

OpenStreetMap

a resource for the data science

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Outline



What's OpenStreetMap



How it Works



Success Stories



OSM in Research



Copyright



Data Model

What's OpenStreetMap



What is OpenStreetMap?



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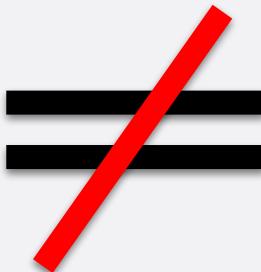
OpenStreetMap powers map data on thousands of web sites, mobile apps, and hardware devices

 Local Knowledge  Community Driven  Open Data

OpenStreetMap is built by a community of mappers that contribute and maintain data about roads, trails, cafés, railway stations, and much more, all over the world.

<http://www.openstreetmap.org/about>

OpenStreetMap is NOT an alternative to Google Maps





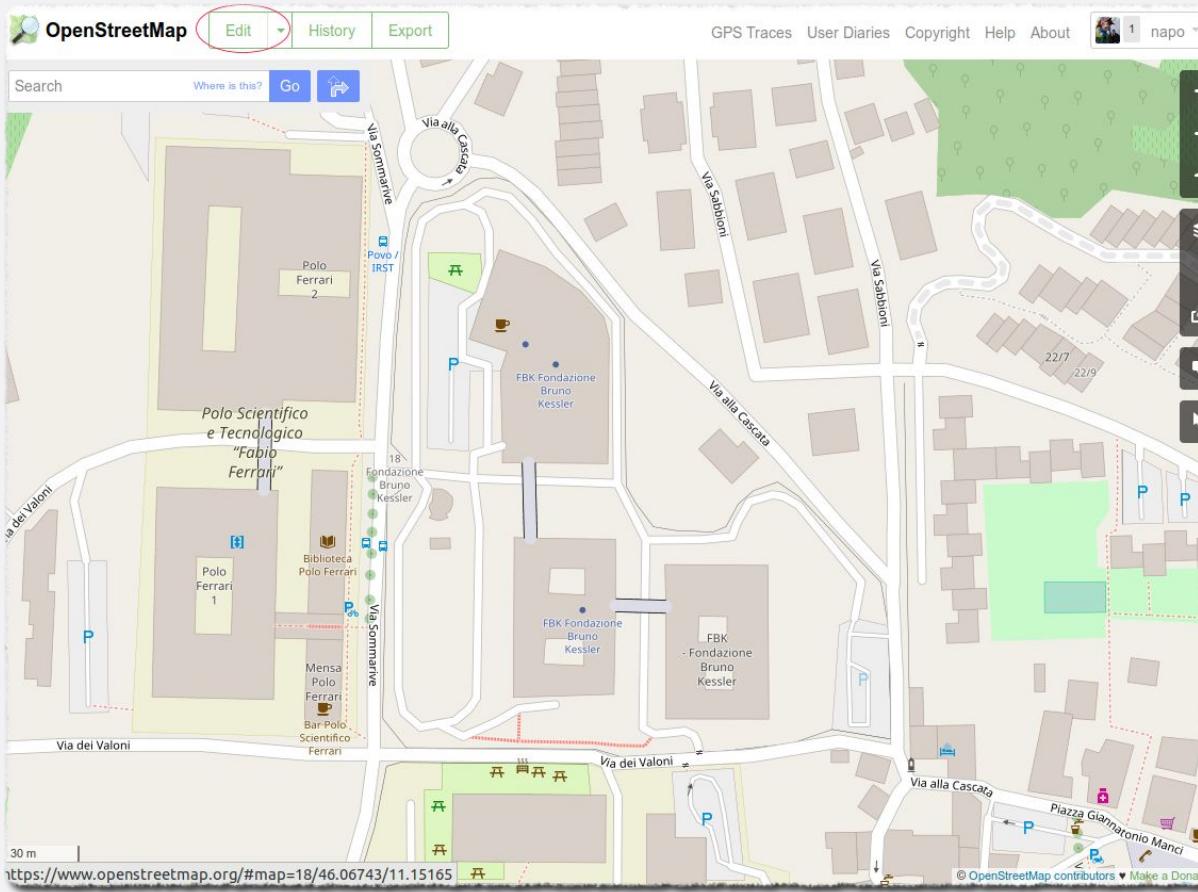
OPEN DATA

IS A COMMONS



How it works





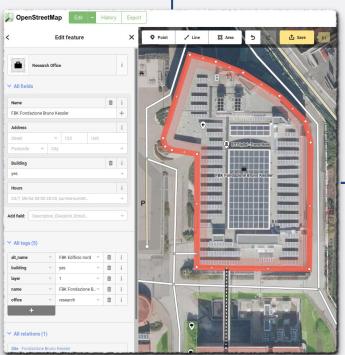
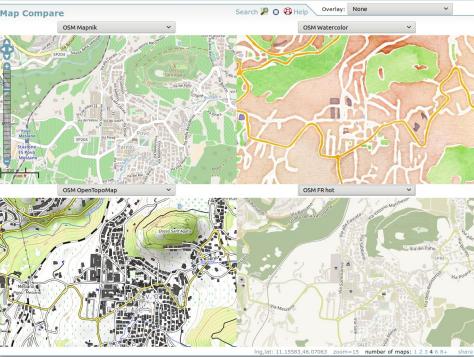
What's happening now



<http://osmlab.github.io/show-me-the-way/>

Geospatial analysis and representation for data science

Master in Data Science - University of Trento



The image displays two side-by-side screenshots of mobile map application websites.

Orux Maps (Left):

- Header:** "Orux Maps" logo, "online/offline map viewer for Android and more...", "Home", "Maps!!!", "Manual", "Downloads", "Links", "FORUM".
- Language Options:** English, Español, Français.
- Content:** A sidebar with "MAIN MENU" (OsmAnd, Download / First Steps, Plugins, Screenshots, How To + FAQs, Blog) and "RESOURCES" (Project Site, Forum, Source Code, OsmAnd release builds, OsmAnd nightly build, OsmAnd C2Z, OSM Homepage, Administrator). A "W" icon indicates a translation progress of 77% done.
- Call-to-action:** "I USE IT" button.

Locus Map (Right):

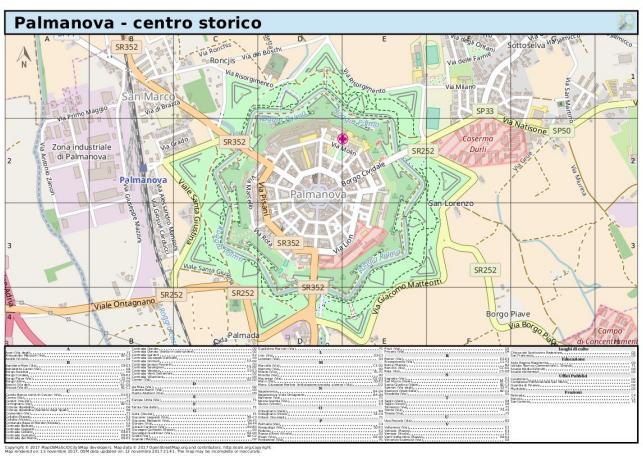
- Header:** "Locus" logo, "HOME", "NEWS", "FEATURES", "DOWNLOAD", "SUPPORT", "CONTACT".
- Content:** Three devices (laptop and two smartphones) displaying the Locus Map interface with various map layers and route planning.
- Text:** "Locus Map – GPS navigation app for Android that can do everything you want".
 - View maps offline
 - Track your route
 - Find caches
 - Use a voice guide
 - And much [more...](#)
- Call-to-action:** "So [download it for free today.](#)" and "GET IT ON Google play" button.
- Google Play Store Information:** Locus Pro (Rating: 4.8, Paid) and Locus Free (Rating: 4.4, Free).
- Google+ Information:** Locus Map page.
- Bottom Navigation:** "Features" (Offline maps, Geocaching, Online maps, Points & Tracks), "Track record", "Hiking & Cycling", "Navigation & More".

