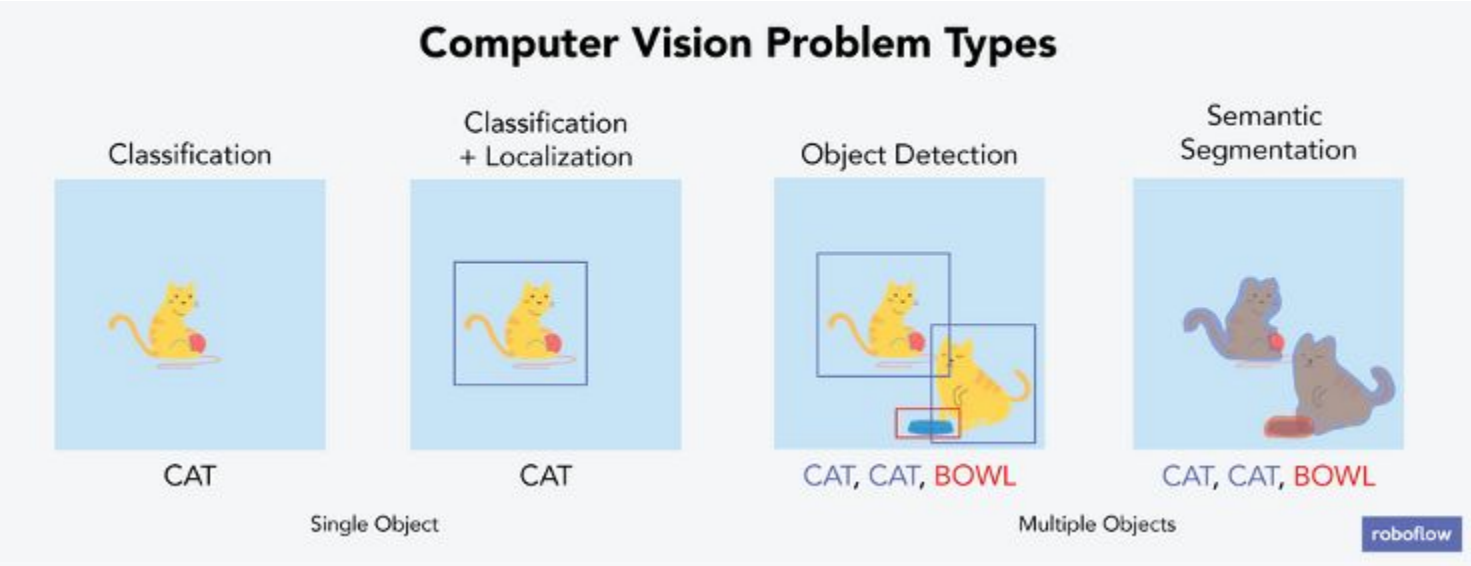
Doplňování přechodů s pomocí ML (AI)

DNL852

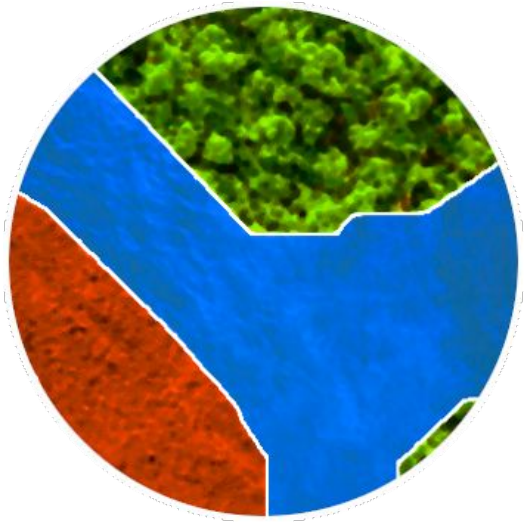
Machine learning

- strojové učení, metoda zpracování dat
- neposkytuje exaktní výsledky, ale pravděpodobnostní
- DPZ + computer vision
- obrovský pomocník při zpracování hromady dat

