in this space:

- Already using ‘satellite imagery and AI’ in humanitarian or other contexts (Please share your use cases in the Chat window)
- Evaluating viable use cases, tools, and resources
- Just starting to learn about what’s possible
- Other (Please share in the Chat window)

Using satellite imagery and AI in humanitarian contexts

Speakers:

Bo Percival, Director of Technology Innovation, Humanitarian OpenStreetMap Team

Dinar Adiatma, Facebook Project Associate, Humanitarian OpenStreetMap Team

AI-Assisted Community Mapping

- **What is OSM?** - What would happen if Wikipedia and Google Maps had a baby raised by a village. (openstreetmap.org)

- **Who is Humanitarian OpenStreetMap Team (HOT)** - An organization supporting a movement to map an area home to one billion people. (hotosm.org)

- **What is our problem?** -Digitizing features (roads and buildings) from satellite imagery is time consuming and inconsistent.

- **What is possible?** - AI image recognition models can identify and classify buildings and roads and make suggestions to mappers to improve speed and quality in mapping workflows.

- **What is the biggest challenge?** –The principle is easier than in practice.

AI ASSISTED WORKFLOW

BUILDING EXTRACTION
- AI model predictions from Microsoft (Bing) imagery.

REFORM & RESHAPE
- AI-assisted map editors RapID & MapwithAI

DATA IMPORT
- Data imported after verfication of model predictions

VALIDATION
- OSM data validated for quality assurance.

Tags/Attributes	Value
building	Yes
Format	geojson-OSM

AI-Assisted Mapping

AMPLIFYING EFFORTS TO CONNECT COMMUNITIES

What problem are you trying to solve?

ACCESS TO RESOURCES

People who are connected thought the map, lack access to:

- **Emergency response**
- **Healthcare**
- **Local markets**
- **Education**
- **Utilities (Electricity, communications, internet etc.)**

COMMUNITY POWER

Disconnected communities have less power when underrepresented to influence:

- **Government policy**
- **Distribution of resources**
- **Community planning**
- **Disaster response**

How is the problem being addressed today?

MAP BY HAND

Also known as 'traditional mapping', satellite imagery is used as an underlay for users to trace roads and upload to OpenStreetMap (OSM). This tracing process, known as map editing, is undertaken using OSM tools such as ID editor or JOSM.

editor	2016	2017	2018	2019	2020
JOSM	625 442 567 (70.8%)	664 173 193 (67.1%)	794 008 723 (68.4%)	790 709 661 (64.1%)	996 071 460 (63.9%)
iD	189 401 329 (21.5%)	279 192 774 (28.2%)	321 496 138 (27.7%)	359 714 471 (29.2%)	459 876 980 (29.5%)

Why is AI better than the current solution?

Increases both the quantity & quality of critical map data

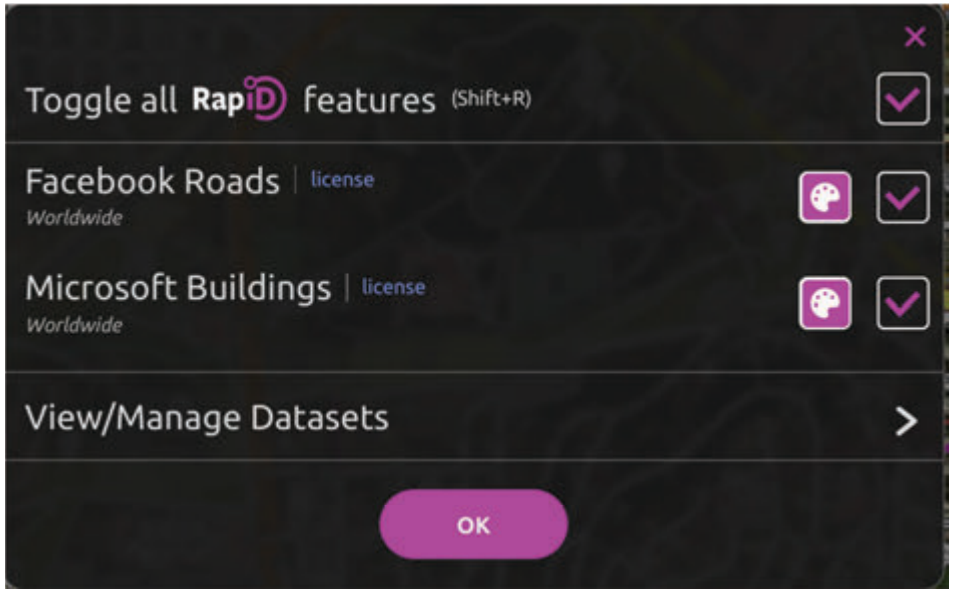
- New mappers can learn the process & contribute more data while learning
- New mappers are guided by AI model output Improving skills & quality together
- Experienced mappers can quickly validate AI model predictions
- Validations also stay in the loop to maintain data quality

What is the solution?