BATTLEFIELD 4 (BF4) IMAGES

The image shows a screenshot of the Battlefield 4 Battlelog leaderboards for the M416 assault rifle. The interface includes a map of a city street with player icons and a circular selection tool. The main leaderboards are for Uppsala (Top 5%), Uppland (Top 70%), Sweden (Top 25%), and World (Top 5%). The world leaderboard is displayed below:

RANK	PLAYER	SCORE
1	ogabrelsson	16,654
2	ogbystrom	15,558
3	JBRipley	15,330
4	Sodatrukt	15,135
5	RSO	14,657
6	TheBikingViking	14,301
7	Indigowind	13,719
8	DarkLord7854	11,503
9	droh31337	11,334
10	Flug-E	10,964
692	MHELOW	7,643

Below the leaderboards, there are sections for "VIEW SPECIFIC ASSAULT RIFLE" and "BF4 SCREENSHOTS - BATTLELOG LEADERBOARD".



MapOSMatic

<http://maposmatic.org>

Orienteering

<http://oobrien.com/oom/>

Tip: click to add controls, or drag the blue marker to move the map. Once done, click "Save & get PDF map".

OPENORIENTEERINGMAP.NET

Load saved map #: Load Jump to Postcode: Jump

Scale: 1:4000 1:5000 1:7500 1:10000 1:12500 1:15000 1:20000

Sheet: A4 A3 RA3 Orientation: Portrait Landscape Delete

Save & get PDF map Show clue sheet

Grahame Park

10m contour

30 minute score, 1 point penalty for every 3 seconds late back.

10 controls 160 points

1 10 Post box number

2 10 Post box number

3 10 Colour of do...

4 10 Colour of do...

5 10 Fire hydrant...

20 Number of tr...

21 20 Name of road

22 20 Gate closes at:

23 20 No _____ al...

24 20 Name of chemist

25 20 Name of chemist

26 20 Name of chemist

27 20 Name of chemist

28 20 Name of chemist

29 20 Name of chemist

30 30 Name of chemist

Supported by

British Orienteering
Created by Oliver O'Brien
Attribution (OS, Ordnance Survey)
More Information Comments

