

Extraction et évolution de contraintes d'intégrité dans les Géocommuns

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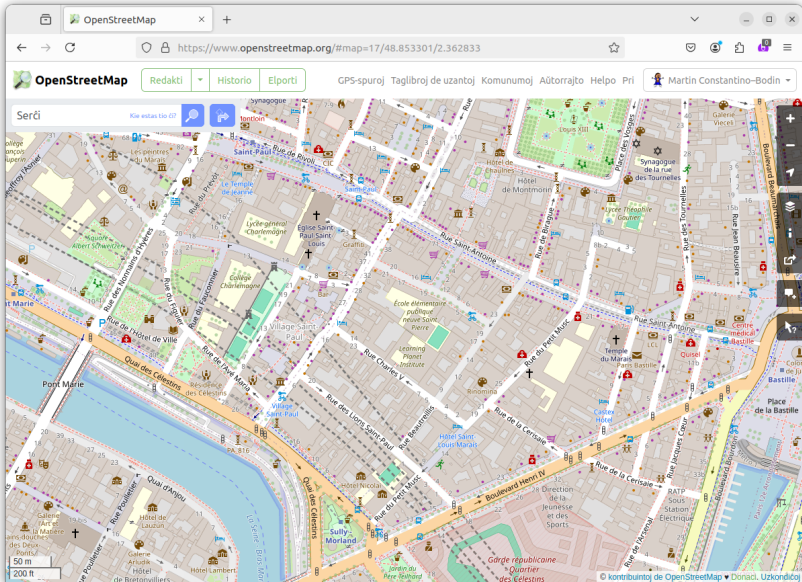
Spades

TyRex

Inria

6 Novembre 2024

OpenStreetMap



The screenshot shows the OpenStreetMap website interface. The browser address bar displays the URL: `https://www.openstreetmap.org/node/2284436566#map=19/48.853191/2.362904&layers=D`. The page title is "Nodo: 2284436566 | Ope: x". The sidebar on the left contains the following information:

Nodo: 2284436566 ✕
Versio #7
Filaire piéton : passages piéton 4e
Arrondissement

Redakita proksimume antaŭ 1 jaro de guiguimapper2002
Ŝanĝaro #139570609
Pozicio: 48,8534822; 2,3617138

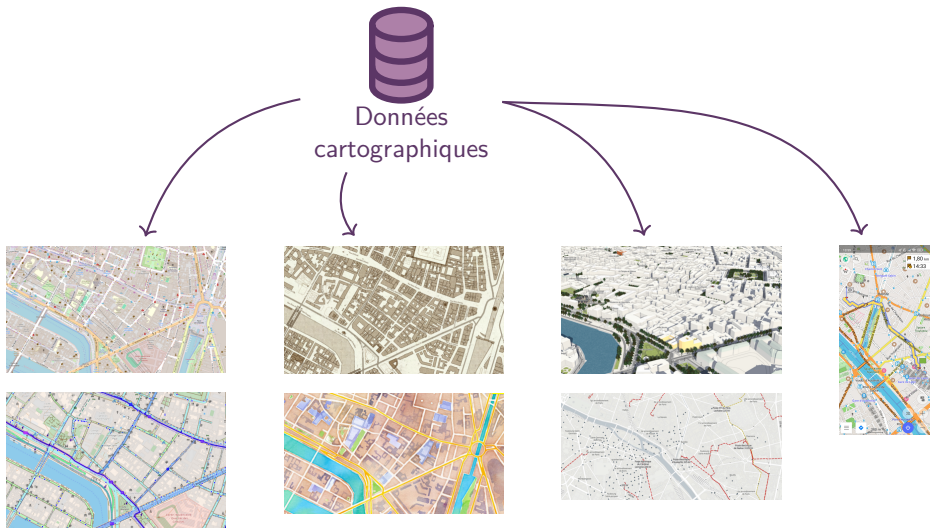
Etikedoj

crossing	uncontrolled
crossing:island	no
crossing:markings	zebra
crossing_ref	zebra
highway	crossing
tactile_paving	no
traffic_signals:sound	no

Parto de
▼ 2 linioj
Rue Saint-Paul (186261809)

The main map area shows a street network with a highlighted crossing. Labels on the map include "École élémentaire publique neuve Saint Pierre" and "Learning Planet Institute". The map includes a scale bar (10m / 50ft) and a copyright notice for OpenStreetMap contributors.