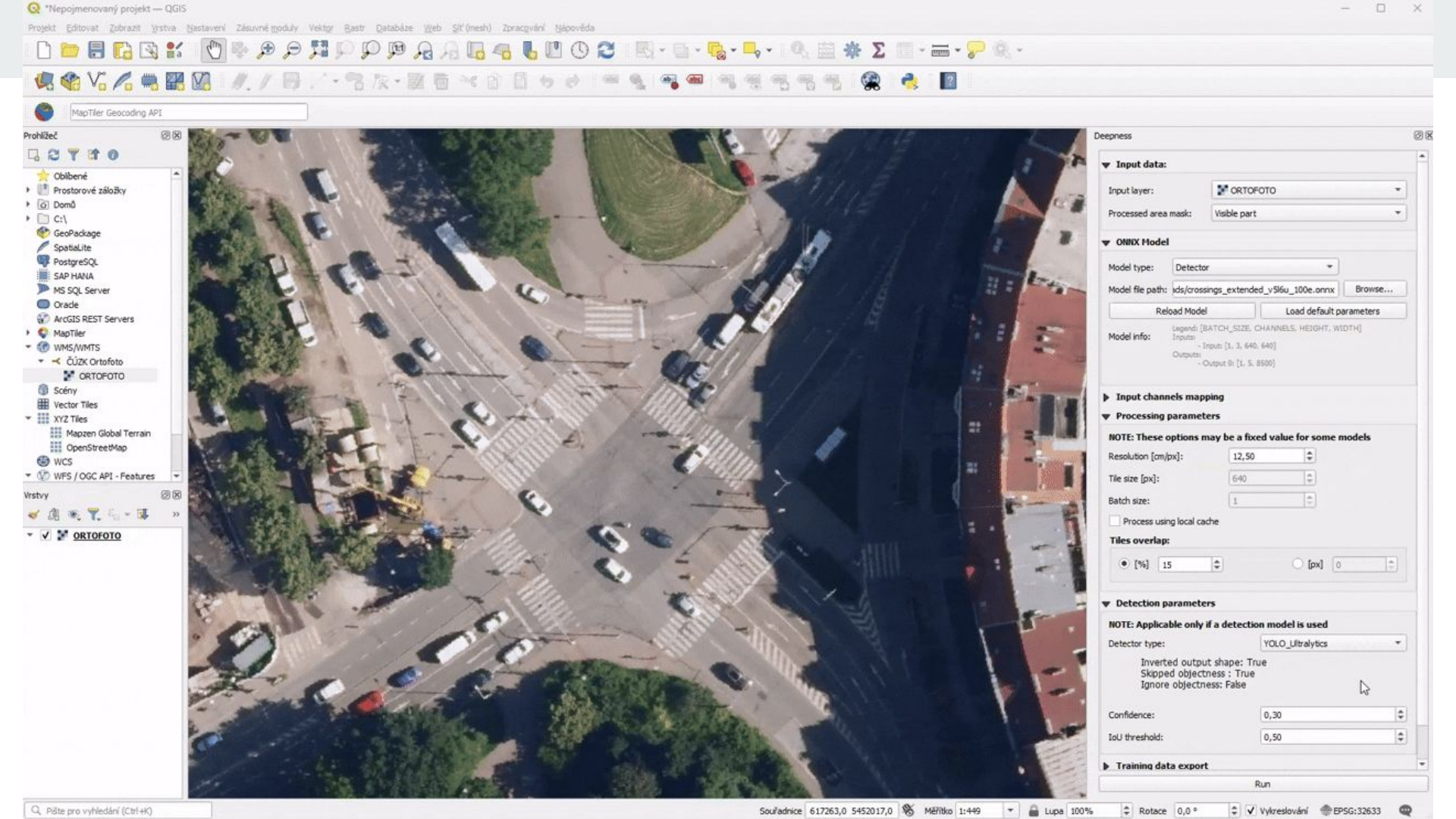
Co umí?


Computer Vision Problem Types
Classification
Classification + Localization
Object Detection
Semantic Segmentation
CAT
CAT
CAT, CAT, BOWL
CAT, CAT, BOWL
Single Object
Multiple Objects
roboflow

ML v QGISu



- plugin Deepness
- Poznań University of Technology
- Nvidia GPU nebo silné CPU


*Nepojmenovaný projekt — QGIS
Projekt Editovat Zobrazit Vrstva Nastavení Zásuvné moduly Vektor Rastr Databáze Web Síť (mesh) Zpracování Nápověda
MapTiler Geocoding API
Prohlížeč
Oblíbené
Prostorové záložky
Domů
C:\
GeoPackage
SpatiaLite
PostgreSQL
SAP HANA
MS SQL Server
Oracle
ArcGIS REST Servers
MapTiler
WMS/WMTS
ČÚZK Ortofoto
ORTOFOTO
Scény
Vector Tiles
XYZ Tiles
Mapzen Global Terrain
OpenStreetMap
WCS
WFS / OGC API - Features
Vrstvy
ORTOFOTO
Deepness
Input data:
Input layer:
ORTOFOTO
Processed area mask:
Visible part
ONNX Model
Model type:
Detector
Model file path:
ids/crossings_extended_v5l6u_100e.onnx
Browse...
Reload Model
Load default parameters
Model info:
Legend: [BATCH_SIZE, CHANNELS, HEIGHT, WIDTH]
Inputs:
- Input: [1, 3, 640, 640]
Outputs:
- Output 0: [1, 5, 8500]
Input channels mapping
Processing parameters
NOTE: These options may be a fixed value for some models
Resolution [cm/px]:
12,50
Tile size [px]:
640
Batch size:
1
Process using local cache
Tiles overlap:
[%]
15
[px]
0
Detection parameters
NOTE: Applicable only if a detection model is used
Detector type:
YOLO_Ultralytics
Inverted output shape: True
Skipped objectness : True
Ignore objectness: False
Confidence:
0,30
IoU threshold:
0,50
Training data export
Run
Souřadnice
617263,0 5452017,0
Měřítko
1:449
Lupa
100%
Rotace
0,0 °
Vykreslování
EPSG:32633

