OSM SidewalkKreator
A QGIS plugin for automated sidewalk drawing for OSM

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first of all...

why

i’m

here??
because there are lots of accessible routes...
because there are lots of accessible routes...

FOR CARS!!
and there also plenty of fine access ramps!
and there also plenty of fine access ramps!

but just FOR CARS!!
now, (more) seriously...
sidewalks are very important!!

They mean safety...

“Roadways without sidewalks are more than twice as likely to have pedestrian crashes as sites with sidewalks on both sides of the street”

US NHTSA

They can mean accessibility!

<table>
<thead>
<tr>
<th>Pedestrians Killed</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>28%</td>
</tr>
<tr>
<td>Urban</td>
<td>72%</td>
</tr>
<tr>
<td>Non-Motorist Location</td>
<td></td>
</tr>
<tr>
<td>Intersection</td>
<td>24%</td>
</tr>
<tr>
<td>Non-Intersection</td>
<td>76%</td>
</tr>
</tbody>
</table>
sidewalks are very important!!

Modes of transport used in the metropolitan areas

- 16% Turin
- 15% Thessaloniki
- 31% Valencia
- 87% Paris

- 53% Turin
- 47% Thessaloniki
- 53% Valencia
- 73% Paris

- 28% Turin
- 40% Thessaloniki
- 30% Valencia
- 72% Paris

They are ubiquitous and needed for a brighter future!!
but they are frequently in a bad shape!
so

how to solve this?
we probably CAN’T. but...
we can help the ones who actually CAN!! but how?
through (detailed and collaborative) MAPPING of Sidewalks!!

of course i'm talking about OpenStreetMap!!
but how to represent sidewalks on OSM?

there's divergence:

Sidewalks as Geometries

attribute tags are stated with clear and simple keys, like:
- surface; smoothness; width; incline...

Sidewalks as Tags

attribute tags need to be stated by compound keys starting with sidewalk:both/left/right, such as:
sidewalk:left:width=*; sidewalk:both:surface ....

some users argue that this schema is simpler and overrepresentation pollutes the map

relying on “left” and “right” can be tricky and misleading
Sidewalks as Geometries

Sidewalks as Tags

Crossings and Kerb Access Points are also geometries on their *actual positions*, enabling for richness of information.

*: sidewalk networks also includes **CROSSINGS** and **KERB/CURB ACESS POINTS**, topologically conected to sidewalks and roads.

all the information must be stored on node(s), and there's lot of **ambiguity**: nodes doesn't have sides; what's the actual road-sidewalk distance?
why we advocate for sidewalks as geometries?

because reality is complex!!

2 road intersection has **8 access points**, in this one: 5 raised and 3 lowered (2 with tactile paving)

SPOILER ALERT: these geometries were created with OSM SidewalkKreator

there also crossing islands...

and complex-shaped sidewalks
but then, apart from that...

what is the State of the sidewalk Map?

well, not that good...
let’s take a look at taginfo...

I - highway=* tag

probably most residential ways have a sidewalk on both sides
let’s take a look at taginfo...

II - sidewalk=* and footway=* tags

only this ~100k are ACTUAL relevant information for ACCESSIBILITY

as all sidewalks need crossings, 3 million is a more representative number
imagine urban area with only 1km$^2$
90x90m blocks
(100m between road intersections)

This would have:

- **22km of roads**
- **23.4km of sidewalks!!**

so, considering the world’s VASTNESS

how to cover (at least a part of) this GAP?
well, draw it only manually may not be the best idea...

it can be error-prone demanding ability to draw it properly

~164 Hours of Mapping + ~396 Hours of Validation
For Only 0.65% of São Paulo’s Urban Area (and just crossings!!!)
then we have created **OSM SideWalkkreator!!**

- Its main purpose is to automatically create *sidewalk network* geometries with basic descriptive tags.
- Does not try to be a fully-automated-one-click-solution, but one that guides the user, allowing control through the entire process!!
- Takes advantage of QGIS resourcefulness.

available at [https://github.com/kauevestena/osm_sidewalkkreator](https://github.com/kauevestena/osm_sidewalkkreator) and [https://plugins.qgis.org/plugins/osm_sidewalkkreator/](https://plugins.qgis.org/plugins/osm_sidewalkkreator/)
and how does OSM SidewalkKreator does its job?

1. Fetch OSM Data
2. Fill Street Widths and Filter Data
3. Draw Sidewalks
4. Draw Crossings & Kerbs
5. Split Sidewalk Geometries
6. Export and Open at JOSM
1. Fetch OSM Data

For an input polygon, downloads:

- Highways (all the Linear)
- Buildings
- Addresses
2. Fill Street Widths and Filter Data

Manual editing/refinement is always encouraged

As most roads don’t have a width=* tag (needed for buffering), we establish it for the missing/invalid ones, based on highway=* tag values.
3. Draw Sidewalks

basically a constrained (to not overlap buildings) buffer operation with some tricks to ensure a custom block-corner-curve-radius
4. Draw Crossings & Kerbs

expands a perpendicular/parallel-to-transverse vector using linear algebra until finds intersection

There’s also options to filter out crossings that are possible outliers
5. Split Sidewalk Geometries

Highlighting a voronoi-polygon (from addresses and building centroids) based split, it includes other options like distance-based and also don’t split at all.
6. Export and Open at JOSM

exporting to a uniquely-named folder, you may proceed to JOSM

At this part the nodes of intersection between roads and crossings are created

You can also carry out some manual adjustments

please include #OSM_SidewalkKreator at changeset comment!
Final Remarks

- There’s a lot of room for improvement!
  - (opening issues with comments, suggestions, bug reports and also Pull Requests are welcome!)
  - Future releases shall include:
    - Deal properly if there’s already a drawn sidewalk
      - correctly handle the crossings
    - Take advantage of information in the tag scheme, allowing for the replacement
      - Switching any information and placing a sidewalk:both=separate tag
      - Not drawing and maintaining at sidewalk:*=no (where the tag scheme still shines)
        - Creation of “exclusion zones”
  - The local reality must always be taken into account, not all places have sidewalks!! The Plugins works better for regular sidewalk grids...
- We can make OSM a more pedestrian-oriented map, and also a tool for ableism combat enabling accessibility-optimized routing and urban planning!
  - Sidewalks worth being geometries, they are ways themselves!!
References

Lots of Thanks:

AUDIENCE!!

THANK YOU,

you can contact me at:
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(Twitter/Instagram/OSM Profile/GitHub)

advisors
Silvana Camboim Daniel Santos

and above all...

to my favourite scientist!

he would be so proud...

IN MEMORIAM