AI imagery recognition models to derive predictions that can be converted to OpenStreetMap data.

Provider	Coverage	Object	Available on
Microsoft	USA, Canada, Tanzania, Uganda, Australia	Building	RapiD & Plugin MapWithAI (JOSM)
Esri	USA	Building and Address	
Facebook	Global	Road	

Data for additional features (roads and buildings) can also be accessed for some areas around the globe (left image).



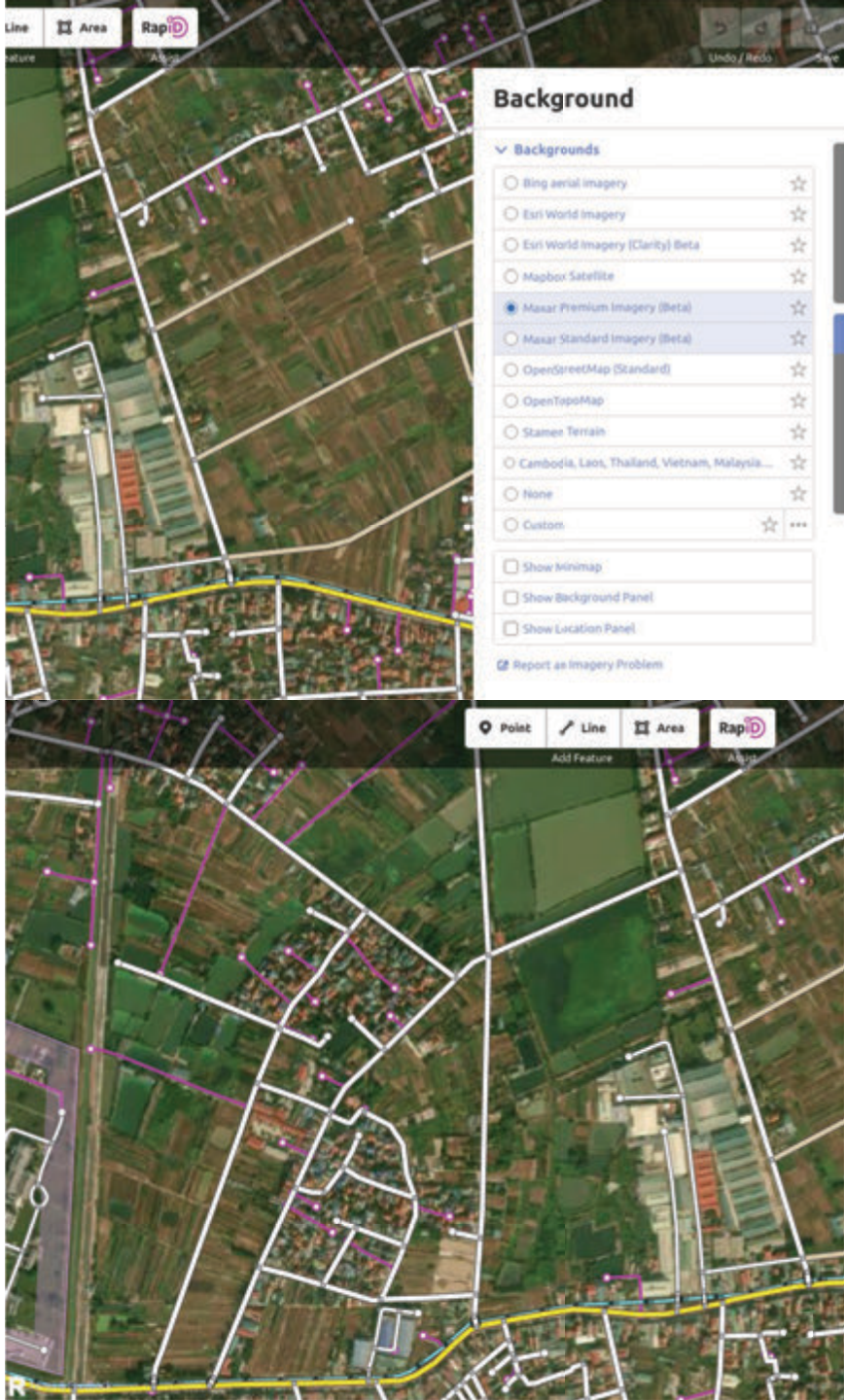
RapiD has OSM-ready road datasets full coverage in Indonesia (right image).