Tvorba vlastního modelu

No-code cesta

+ Jednoduché
+ Plno návodů
+ Uživatelsky přívětivé nástroje
+ Cena x výkon

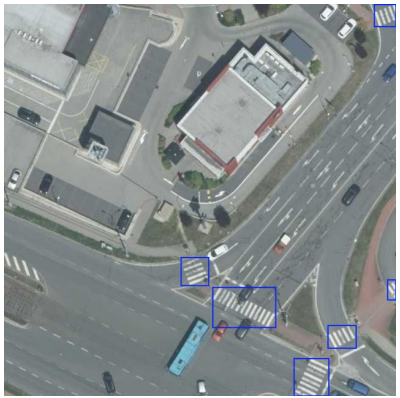
- Občas nutné připlatit za prémium
- Menší kontrola trénování
- Vše není open-source

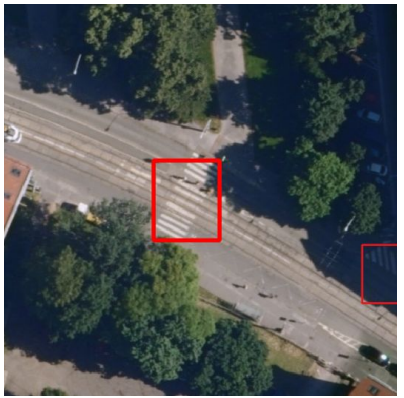
Code cesta

+ Vyšší kontrola procesu učení
+ Open-source
+ Učím se cenné věci

- Časově náročné
- Krev, pot, slzy a káva
- Bez cloud computingu vysoká cena HW
- AI vám spíš nepomůže

Tvorba vlastního modelu





Tvorba trénovacích dat

90 % času

Učení modelu

5 % času

Běh modelu

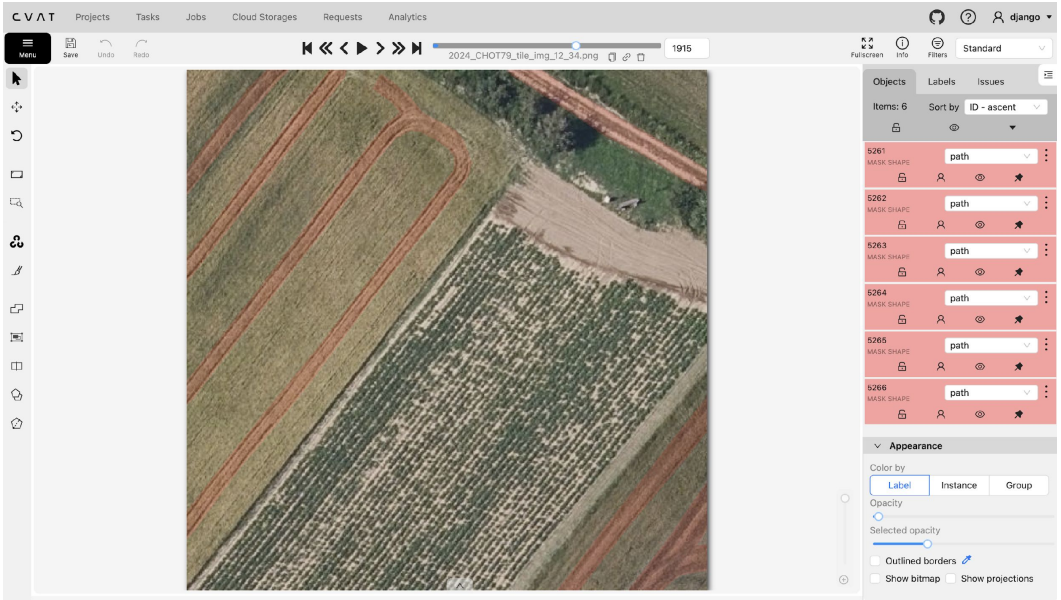
5 % času

Technology stack

- **CVAT** (anotace dat)
- **Ultralytics** → **Pytorch** a YOLOv modely (trénování modelu)
- **Python** + **QGIS** + **Deepness plugin** (automatizace detekcí)

Tvorba trénovacích dat

- Ruční práce x existující datasety
- Nejdražší část ML
- Neexistuje ideální množství
- Rozmanitost
- Garbage in, garbage out