OpenStreetMap est une base de données



```
        highway = crossing
        crossing = uncontrolled
    crossing:markings = zebra
        crossing:island = no
    traffic_signals:sound = no
        tactile_paving = no
            crossing_ref = zebra
```






```
        highway = crossing
        crossing = uncontrolled
crossing:markings = zebra
        crossing:island = no
traffic_signals:sound = no
        tactile_paving = no
        crossing_ref = zebra
```

```
( clé = valeur )*
```

```
        clé def string
        valeur def string
```

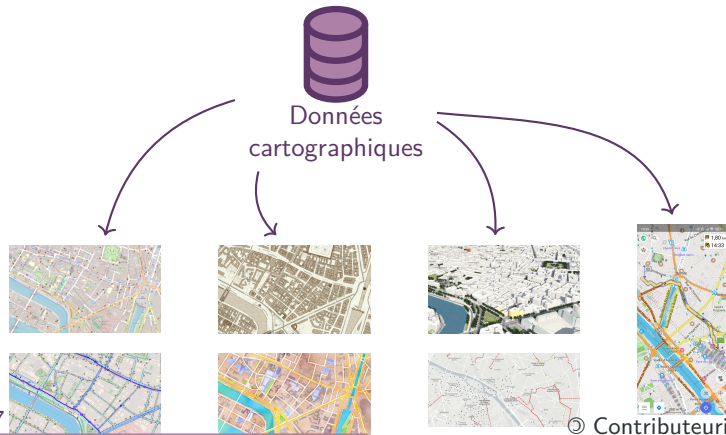
Wiki OpenStreetMap

The screenshot shows a web browser window displaying the OpenStreetMap Wiki page for 'Keysurface'. The browser's address bar shows the URL `https://wiki.openstreetmap.org/wiki/Keysurface`. The page content is organized into a table with four rows, each representing a different surface type. Each row includes a name, a description, a representative image, and a statistics panel.

gravel	This tag has very large meaning range. Used for cases ranging from huge gravel pieces like track ballast used as surface, through small pieces of gravel to compacted surface.		<ul style="list-style-type: none">6 314 1,79%2 161 840 3,34%2 858 3,41% View details at taginfo
shells	Crushed or whole seashells; commonly seen on footways and cycleways in the Netherlands.		<ul style="list-style-type: none">1 157 0%11 0%1 142 0%4 0% View details at taginfo
rock	Big pieces of rock used to improve path quality or exposed bare rock, including trails across <code>natural=bare_rock</code> . Typically in mountainous areas.	 	<ul style="list-style-type: none">25 542 0,04%165 0,05%25 262 0,04%115 0,14% View details at taginfo
pebblestone	Pebbles are stones rounded by waves or river flow. Typical size range from 2 to 8 cm. Describing a surface in OSM they are loosely arranged. Like gravel pebbles can be used as a building part of compacted.		<ul style="list-style-type: none">134 694 0,21%415 0,12%133 530 0,21%749 0,89% View details at taginfo