What kinds of data does your solution need?

- Satellite imagery for OSM (open licensed)
- OSM reference data (to train model)
- Road ready-to-use dataset

Where and how are you getting these data?

- Maxar premium imagery
- OpenStreetMap Database
- Facebook RapID model predictions
- Publicly available for OSM community via RapiD Editor or MapWithAI JOSM Plugin



What resources do you need to support the development, implementation, and maintenance of the solution?

Technical

- Product Owner (Facebook)
- Developer (Facebook)
- Quality control (HOT & Facebook)
- Human validator (HOT & Facebook)

Non-technical

- Administration : documenting the data import workflow in Wiki OpenStreetMap (Facebook)
- Local community facilitator: support to improve user experience using RapiD via training or Mapathon (HOT)

What are the potential biases that AI may introduce or amplify in your context?

DATA FRESHNESS

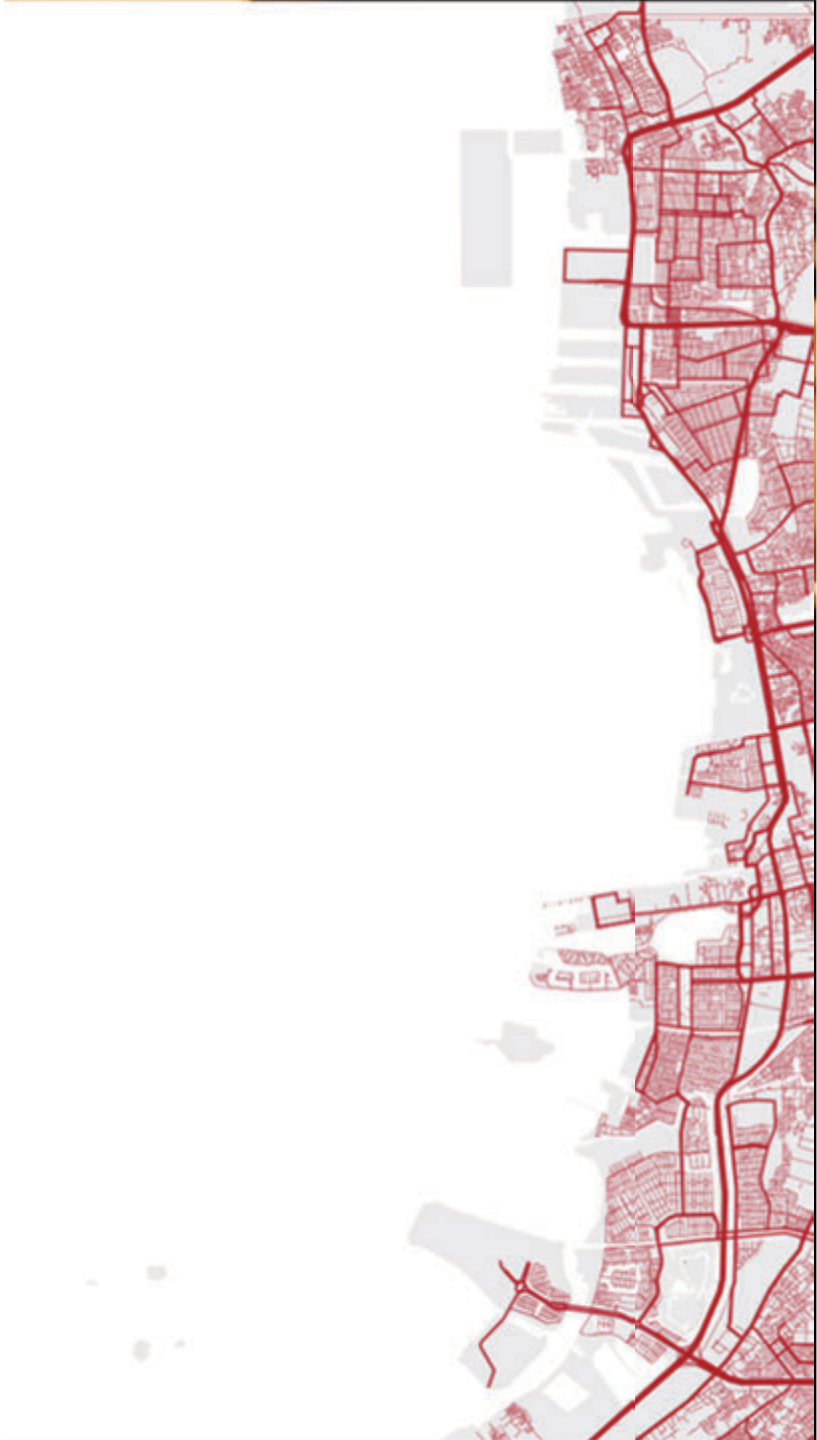
- AI road data is not generated 'real time'.
- 71% AI road data produced in 2020*.
- Estimated less than 10% cases we tracing manually.