Crossing_extended

Train Model

daniloter@gmail.com Uploaded 9 months ago

Task Detect Classes 1 Images 8194 Size 4.8 GB

Images Overview

Train Validation Test

Search class

crossing 2511


2022_BILO00_tile_img_0_1.png


2022_BILO00_tile_img_0_10.png


2022_BILO00_tile_img_0_11.png

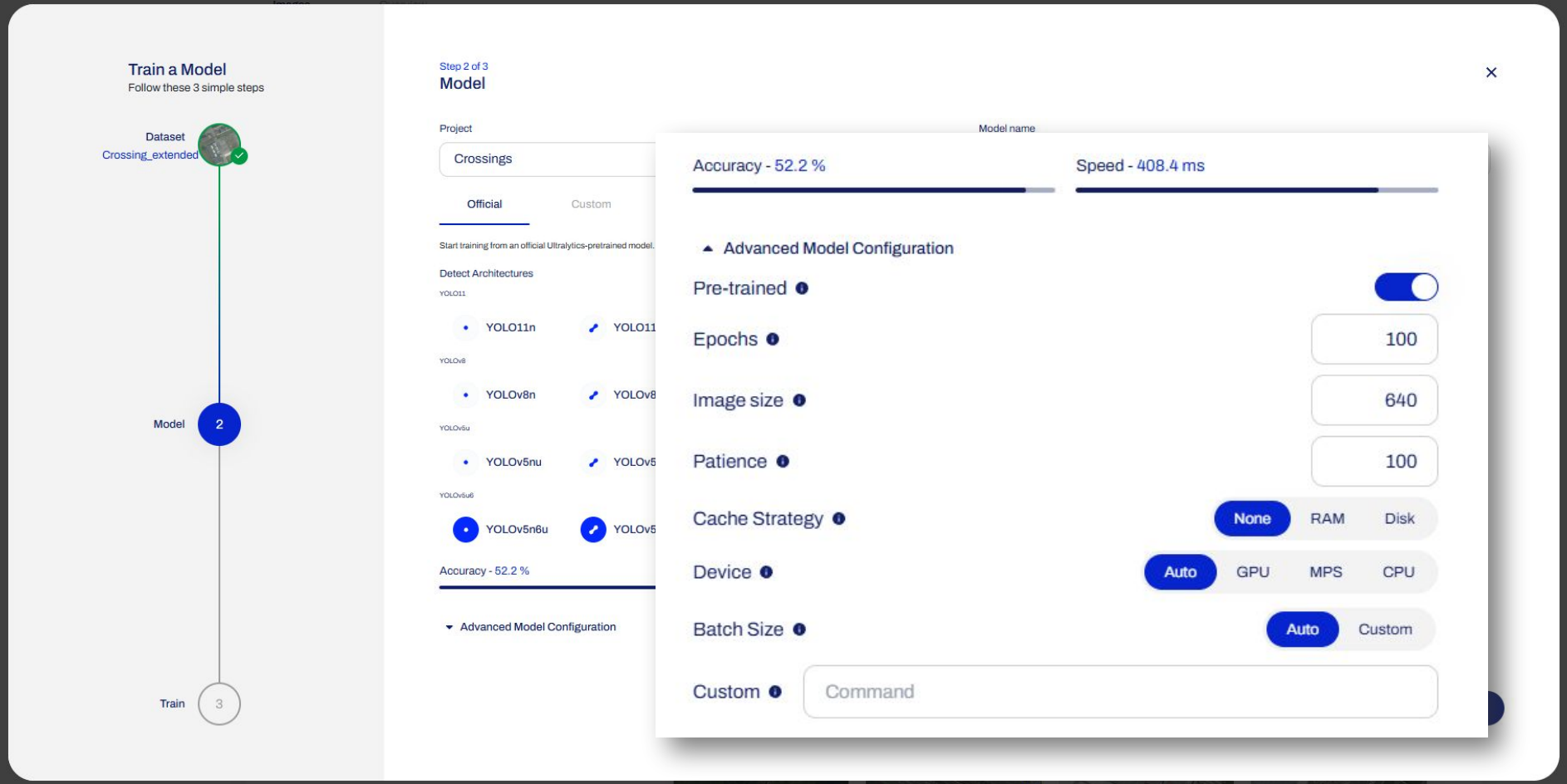

2022_BILO00_tile_img_0_12.png


2022_BILO00_tile_img_0_13.png


crossing
2022_BILO00_tile_img_0_14.png


crossing
2022_BILO00_tile_img_0_15.png


crossing
2022_BILO00_tile_img_0_16.png


Train a Model
Follow these 3 simple steps
Dataset
Crossing_extended
Model
2
Train
3
Step 2 of 3
Model
Project
Crossings
Official
Custom
Start training from an official Ultralytics-pretrained model.
Detect Architectures
YOLO11
YOLO11n
YOLO11
YOLOv8
YOLOv8n
YOLOv8
YOLOv5u
YOLOv5nu
YOLOv5
YOLOv5u6
YOLOv5n6u
YOLOv5
Accuracy - 52.2 %
Advanced Model Configuration
Model name
Accuracy - 52.2 %
Speed - 408.4 ms
Advanced Model Configuration
Pre-trained
Epochs
100
Image size
640
Patience
100
Cache Strategy
None
RAM
Disk
Device
Auto
GPU
MPS
CPU
Batch Size
Auto
Custom
Custom
Command

Ultralytics HUB Pokud chcete zachovat změny, uložte je do GitHub

Soubor Upravit Zobrazit Vložit Běh Nástroje Nápověda

Sdílet Gemini

Příkazy | + Kód | + Text | Spustit vše | Zkopírovat na Disk

RAM
Disk

Setup

Pip install `ultralytics` and dependencies and check software and hardware.

pypi v8.3.197 | downloads 117M | python 3.8 | 3.9 | 3.10 | 3.11 | 3.12

[1] ✓ 15 s

```
%pip install ultralytics
from ultralytics import YOLO, checks, hub

checks()  # Verify system setup for Ultralytics training
```

```
Ultralytics 8.3.197 🚀 Python-3.12.11 torch-2.8.0+cu126 CUDA:0 (Tesla T4, 15095MiB)
Setup complete ✅ (2 CPUs, 12.7 GB RAM, 39.1/112.6 GB disk)
```

Start

Login with your API key, load your YOLO 🚀 model, and start training in 3 lines of code!