wiki.openstreetmap.org

La communauté OpenStreetMap



La communauté OpenStreetMap



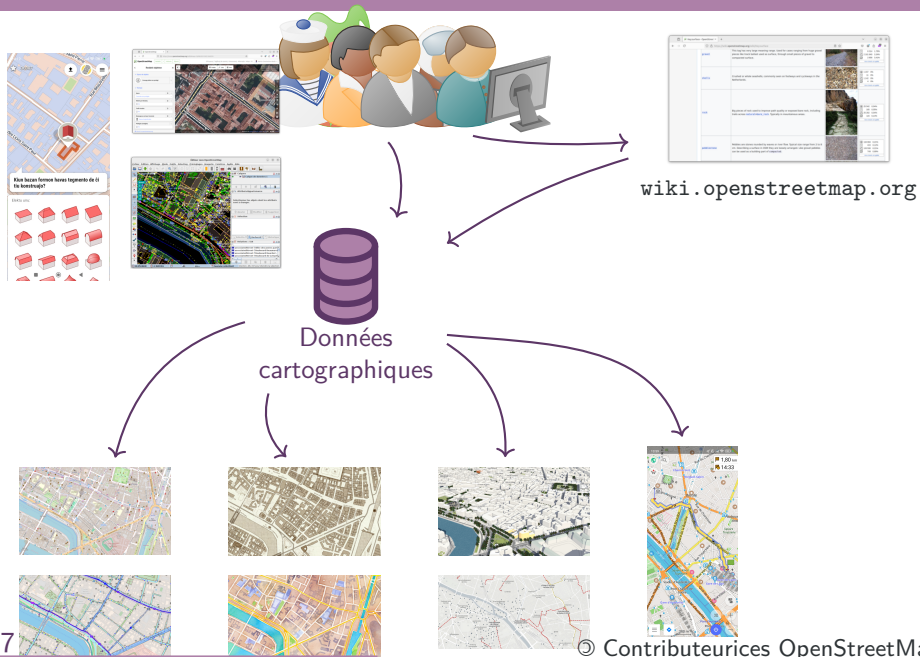
wiki.openstreetmap.org



Données
cartographiques



La communauté OpenStreetMap



- zebra



- pelican



- pegasus



- toucan



- puffin



- tiger



- zebra



- toucan



- pelican

- puffin

Évolution des pratiques

```
crossing = pelican
      ↴
      crossing = traffic_signals
crossing:markings = dots
  button_operated = yes
traffic_signals:sound = yes
```



L'usage prime



wiki.openstreetmap.org



Données
cartographiques



Contraintes d'intégrité

Incohérences dans la base de données

Fautes de frappe

```
corrsing = unmarked  ~>  crossing = unmarked
```

Clés dépréciées

```
crossing = pelican ~> crossing = traffic_signals  
crossing:markings = dots  
crossing:signals = yes  
crossing_ref = pelican
```

Clés incompatibles

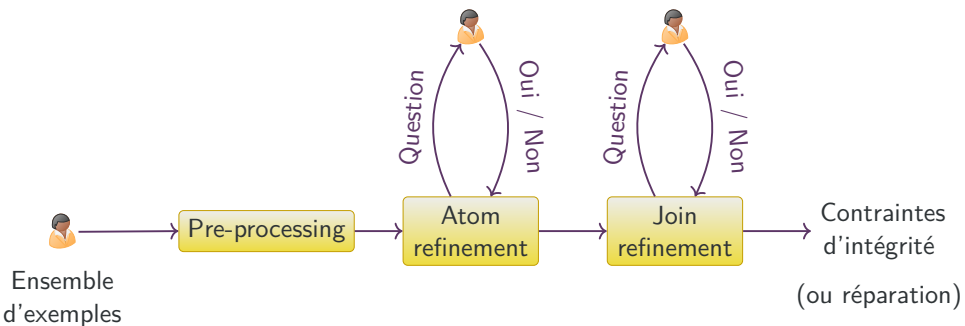
```
crossing = unmarked  
highway = motorway
```

Incohérences entre objets

```
sidewalk = no  à côté de  footway = sidewalk
```


Interactive mapping specification and repairing framework

Travaux antérieurs



Interactive mapping specification and repairing framework

Exemple

Company:

IdCompany	Name	Town
C1	AA	Paris
C2	Ev	Lyon

Flight:

Departure	Arrival	IdCompany
Lyon	Paris	C1
Paris	Lyon	C2

Travel Agency:

IdAgency	Name	Town
A1	TC	L.A.