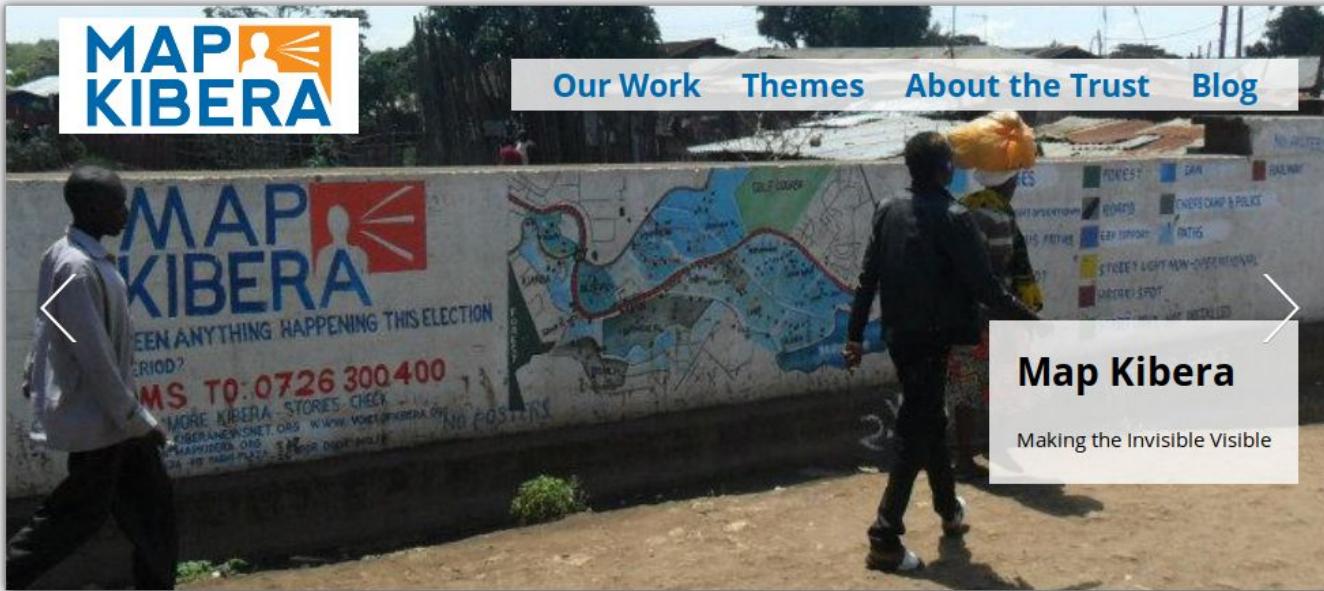


<https://touch-mapper.org/>

Success Stories

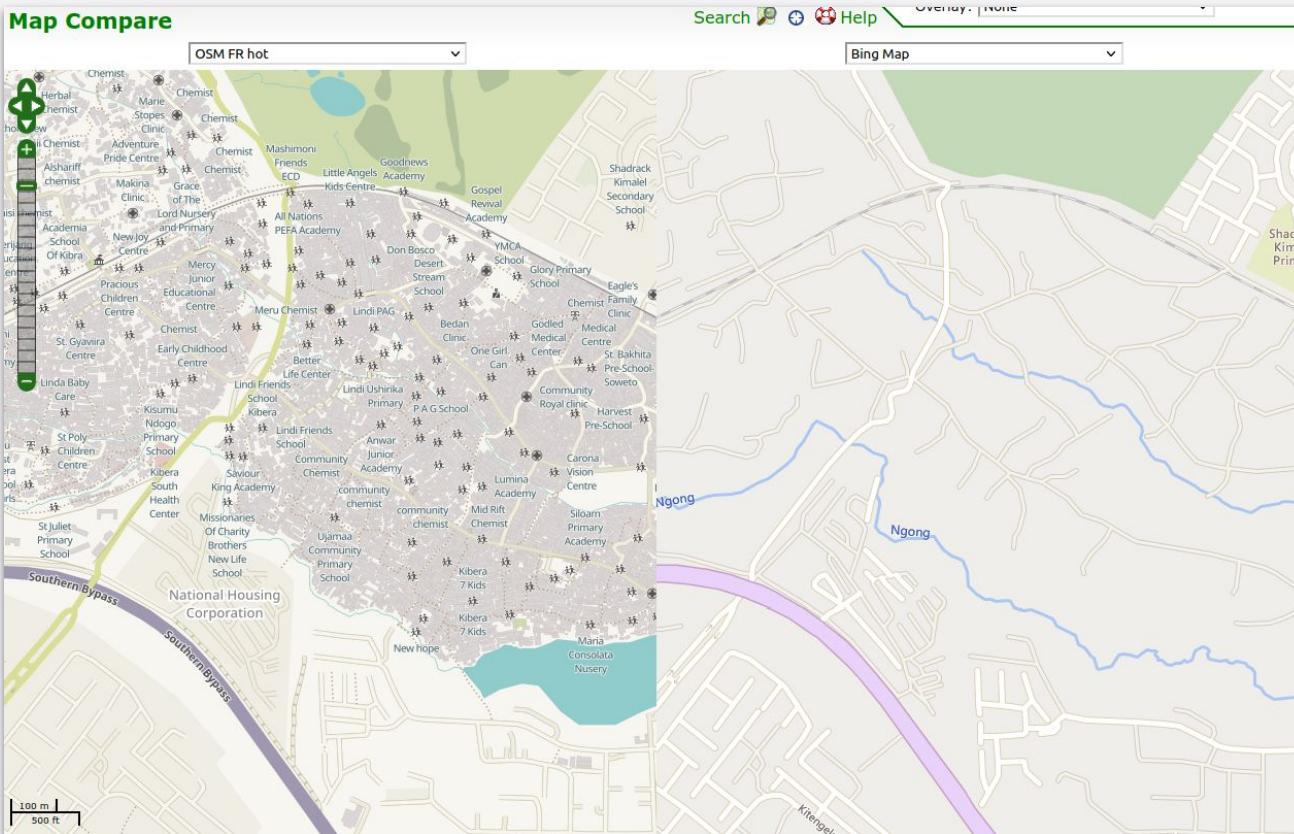


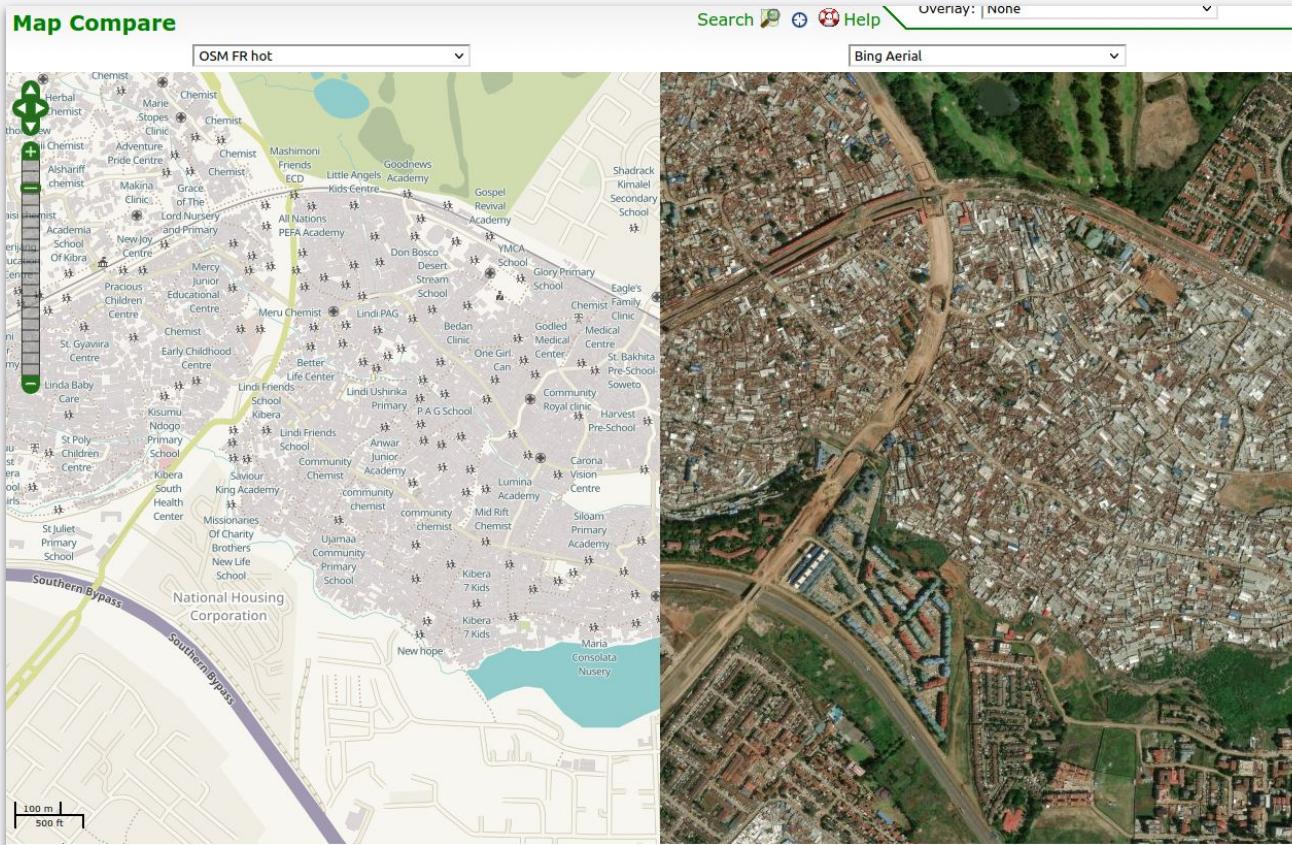
Making the Invisible Visible



mapkibera.org

<http://tiny.cc/kiberacompare>





 Humanitarian
OpenStreetMap
Team

WHAT WE DO OUR WORK TOOLS & DATA NEWS COMMUNITY & ORGANIZATION PARTNER WITH US GET INVOLVED 

HOT is an international team dedicated to humanitarian action and community development through open mapping.

[Learn about what we do](#) > [START MAPPING](#) >  



Mwanza Urban Risks Mapping: Ramani Mwanza
Tanzania



Integrating OpenStreetMap data into Caribbean disaster risk reduction
19 Countries

359,817
Community Mappers⁽¹⁾

151,726,808
Total Map Edits⁽¹⁾

115,559,206
Buildings Mapped⁽¹⁾

2,602,131
Roads Mapped (KM)⁽¹⁾

<https://www.hotosm.org/>





Putting the World's Vulnerable People on the Map

Each year, disasters around the world kill nearly 100,000 and affect or displace 200 million people. Many of the places where these disasters occur are literally 'missing' from any map and first responders lack the information to make valuable decisions regarding relief efforts. Missing Maps is an open, collaborative project in which you can help to map areas where humanitarian organisations are trying to meet the needs of vulnerable people.

Step 1.
Community volunteers add local detail such as neighborhoods, street names, and evacuation centers

Step 2.
Humanitarian organizations use mapped information to plan risk reduction and disaster response activities that save lives

Step 3.
Remote volunteers trace satellite imagery into OpenStreetMap

<http://www.missingmaps.org/>



Fondazione Bruno Kessler

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FONDATION BRUNO KESSLER

WELCOME TO FBK
bit.ly/FBKvirtualtour

Fondazione Bruno Kessler (Scientific Center)

Home Mi piace Segui Condividi ... Chiama ora

Foto Recensioni

Negozi Informazioni Community

Crea una Pagina

Post

Fondazione Bruno Kessler 12 n.

Prosegue il nostro viaggio attraverso le 9 storie favolose di #RACCONTASCIENZA

Il racconto "La lezione dell'acqua", di Albiana Calepija, dai 6 anni in su, è la seconda tappa

Leggi tutto! <https://buff.ly/38O9whF...> Altro...