[2]

```
hub.login('f0051abc521ec4dc7dd6a1c5a772b80c99190c711e')

model = YOLO('https://hub.ultralytics.com/models/DDBrJPYOQZydvtxmFjxJ')
results = model.train()
```

```
requirements: Ultralytics requirement ['hub-sdk>=0.0.12'] not found, attempting AutoUpdate...

requirements: AutoUpdate success ✅ 0.7s
WARNING ⚠️ requirements: Restart runtime or rerun command for updates to take effect

Ultralytics HUB: New authentication successful ✅
Ultralytics HUB: View model at https://hub.ultralytics.com/models/DDBrJPYOQZydvtxmFjxJ 🚀
Downloading https://github.com/ultralytics/assets/releases/download/v8.3.0/yolov5lu.pt to 'yolov5lu.pt': 100% ━━━━━━━━━━━━ 102.0MB 11.0MB/s 9.3s
Ultralytics 8.3.197 🚀 Python-3.12.11 torch-2.8.0+cu126 CUDA:0 (Tesla T4, 15095MiB)
engine/trainer: agnostic_nms=False, amp=True, augment=False, auto_augment=randaugment, batch=-1, bgr=0.0, box=7.5, cache=None, cfg=None, classes=None, close_mosai
Downloading https://storage.googleapis.com/ultralytics-hub.appspot.com/users/4scTiSBxuIaN49mp0uGwg8Pi0Ye2/datasets/2RwCNuKLFppdgAOI4JO1/crossings_extended.zip to
```

Zdroje

Nemáte předplatné. Další informace
Aktuálně žádné výpočetní jednotky nejsou k dispozici. Zdroje nabízené bez dalších poplatků nejsou zaručeny. Další jednotky si můžete zakoupit zde.
Při aktuální úrovni využití může tohle spuštění vydržet až 4 hodin 30 minut.

Spravovat relace

Chcete více paměti a místa na disku?
Upgradovat na Colab Pro

Python 3 Back-end Google Compute Engine (GPU)
Zobrazují se zdroje od 22:25 do 22:26

RAM systému
1.8 / 12.7 GB

RAM GPU
0.0 / 15.0 GB

Disk

Proměnné | Terminál

Provádění (27 s) | T4 (Python 3)

Home > Models >

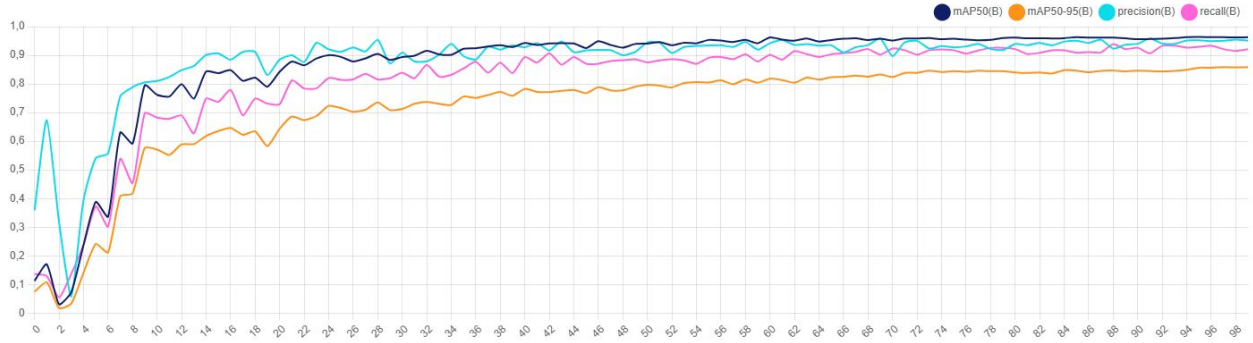
Crossings_extended_v5lu_100e

daniloter@gmail.com | Last updated 9 months ago | YOLOv5lu | Pretrained: Yes | Epochs: 100 | Image Size: 640 | Patience: 100 | Cache: None | Device: Auto | Batch Size: Auto