⇒

Carrier:

Id	Name	Town
Id1	AA	Paris
Id2	Ev	Lyon
Id3	TC	L.A.

Departure:

Town	IdCarrier
Lyon	Id1
Paris	Id2

Arrival:

Town	IdCarrier
Paris	Id1
Lyon	Id2

$Company(c1, aa, paris)$
 $\wedge Company(c2, ev, lyon)$
 $\wedge Flight(lyon, paris, c1)$
 $\wedge Flight(paris, lyon, c2)$
 $\wedge TravelAgency(a1, tc, la)$

$\exists id1, id2, id3,$
 $Carrier(id1, aa, paris)$
 $\wedge Departure(lyon, id1)$
 $\wedge Arrival(paris, id1)$
 $\wedge Carrier(id2, ev, lyon)$
 $\wedge Departure(paris, id2)$
 $\wedge Arrival(lyon, id2)$
 $\wedge Carrier(id3, tc, la)$

Interactive mapping specification and repairing framework

Exemple

Company:

IdCompany	Name	Town
C1	AA	Paris
C2	Ev	Lyon

Flight:

Departure	Arrival	IdCompany
Lyon	Paris	C1
Paris	Lyon	C2

Travel Agency:

IdAgency	Name	Town
A1	TC	L.A.

Carrier:

Id	Name	Town
Id1	AA	Paris
Id2	Ev	Lyon
Id3	TC	L.A.

Departure:

Town	IdCarrier
Lyon	Id1
Paris	Id2

Arrival:

Town	IdCarrier
Paris	Id1
Lyon	Id2

⇒

$$\begin{aligned} & \exists id1, id2, id3, \\ & \text{Carrier}(id1, aa, paris) \\ & \wedge \text{Company}(c1, aa, paris) \\ & \wedge \text{Company}(c2, ev, lyon) \\ & \wedge \text{Flight}(lyon, paris, c1) \\ & \wedge \text{Flight}(paris, lyon, c2) \\ & \wedge \text{TravelAgency}(a1, tc, la) \\ & \Rightarrow \\ & \text{Carrier}(id1, aa, paris) \\ & \wedge \text{Departure}(lyon, id1) \\ & \wedge \text{Arrival}(paris, id1) \\ & \wedge \text{Carrier}(id2, ev, lyon) \\ & \wedge \text{Departure}(paris, id2) \\ & \wedge \text{Arrival}(lyon, id2) \\ & \wedge \text{Carrier}(id3, tc, la) \end{aligned}$$

Split-reduction

$$\begin{aligned} & \{ \exists id1, \text{Carrier}(id1, aa, paris) \wedge \text{Departure}(lyon, id1) \wedge \text{Arrival}(paris, id1); \\ & \exists id2, \text{Carrier}(id2, ev, lyon) \wedge \text{Departure}(paris, id2) \wedge \text{Arrival}(lyon, id2); \\ & \exists id3, \text{Carrier}(id3, tc, la) \} \end{aligned}$$

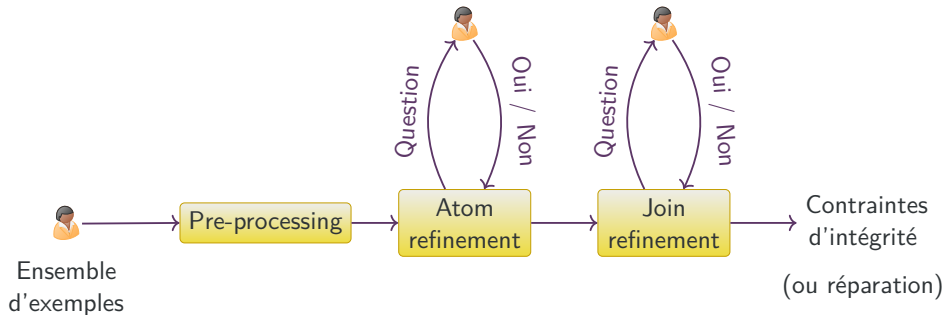
Removing superfluous atoms

$$\begin{aligned} & \text{Company}(c1, aa, paris) \wedge \text{Company}(c2, ev, lyon) \\ & \wedge \text{Flight}(lyon, paris, c1) \wedge \text{Flight}(paris, lyon, c2) \wedge \text{TravelAgency}(a1, tc, la) \\ & \Rightarrow \exists id1, \text{Carrier}(id1, aa, paris) \wedge \text{Departure}(lyon, id1) \wedge \text{Arrival}(paris, id1) \end{aligned}$$