Visualizza tutte le statistiche

sessioni 0

Padreviews 0

Visualizza tutte le statistiche

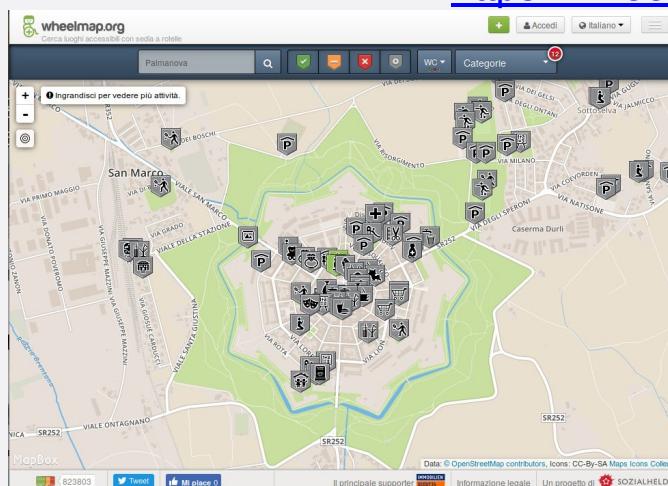




Be the movement!

Join "MapMyDay" – a global social event for more accessibility! We need your support! Because steps are a daily barrier for millions of people worldwide who are traveling – whether they use a wheelchair, a walking aid or a stroller. The event will kick off on World Tourism Day. Help out with a few clicks and mark places in your neighborhood on the online map Wheelmap.org as to whether they are wheelchair accessible or not. Let's do this together and gather as many places as possible!

<http://mapmyday.org/en>



<https://wheelmap.org/it/>

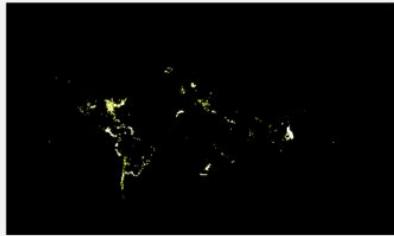
OSM in Research



Corporate Editors in the Evolving Landscape of OpenStreetMap



Telenav



Kaart



Apple



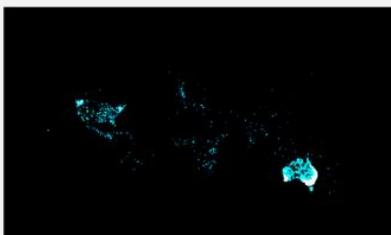
Facebook



Mapbox & Development Seed



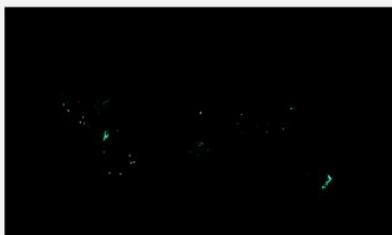
Amazon



Microsoft



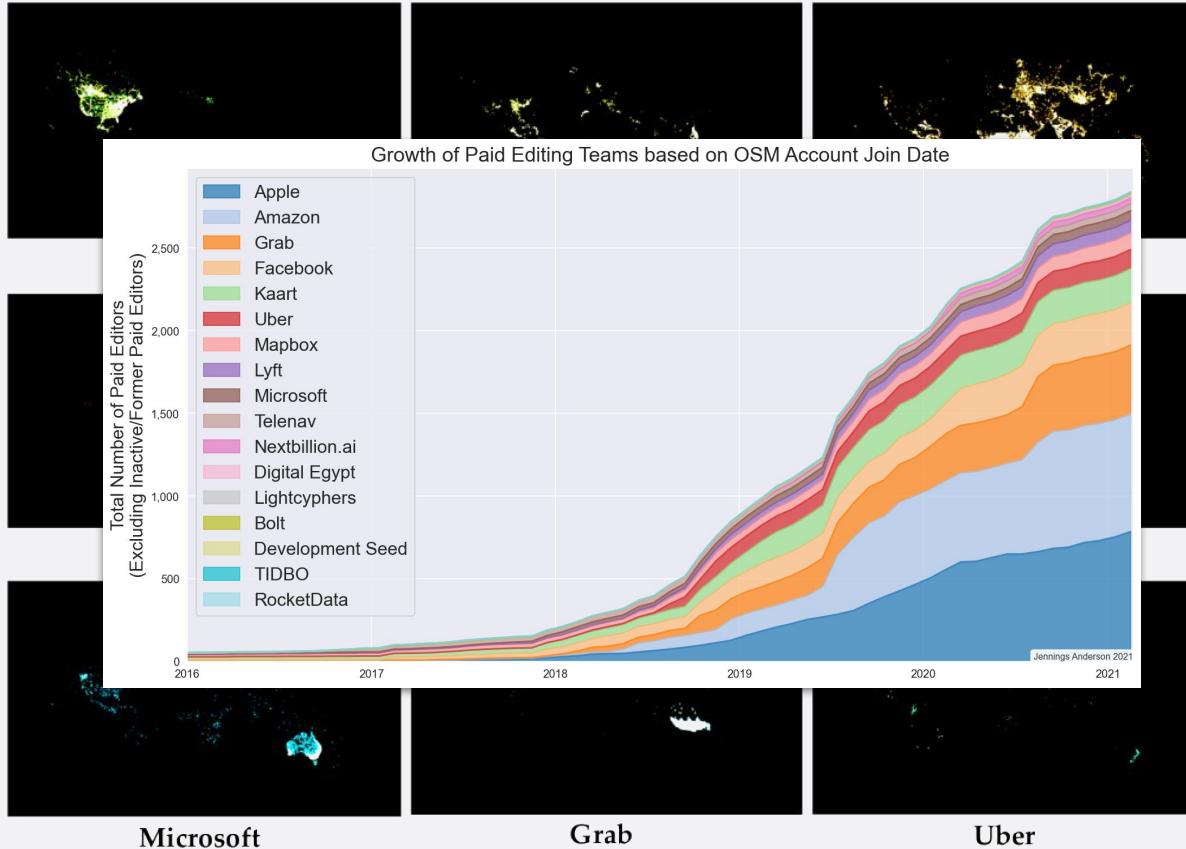
Grab



Uber

<https://www.mdpi.com/2220-9964/8/5/232>

Corporate Editors in the Evolving Landscape of OpenStreetMap



<https://www.openstreetmap.org/user/Jennings%20Anderson/diary/396271>



Atlas

build passing

The [Atlas](#) is a way to efficiently represent OpenStreetMap data in memory. A subset of the data is in a "navigable network" form, meaning anything that is assumed to be navigable will be in a form of `Node`s and `Edge`s in a way a routing algorithm could traverse it. It also provides easy to use APIs to access geographical data. On top of it all, it is easy to shard and re-stitch, making it perfect for distributed processing!

Projects using Atlas:

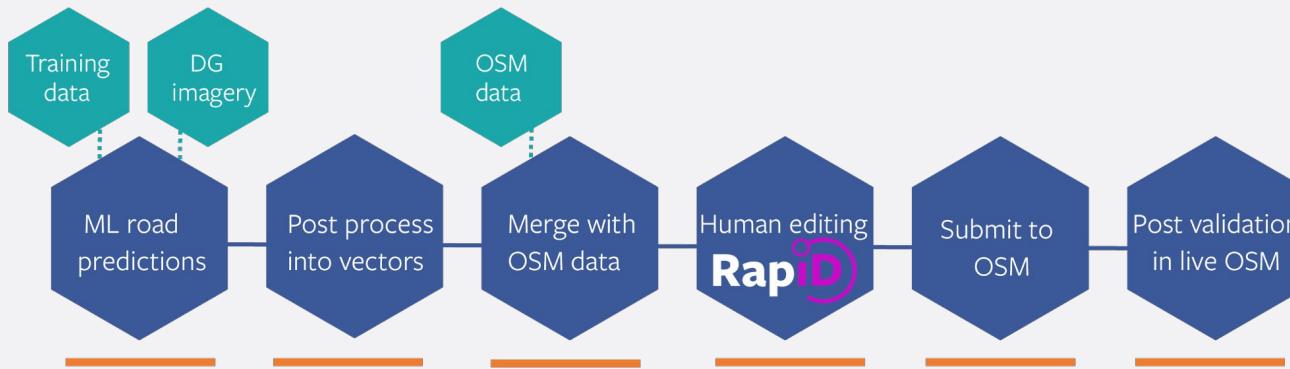
- [atlas-generator](#): A Spark job to distribute Atlas shards generation
- [atlas-checks](#): A suite of tools to check OSM data integrity using Atlas, and Spark.
- [josm-atlas](#): A JOSM plugin to visualize Atlas data.