Train | Configuration | Charts | Preview | Deploy

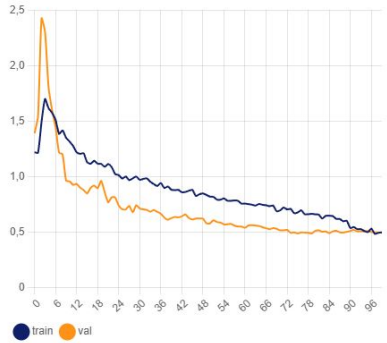
Metrics

Model accuracy measured on validation set



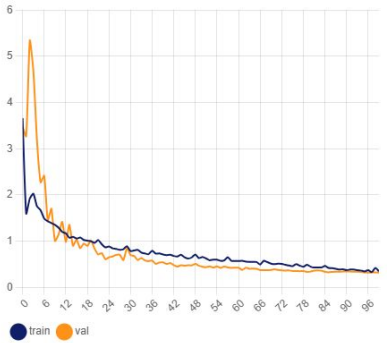
Box Loss

Difference between predicted and true boxes



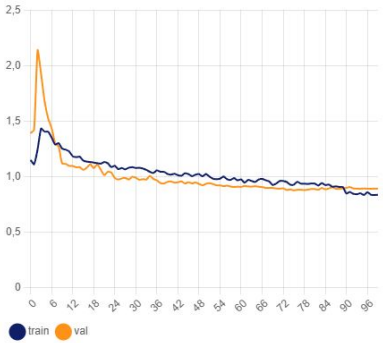
Class Loss

The accuracy of the classes in each detection



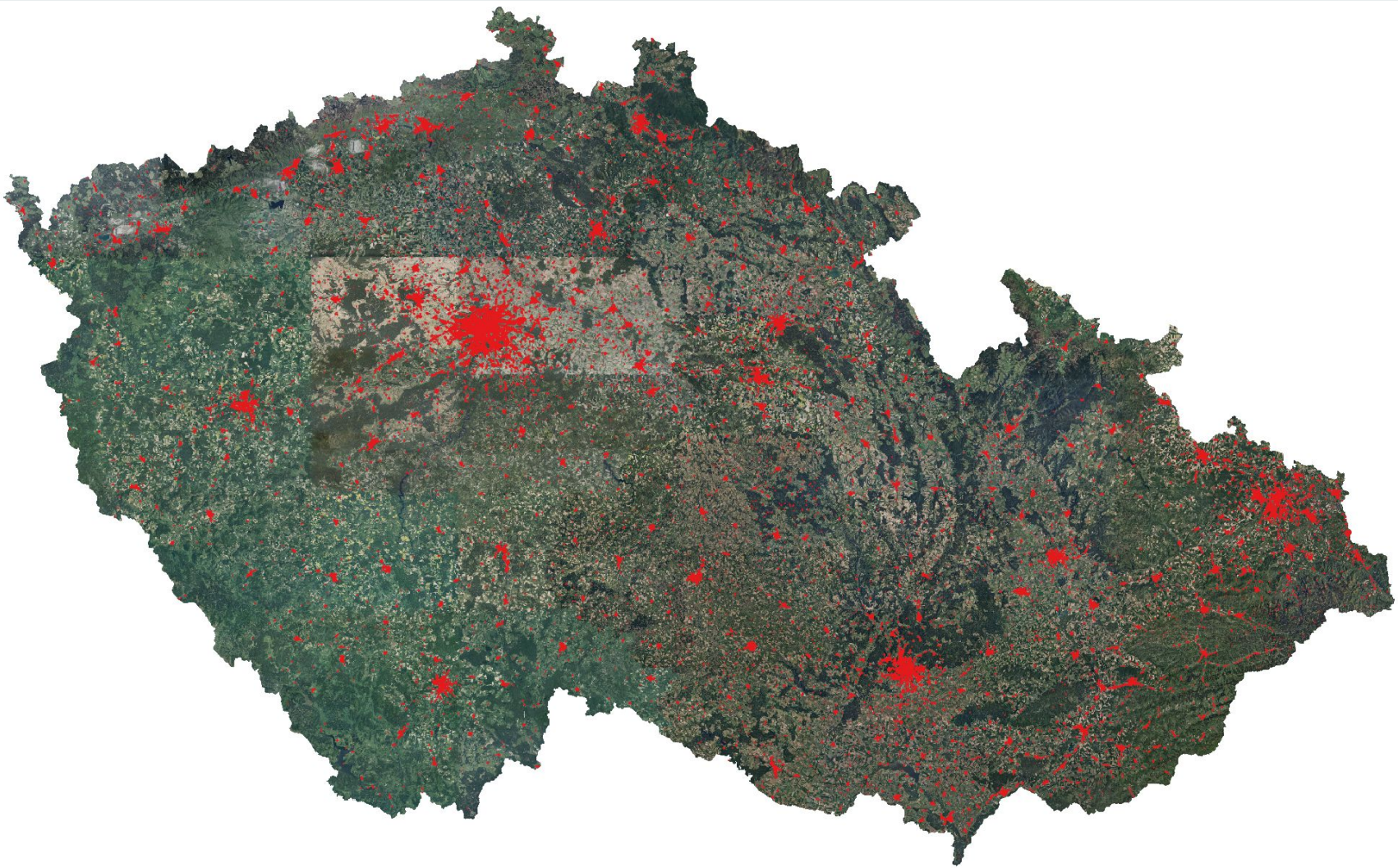
Object Loss