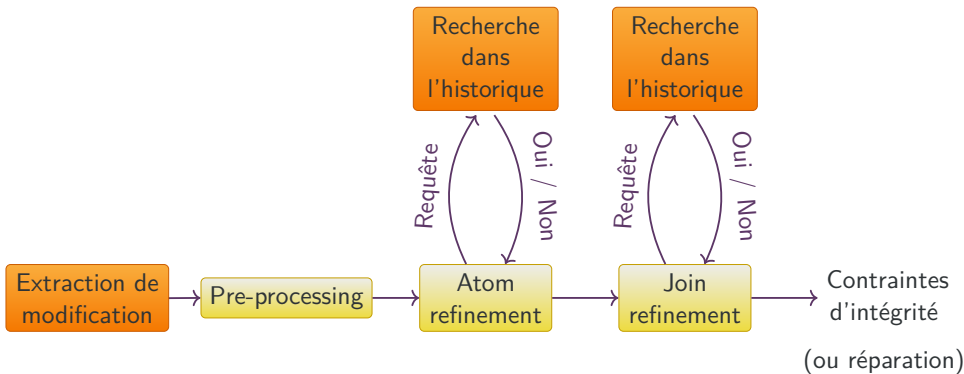
Join refinement

$$\text{Company}(c1, aa, \text{paris}_1) \wedge \text{Flight}(lyon, \text{paris}_2, c1) \Rightarrow \exists id1, \text{Carrier}(id1, aa, \text{paris}_3) \wedge \text{Departure}(lyon, id1) \wedge \text{Arrival}(\text{paris}_4, id1)$$

Remplacer les questions par une recherche dans l'historique



Remplacer les questions par une recherche dans l'historique



Interagir avec la communauté

Que faire des contraintes inférées ?

- Les ajouter sur le wiki,
- Automatiquement modifier la base de donnée.

Que faire des contraintes inférées ?

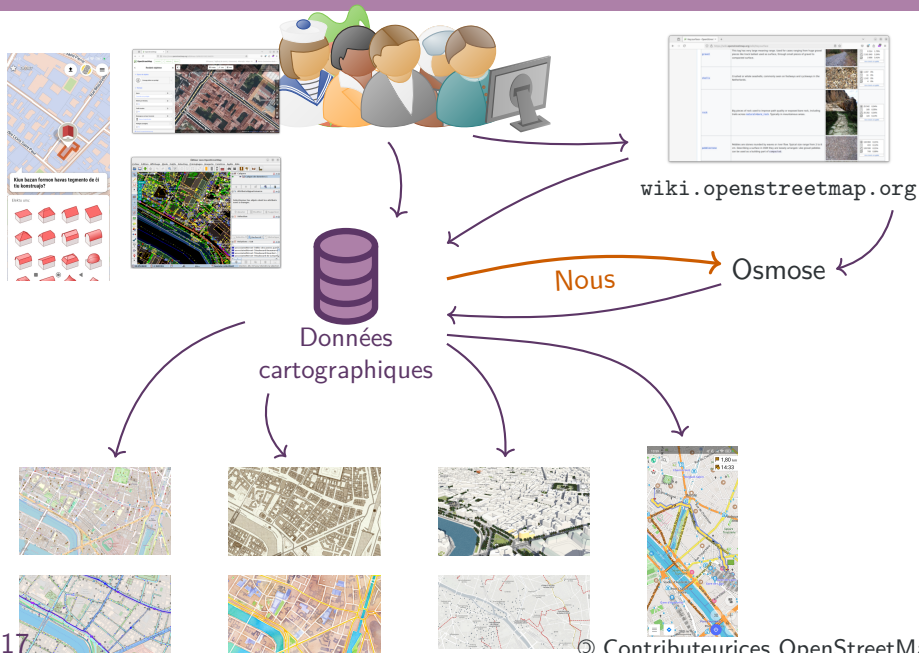
- Les ajouter sur le wiki,
- Automatiquement modifier la base de donnée.
- Les proposer à la communauté.