<https://github.com/osmlab/atlas>

27 lines (21 sloc) | 1.52 KB

```
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2
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```





https://wiki.openstreetmap.org/wiki/AI-Assisted_Road_Tracing

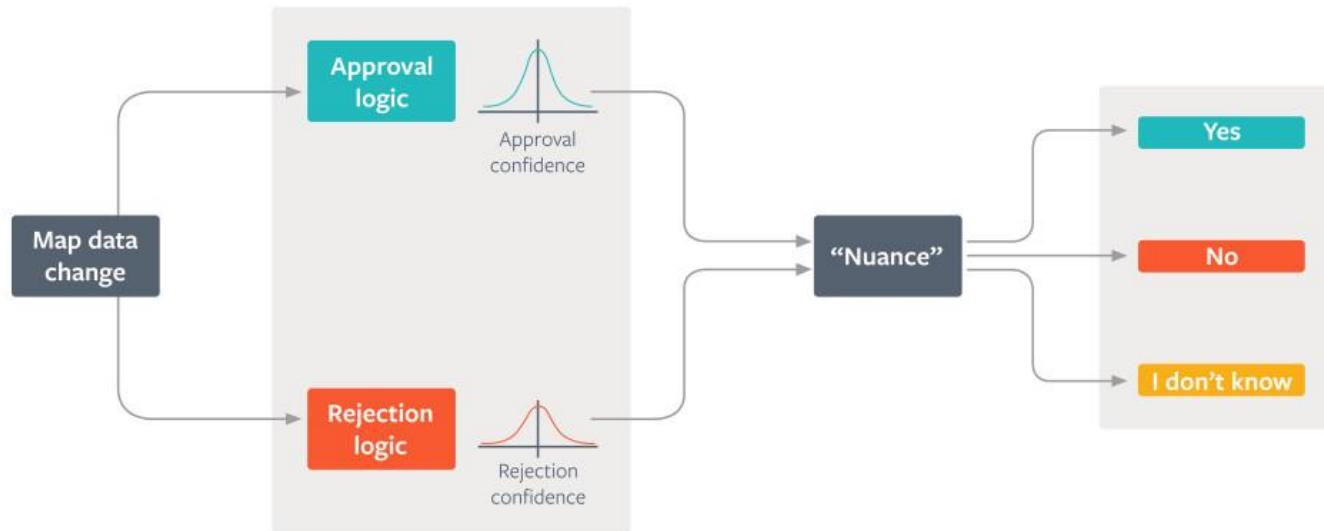
MaRS - data collection



machine-augmented automatic review system (MaRS).



MaRS - data checking

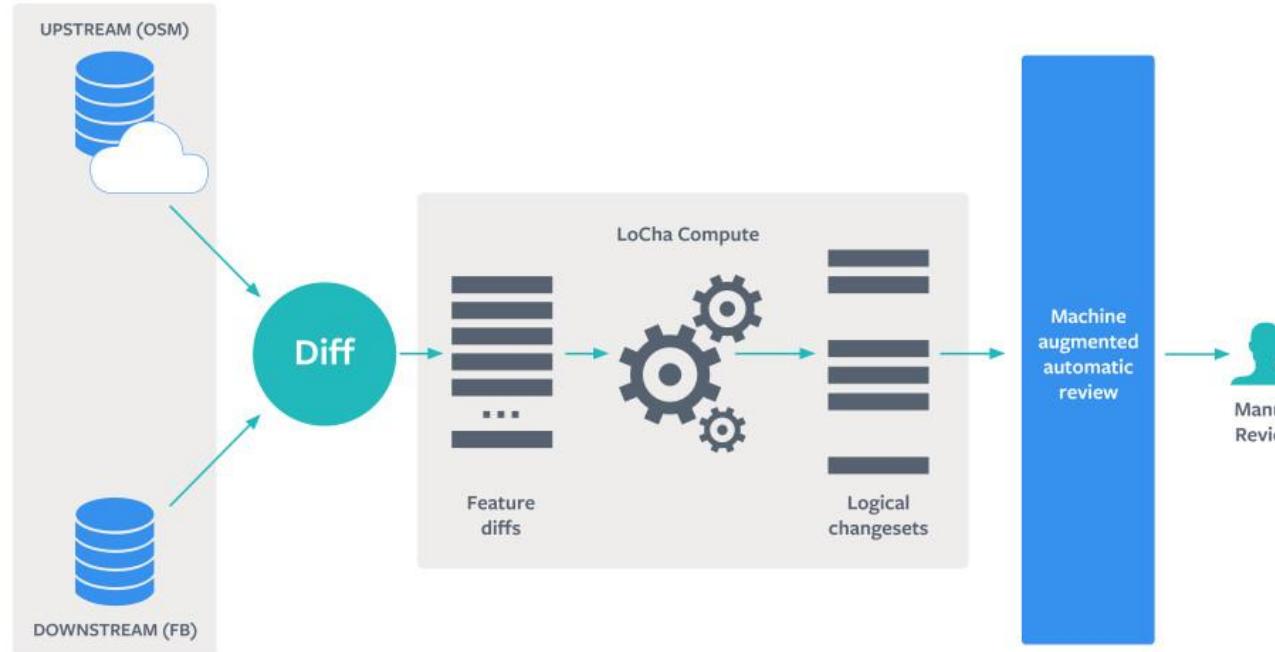


machine-augmented automatic review system (MaRS).





MaRS - data entry



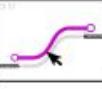
machine-augmented automatic review system (MaRS).

 mapwith.ai

Using AI to Map the World

In conjunction with OpenStreetMap, we are creating tools that we hope will enable the mapping community to enjoy a faster & more accurate mapping experience. To this end, we used artificial intelligence to predict features on high-resolution satellite imagery; these features are then populated in our RapiD map editing tool. When combined with global-scale humanitarian efforts, we hope RapiD can help realize our vision of a more connected world.



 +  + 

Artificial Intelligence Detected Roads / Mapping the World w/ RapiD Editor / Humanitarian Prioritized Community Task Mapping

ML Roads



≡ Google Scholar OpenStreetMap 

Articles About 63,400 results 0.04 sec

Any time Since 2021 Since 2020 Since 2017 Custom range...

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[BOOK] [OpenStreetMap](#)
J Bennett - 2010 - books.google.com
This book introduces the OSM project, its aims and objectives, and its history, then guides you through the process of gathering, editing, and using OpenStreetMap data using a series of real-world examples. This book is the perfect aid for geographic-information professionals ...
 99 Cited by 166 Related articles

[Openstreetmap: User-generated street maps](#)
M Haklay, P Weber - IEEE Pervasive computing, 2008 - ieeexplore.ieee.org
The [OpenStreetMap](#) project is a knowledge collective that provides user-generated street maps. OSM follows the peer production model that created Wikipedia; its aim is to create a set of map data that's free to use, editable, and licensed under new copyright schemes. A ...
 99 Cited by 2682 Related articles All 13 versions

[Quality assessment of the French OpenStreetMap dataset](#)
JF Girres, G Touya - Transactions in GIS, 2010 - Wiley Online Library
Abstract The concept of Volunteered Geographic Information (VGI) has recently emerged from the new Web 2.0 technologies. The [OpenStreetMap](#) project is currently the most significant example of a system based on VGI. It aims at producing free vector geographic ...
 99 Cited by 711 Related articles All 5 versions

[PDF] [A review of OpenStreetMap data](#)
P Mooney, M Minghini - 2017 - library.oapen.org
While there is now a considerable variety of sources of Volunteered Geographic Information (VGI) available, discussion of this domain is often exemplified by and focused around [OpenStreetMap](#) (OSM). In a little over a decade OSM has become the leading example of ...
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Related searches

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Subject Area

Biology and life sciences (276)

Earth sciences (248)

Social sciences (203)

People and places (172)

Medicine and health sciences (160)

Geography (159)

Ecology and environmental sciences (156)

[Modelling urban vibrancy with mobile phone and OpenStreetMap data](#)
Federico Botta, Mario Gutiérrez-Roig
Research Article | published 02 Jun 2021 PLOS ONE
<https://doi.org/10.1371/journal.pone.0252015>
Views: 409 • Citations: 1 • Saves: 0 • Shares: 8

[The world's user-generated road map is more than 80% complete](#)
Christopher Barrington-Leigh, Adam Millard-Ball
Research Article | published 10 Aug 2017 PLOS ONE
<https://doi.org/10.1371/journal.pone.0180698>
Views: 13574 • Citations: 131 • Saves: 167 • Shares: 247

[ISED: Constructing a high-resolution elevation road dataset from massive, low-quality in-situ observations derived from geosocial fitness tracking data](#)
Grant McKenzie, Krzysztof Janowicz
Research Article | published 13 Oct 2017 PLOS ONE
<https://doi.org/10.1371/journal.pone.0186474>
Views: 3533 • Citations: 2 • Saves: 18 • Shares: 1

[Using OpenStreetMap point-of-interest data to model urban change—A feasibility study](#)
Liming Zhang, Dieter Pfoser

Copyright



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For a browsable electronic map, the credit should appear in the corner of the map. For example:



The screenshot shows the OpenStreetMap website's 'Copyright and License' page. At the top, there is a navigation bar with links for 'Edit', 'History', 'Export', 'GPS Traces', 'User Diaries', 'Copyright', 'Help', 'About', 'Log In', and 'Sign Up'. The main title 'Copyright and License' is displayed prominently. Below the title, a note states: 'OpenStreetMap® is open data, licensed under the [Open Data Commons Open Database License \(ODbL\)](#) by the [OpenStreetMap Foundation \(OSMF\)](#)'. A large text box contains the following text:

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Our documentation is licensed
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We require that you use the cre
You must also make it clear tha
Alternatively, and as a requirem
are not possible (e.g. printed w
address) and to opendatacomm
The map tiles in the "standard s
under the Open Database Licen
For a browsable electronic map,

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At the bottom left, there is a small thumbnail image of a map showing a road labeled 'B4437' and a location labeled 'Charbury', with the text '© OpenStreetMap contributors' below it.

OpenStreetMap Edit History Export GPS Traces User Diaries Copyright Help About Log In Sign Up

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To Adapt: To modify, transform and build upon the database.

As long as you:



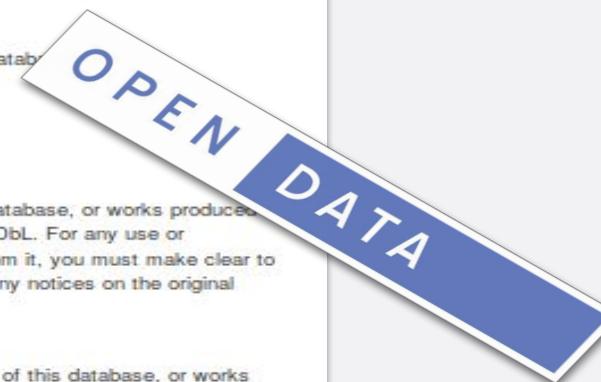
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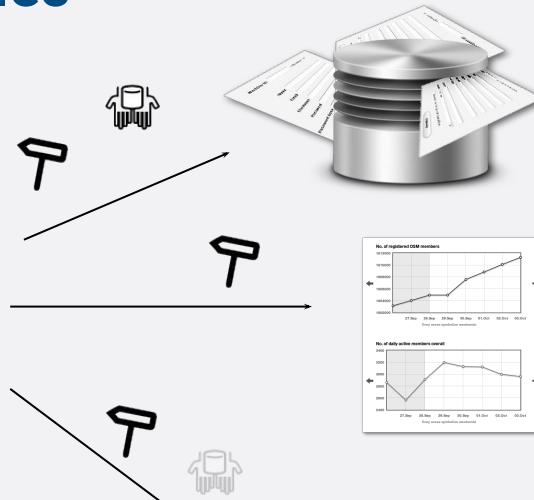


The ODbL license by examples

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<node id="9193845" lat="46.1201572" lon="11.0860898" version="0" timestamp="2011-02-07T11:18:24Z" changeset="7217702" uid="330007" user="pikapp79"/>
<node id="9193877" lat="46.0521785" lon="11.1175845" version="11" timestamp="2010-08-06T16:15:07Z" changeset="8939495" uid="330007" user="pikapp79"/>
<node id="9193996" lat="46.0534124" lon="11.1185143" version="9" timestamp="2013-05-21T19:07:54Z" changeset="16228624" uid="330007" user="pikapp79"/>
<node id="9194295" lat="46.0533991" lon="11.1278855" version="8" timestamp="2011-05-07T08:06:53Z" changeset="5443649" uid="24966" user="nfranz79"/>
```