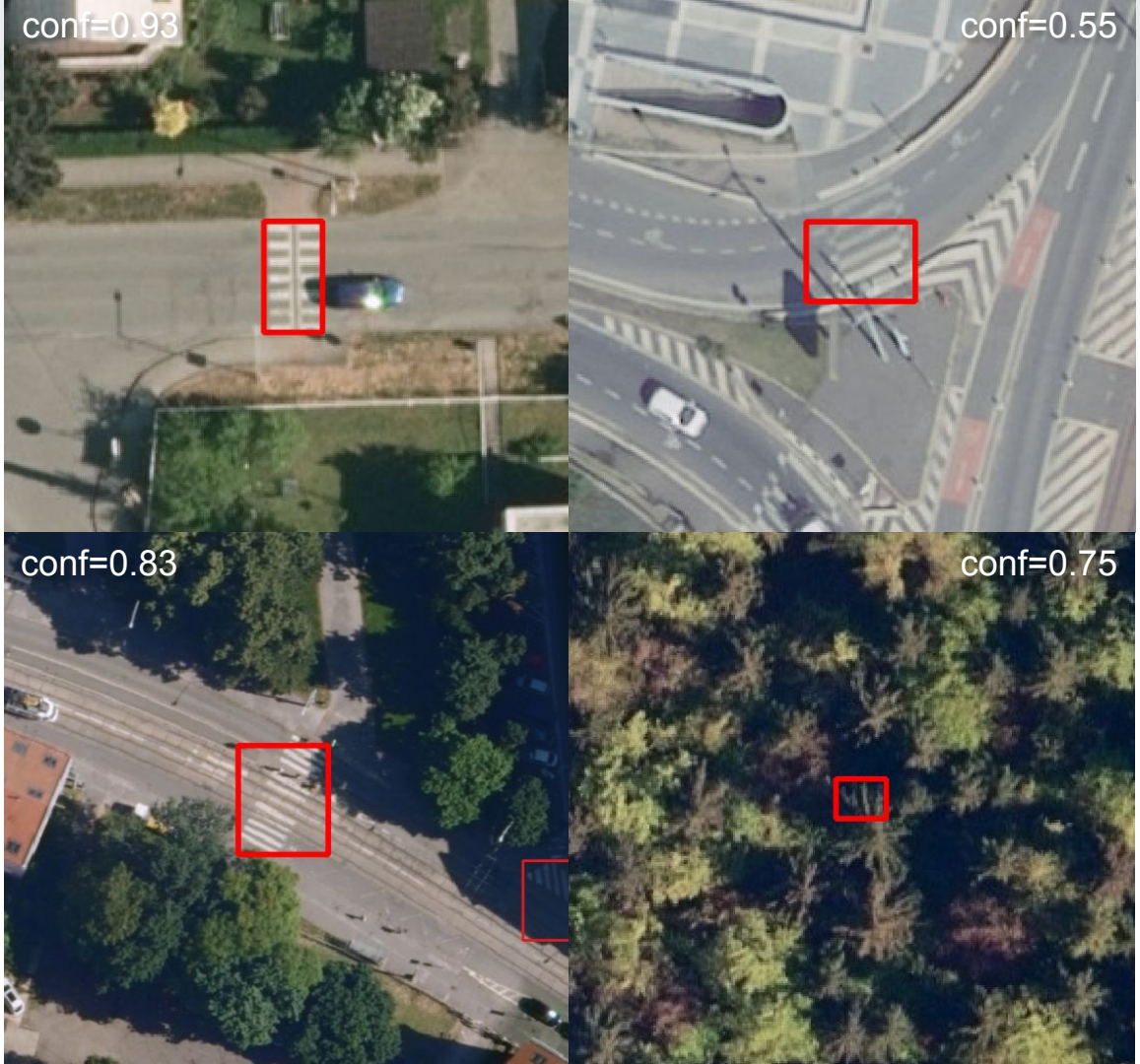
The detected objects



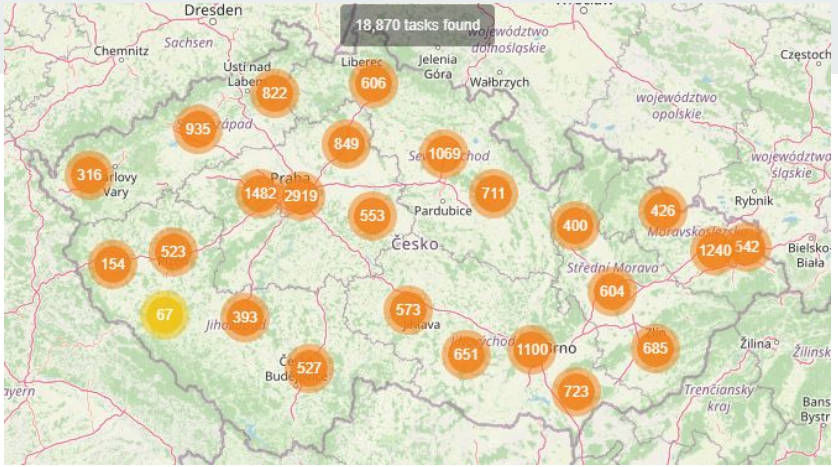
Běh modelu

- Cca 67 tisíc detekcí
- Trénováno zhruba 6 hodin v Google Colab na 2 511 anotacích
- YOLOv5
- Detekce všech přechodů
  - 16 tisíc ortofoto snímků
  - 12,5 cm/px
  - Cca 2 týdny běhu RTX 4080 Super
- 10.5281/zenodo.15746210
- běží detekce nad SK ortofotem (díky Tomas_J!)