The screenshot displays the Osmose web application interface. At the top, the browser address bar shows the URL: https://osmose.openstreetmap.fr/tr/map/#loc=15/48.85783/2.36253&item=3032&level=1&issue_uuid=bbd923. The main map area shows a street view of Paris with a popup window titled "Combinaison d'attributs". The popup contains the following information:

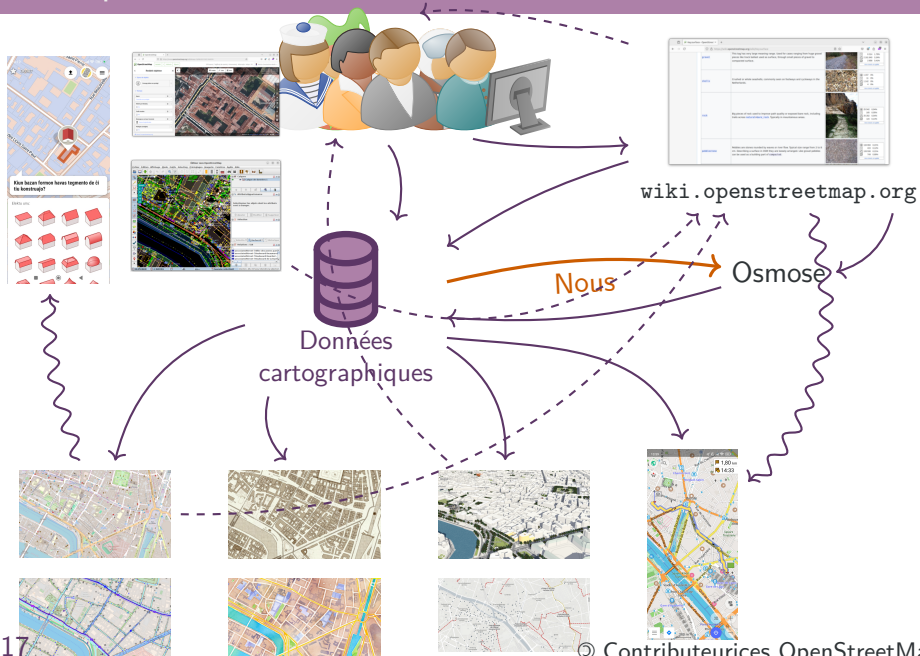
- Combinaison d'attributs**
- Ajouter l'attribut "school:FR"
- way 252752292 (open) (ID edit)
- name = Ateliers des beaux-arts de la ville de Paris - Centre Sévigné
- amenity = school
- contact:city = Paris
- contact:street = Rue de Sévigné
- contact:postcode = 75003
- contact:housenumber = 48
- osm:shop (ID, name, zoom, zone, details)
- signature: de : 2020-11-04

On the left side, there is a sidebar with filter options under "Plus de filtres". The "Attributs manquants /14 tous rien" section is expanded, showing various filter categories with colored dots indicating their status. On the right side, there is a panel titled "i Combinaison d'attributs" with a "Cacher les marqueurs" button and a "Code source" section showing the tag `TagFix_MultipleTag_FR.py#L33`. Below the code, there is a link to the documentation: wiki.osm.org/Cosmos#i-tag.

Inférer des règles pour la communauté



Merci pour votre attention



- 1 OpenStreetMap
- 2 Contraintes d'intégrité
- 3 Interagir avec la communauté