The screenshot shows a map of Lake Constance and the surrounding area. A route is plotted from Friedrichshafen to Lindau, with a red line indicating the path and green dots marking waypoints. The map includes labels for various towns like Romanshorn, Kreuzlingen, and Arbon. A legend on the left provides information about the map's features, including icons for roads, water bodies, and points of interest.

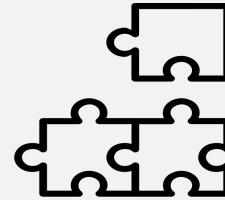


The screenshot shows the OpenStreetMap search interface. The search bar at the top contains the query "Matera". Below the search bar is a "Search Results" section with a "Close" button. The results are listed as follows:

- Results from OpenStreetMap Nominatim:
 - City Boundary Matera, MT, BAS, Italy
 - Hamlet Matera, AR, MAR, Italy
- Locality La Mureta, San Esteban de Gormaz, Provincia de Soria, Castile and Leon, Spain
- County Boundary MT, BAS, Italy
- Archaeological Site Matera, P-3, Sassi, Southern Zone, Enilles
- Residential Matera, Vista Flora, Northwood, Indio, Orange, California, 92665, United States of America

At the bottom of the results list is a "More results" button. To the right of the search results is a map showing the geographical area around Matera, Italy.

Data Model



tag

key=value

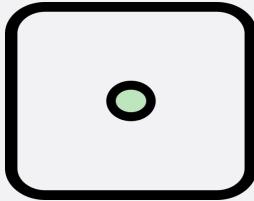
Public Transport

This is used for features related to public transport. For example: railway stations, bus stops and services. See the page titled [Public transport](#) for an introduction on its usage.