DATA QUALITY

- Data geometry
- Invalid tag
- Suspicious edits (e.g. mass deletion, data vandalism)

INCREASED ORGANISED MAPPERS

- Vietnam has 92% organized mappers per 17 March 2021 (https://osmstats.neis-one.org/?item=countries)
- We always follow the local guideline from Wiki OpenStreetMap.
- Maintain feedback and communication with local mappers and mappers around us.

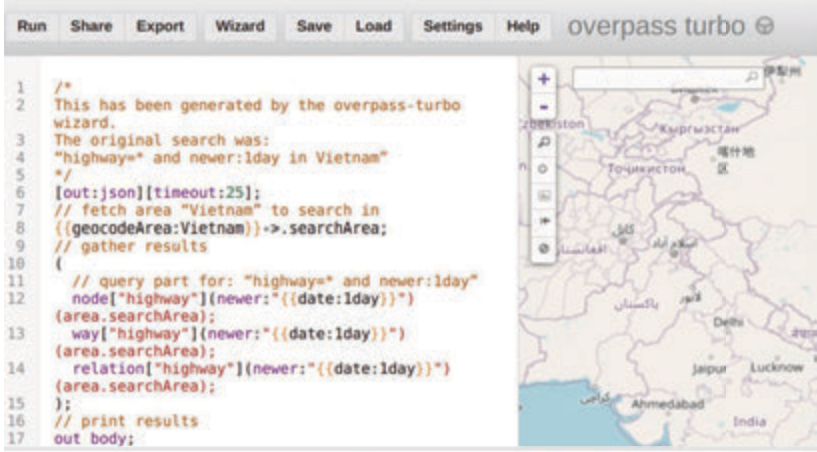


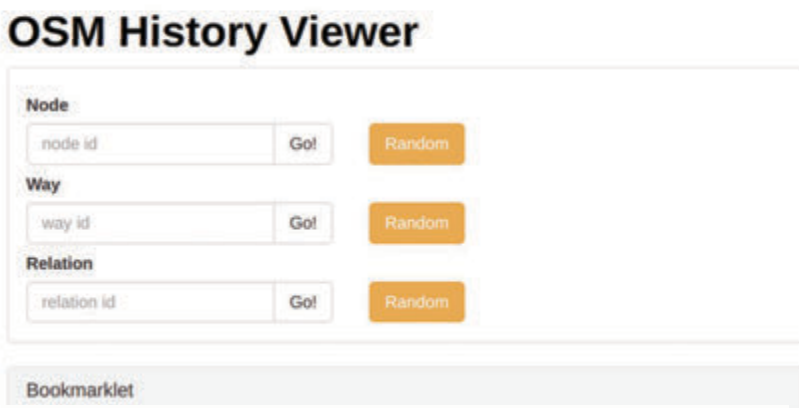
What is your approach to maintaining the solution?

USING QUALITY ASSURANCE TOOLS

Quality Assurance tools help lead to better quality of OpenStreetMap data by provide list of bugs of visualization from OpenStreetMap data

1. **Overpass Turbo - OSM minutely changes**
2. **OSM History Viewer (by PeWu)**
3. **OSMCha changeset data validation tool**



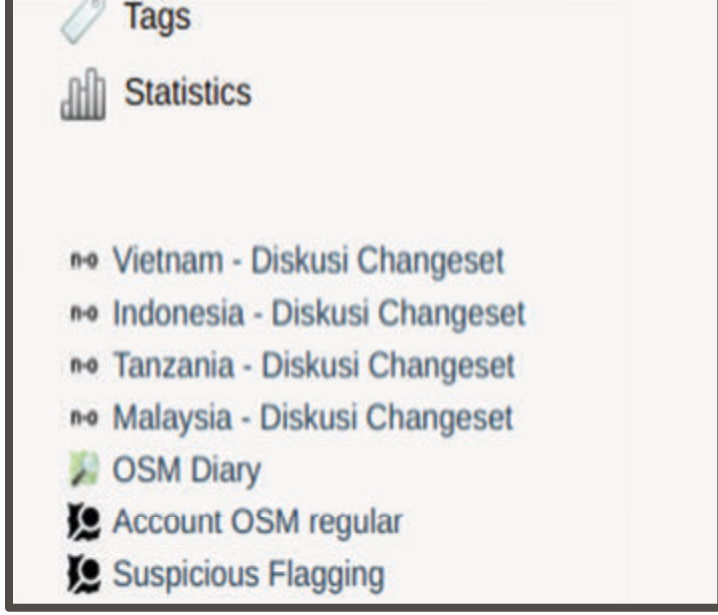


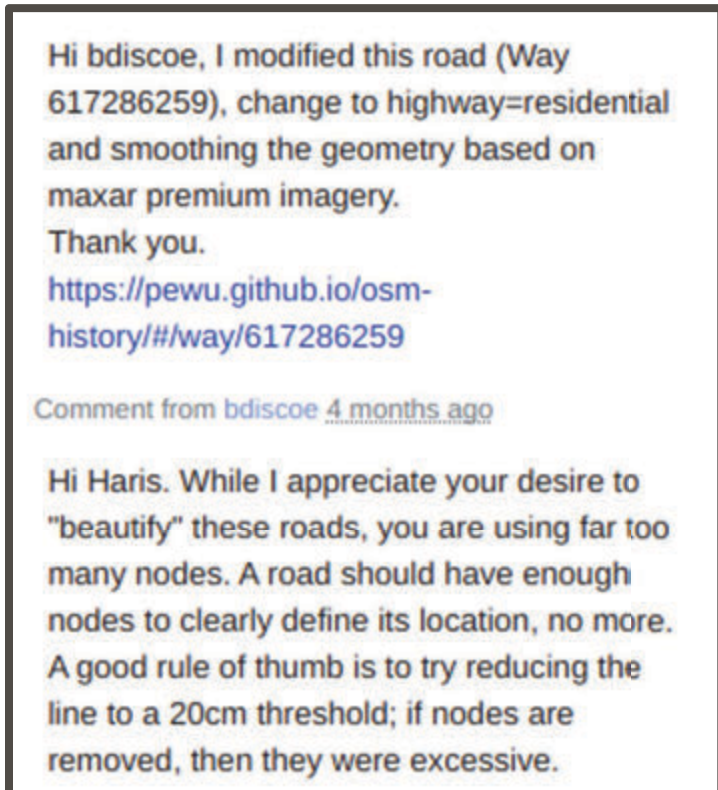
What is your approach to maintaining the solution?

USING QUALITY ASSURANCE TOOLS (CONT)

Being responsive to OSM community feedback is also critical to maintaining the solution achieved through:

1. **RSS Feeder for OSM Changeset Analyzer, OpenStreetMap forum, and Changeset discussion in almost real time.**
2. **Changeset Feedback discussion >> Very informative and usually drive our workflow**





Call to Action

How you can contribute

- Perform RapiD mapping & validation training for local people.
- Sponsored mapping in remote areas.
- Imagery partnerships

Opportunities to partner

- Be an expert end-user
- Provide imagery with open & public licenses
- Provide an OSM-compatible license dataset
- Sharing ideas with developers or mappers
- Adapt, train and validate models for new geographies

In this presentation - HOTSM used 8 questions from NetHope's AI Suitability Toolkit to provide an overview of the project and share lessons learned:

1. What problem are you trying to solve?
2. How is the problem being addressed today?
3. Why is AI better than the current solution?
4. What is the solution?
5. What kinds of data does your solution need?
6. What resources do you need to support the development, implementation, and maintenance of the solution?
7. What are the potential ethical issues that AI may introduce or amplify in your context?
8. What is your approach to maintaining the solution?

NetHope's AI Suitability Toolkit for Nonprofits provides a framework with 32 questions to help you determine suitability of AI for humanitarian and international development programs and plan for sustainability.

https://solutionscenter.nethope.org/artificial-intelligence-suitability-toolkit-for-nonprofits

Please post in the Chat window

What are some of the other use cases and topics that you would like to hear about or share in future webinars?

Q&A

- What are the specific ethical risks (in using satellite imagery and AI in humanitarian contexts) and how you're mitigating them?
- What are some of the key elements of a successful (cross-sector) partnership? How do you ensure 'ethical design and use' when working in cross-sector partnerships?

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