Key	Value	Element	Description	Map rendering	Image	Count
public_transport	stop_position		The position on the street or rails where a public transport vehicle stops.			631 228  392  199 
public_transport	platform	  	The place where passengers are waiting for the public transport vehicles.			844 953  203 891  3 646 
public_transport	station	 	A station is an area designed to access public transport.			22 639  9 897  355 
public_transport	stop_area	 	A relation that contains all elements of a train, subway, monorail, tram, bus, trolleybus, aerialway, or ferry stop.			528  198  180 878 

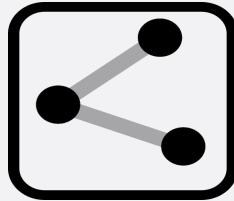
https://wiki.openstreetmap.org/wiki/Map_Features





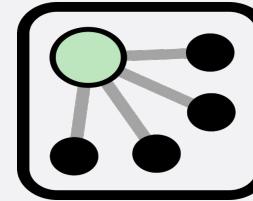
NODE

A **node** is one of the core elements in the OpenStreetMap data model. It consists of a single point in space defined by its **latitude, longitude** and **node id**.



WAY

A **way** is an ordered list of nodes which normally also has at least one tag or is included within a Relation. A way can have between 2 and 2,000 nodes, although it's possible that faulty ways with zero or a single node exist. A way can be *open* or *closed*. A *closed way* is one whose last node on the way is also the first on that way. A closed way may be interpreted either as a closed polyline, or an area, or both.



RELATION

A **relation** is one of the core data elements that consists of one or more tags and also an **ordered list** of one or more nodes, ways and/or relations as **members** which is used to define logical or geographic relationships between other elements. A member of a relation can optionally have a **role** which describes the part that a particular feature plays within a relation.

Example of relation: line path of the bus number 5

OpenStreetMap Edit History Export

Piazza Fiera - Povo - Oltrecastello (variante z) (1396109)

(no comment)

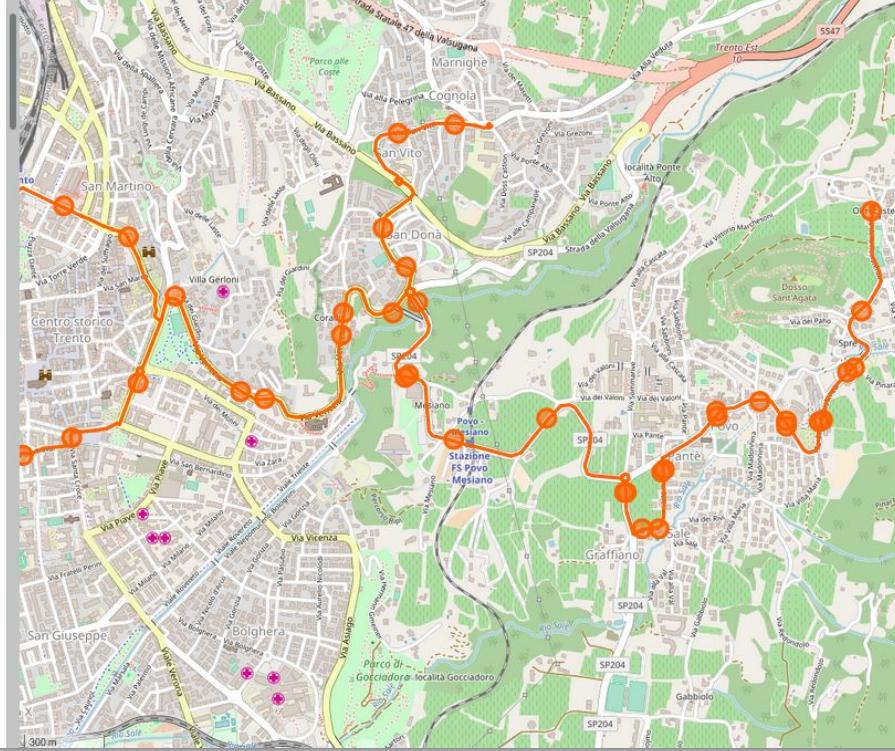
Edited 3 months ago by gumar
Version #44 · Changeset #57637620

Tags

colour	#f5c500
from	Piazza Dante
importance	urban
name	Linea 5 - Piazza Dante - Piazza Fiera - Povo - Oltrecastello (variante z)
network	Servizio Urbano Trento
operator	Trentino Trasporti
ref	5
route	bus
state	alternate
to	Oltrecastello
type	route

Members

- Way Piazza Dante (96965212) as forward
- Way Piazza Dante (2306740) as forward
- Way Via Andrea Pozzo (23058004) as forward
- Way Via Torre Vanga (23058904) as forward
- Way Via Torre Vanga (28301098) as forward
- Way Via Torre Vanga (141265570) as forward
- Way Via Torre Vanga (177180085) as forward
- Way Via Prepositura (23794856) as forward
- Way Via Prepositura (141205569) as forward

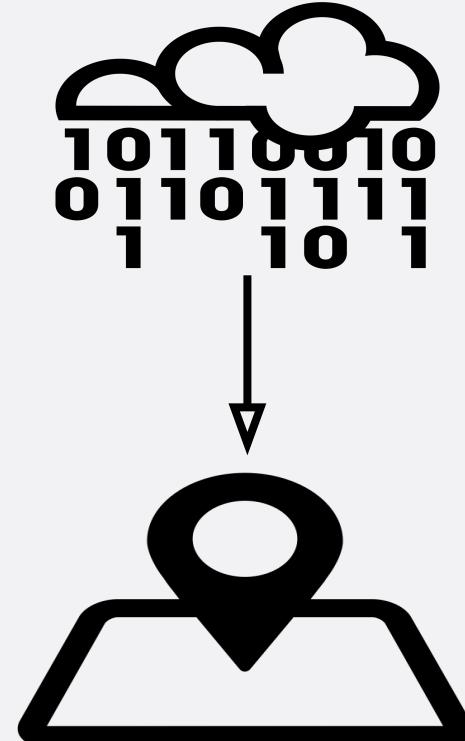


<https://www.openstreetmap.org/relation/1396109#map=15/46.0670/11.1508>

Import are hard to do

Contents [hide]

- 1 Process
 - 1.1 Step 1 - Prerequisites
 - 1.2 Step 2 - Community Buy-in
 - 1.3 Step 3 - License approval
 - 1.4 Step 4 - Documentation
 - 1.5 Step 5 - Import Review
 - 1.6 Step 6 - Uploading
- 2 Key considerations
 - 2.1 Discuss your proposed import
 - 2.2 Document your import
 - 2.3 Ensure that the data license is OK
 - 2.4 Use a dedicated user account
 - 2.5 Use the right tags
 - 2.6 Don't put data on top of data
 - 2.7 Consider simplifying
 - 2.8 Keep server resources in mind
 - 2.9 Take great care to avoid damaging the database
- 3 See also



<https://wiki.openstreetmap.org/wiki/Import/Guidelines>

THE CYCLE PATHS OF TRENTINO



- OpenStreetMap
- Azienda Promozione Turistica
- Provincia Autonoma di Trento
- Comune di Trento

THE CYCLE PATHS OF TRENTO



OpenStreetMap

Campi

- cycleway
- foot
- footway
- highway
- segregated
- source
- surface
- name
- name:de
- name:it

enda Promozione Turistica
vincia Autonoma di Trento
nune di Trento

THE CYCLE PATHS OF TRENTINO



Legend:

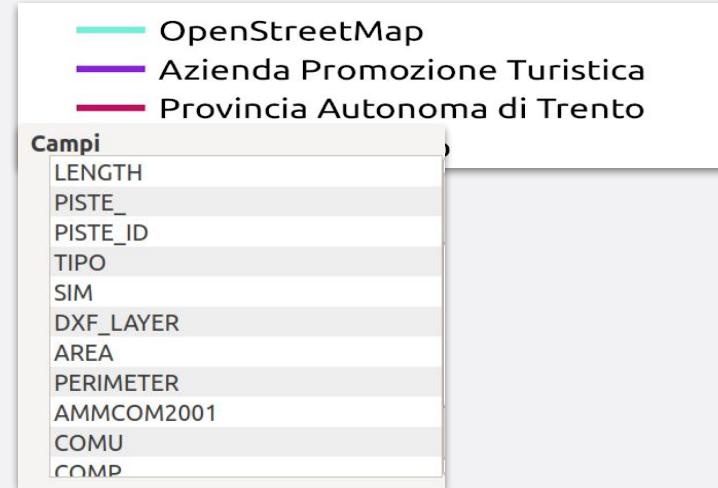
- OpenStreetMap (cyan)
- Azienda Promozione Turistica (purple)

Campi (Fields):

- name
- cmt
- desc
- src
- link1_href
- link1_text
- link1_type
- link2_href
- link2_text
- link2_type

Autonomia di Trento
Trentino Autonome di Trento

THE CYCLE PATHS OF TRENTINO



THE CYCLE PATHS OF TRENTINO



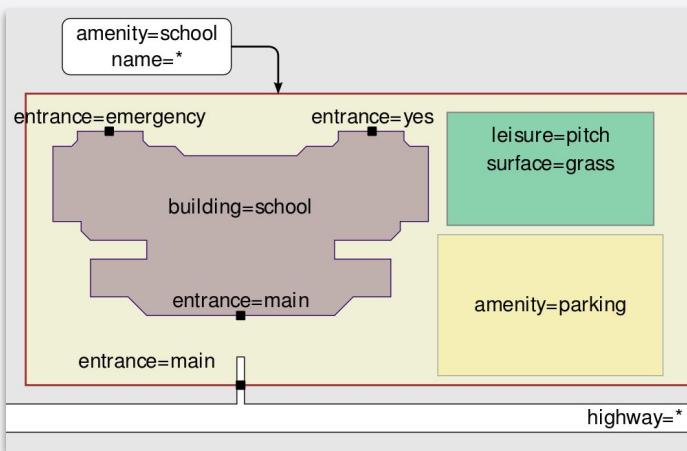
- OpenStreetMap
- Azienda Promozione Turistica
- Provincia Autonoma di Trento
- Comune di Trento

Campi

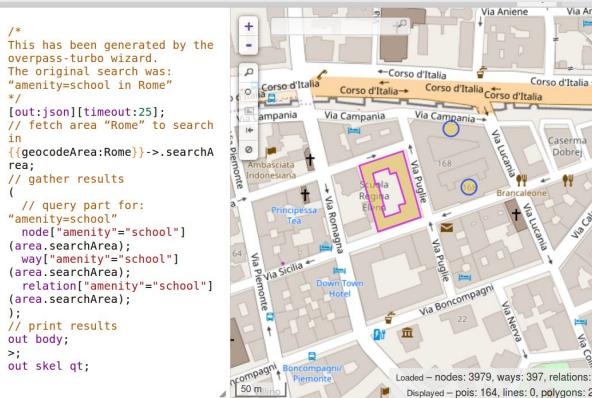
tipo
fumetto
scala_1000
scala_2000
descrizion

EVOLUTION OF THE OBJECTS DURING THE TIME

amenity=school		
A primary or secondary school (pupils typically aged 6 to 18)		
Overview	Combinations	Map
Overview		
Type	Number of objects	
<input checked="" type="checkbox"/> All	898 117	0.02%
<input type="checkbox"/> Node	415 180	0.33%
<input type="checkbox"/> Way	468 152	0.10%
<input type="checkbox"/> Relation	14 785	0.26%



```
/*
This has been generated by the
overpass-turbo wizard.
The original search was:
"amenity=school in Rome"
*/
[out:json][timeout:25];
// fetch area "Rome" to search
({geocodeArea:Rome})>.searchArea;
// gather results
(
  // query part for:
  "amenity=school"
  node["amenity"="school"]
  (area.searchArea);
  way["amenity"="school"]
  (area.searchArea);
  relation["amenity"="school"]
  (area.searchArea);
);
// print results
out body;
>;
out skel ct;
```



Overview of the ResultMaps @ [neis-one.org](http://resultmaps.neis-one.org/)

Copyright © Pascal Neis (neis-one.org) - Map data © OpenStreetMap contributors

Updated Maps/Websites



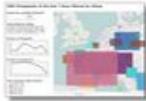
Detect suspicious OSM Changesets
(Since January 20th, 2016)
[Website](#) - [Blog Post](#)



Latest OSM Changeset Discussions/Comments
(Since March 20th, 2015)
[Website](#) - [Blog Post](#) - [Twitter](#)



OSMstats
Statistics of the free wiki world map
(Since September 7th, 2014)
[Website](#) - [Blog Post](#)



Filtering OpenStreetMap Changesets by a Specific Comment
(Since February 2nd, 2014)
[Website](#) - [Blog Post](#)



Stats about added OpenStreetMap Notes
(Since May 5th, 2013)
[Website](#) - [Blog Post](#)

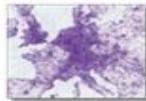


**Overview of OpenStreetMap Contributors
aka Who's around me?**
(Since January 6th, 2013)
[Map](#) - [Blog Post](#)

Static Maps/Websites



Unmapped Places of OpenStreetMap
(June 19th, 2016)
[Map](#) - [Blog Post](#)



OpenStreetMap-GPS-Grid-Map
(May 27th, 2012)
[Map](#) - [Blog Post](#)



Unmapped Places in OSM Europe
(Since August 1st, 2010)
[Map](#) - [Blog Post](#)

<http://resultmaps.neis-one.org/>

Emacsen's Blog

Education | Esperanto | Free culture | Misc | Openstreetmap | Python | React | Reviews | Videos

Atom

FRI 16 FEBRUARY 2018

Why OpenStreetMap is in Serious Trouble

I was a contributor for OpenStreetMap for a long time, and I advocated for OpenStreetMap for a long time, but the project has stalled while the proprietary mapping world has continued to improve in data quality. For those of us who care about Free and Open data, this is a problem. In this article, I explore the reasons why I think OSM has stalled, as well as solutions to get the project back on track.

I was a contributor to the OpenStreetMap project from 2009 until roughly 2016. I am no longer involved.

Recent Posts

[Why OpenStreetMap is in Serious Trouble](#)

[Free Software Call To Action](#)

[Why is SFLC siding with Oracle over Linux developers?](#)

[The Rule of One](#)

[Modern Web Development with React \(Part 4\)](#)

Categories

Education

<https://blog.emacsen.net/blog/2018/02/16/osm-is-in-trouble/>



Tech Corner: how obtain the data

Talk with OSM

API I/O

<http://wiki.openstreetmap.org/wiki/Xapi>

API for special queries

<http://overpass-api.de>

Extract the data

Raw/Historic/Log data:

<http://planet.openstreetmap.org>

Country data:

<http://download.geofabrik.org>

Areas in different formats

<http://https://osmaxx.hsr.ch>

<http://export.hostosm.org>



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