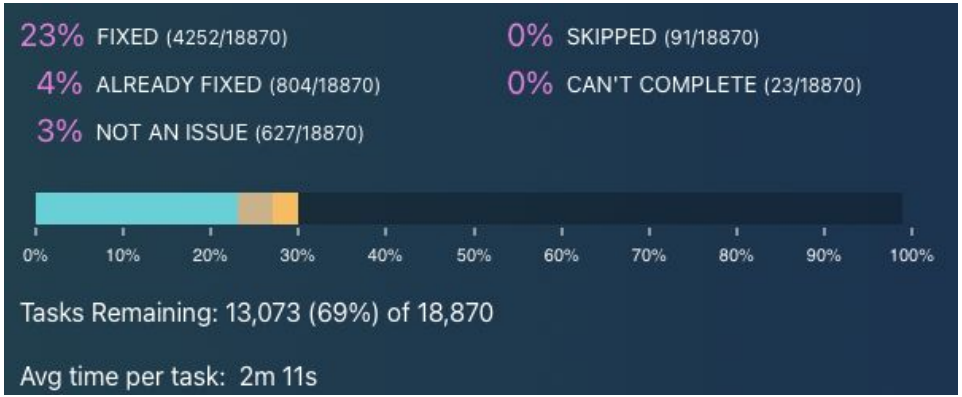


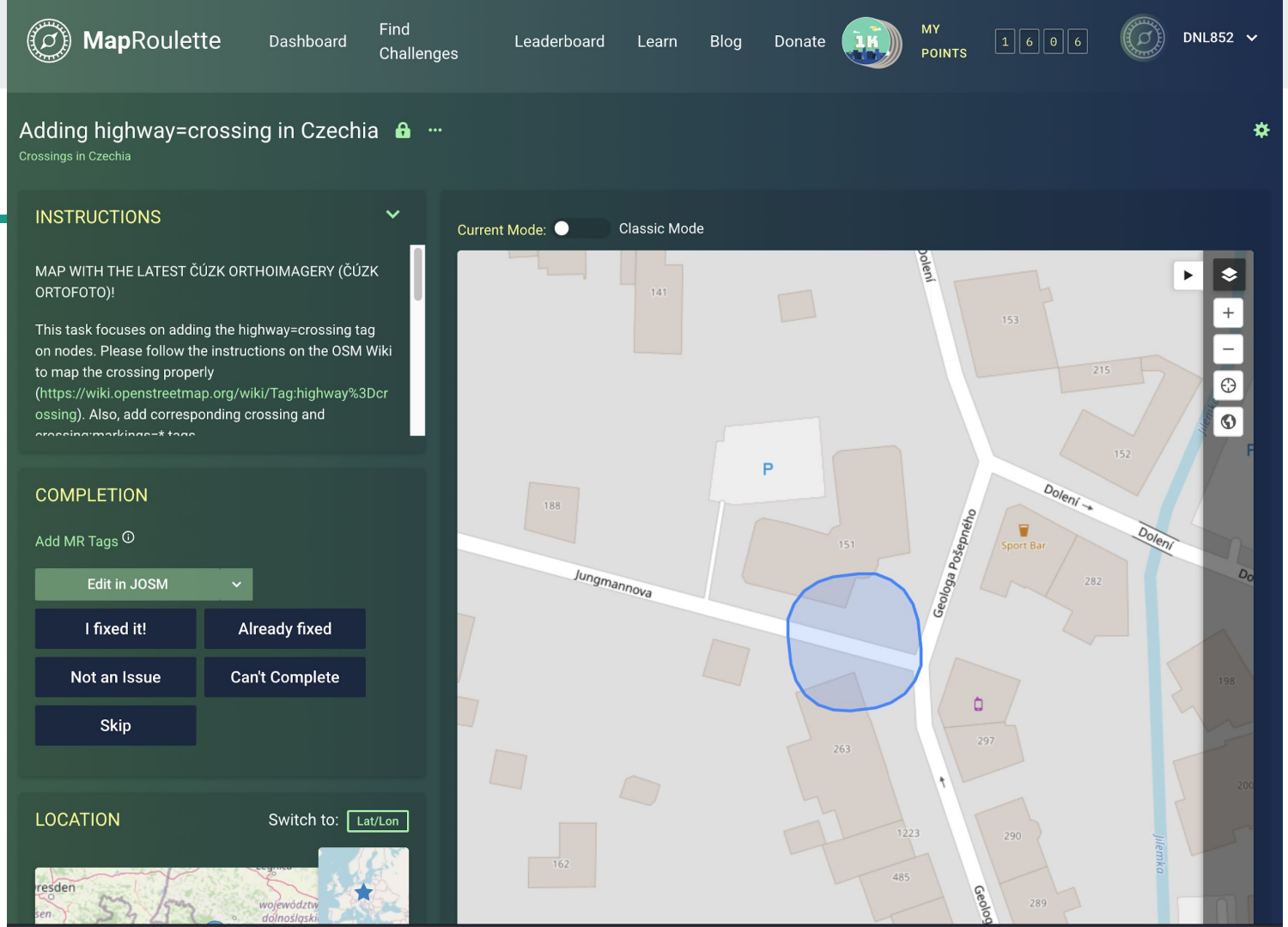

conf=0.93
conf=0.55
conf=0.83
conf=0.75

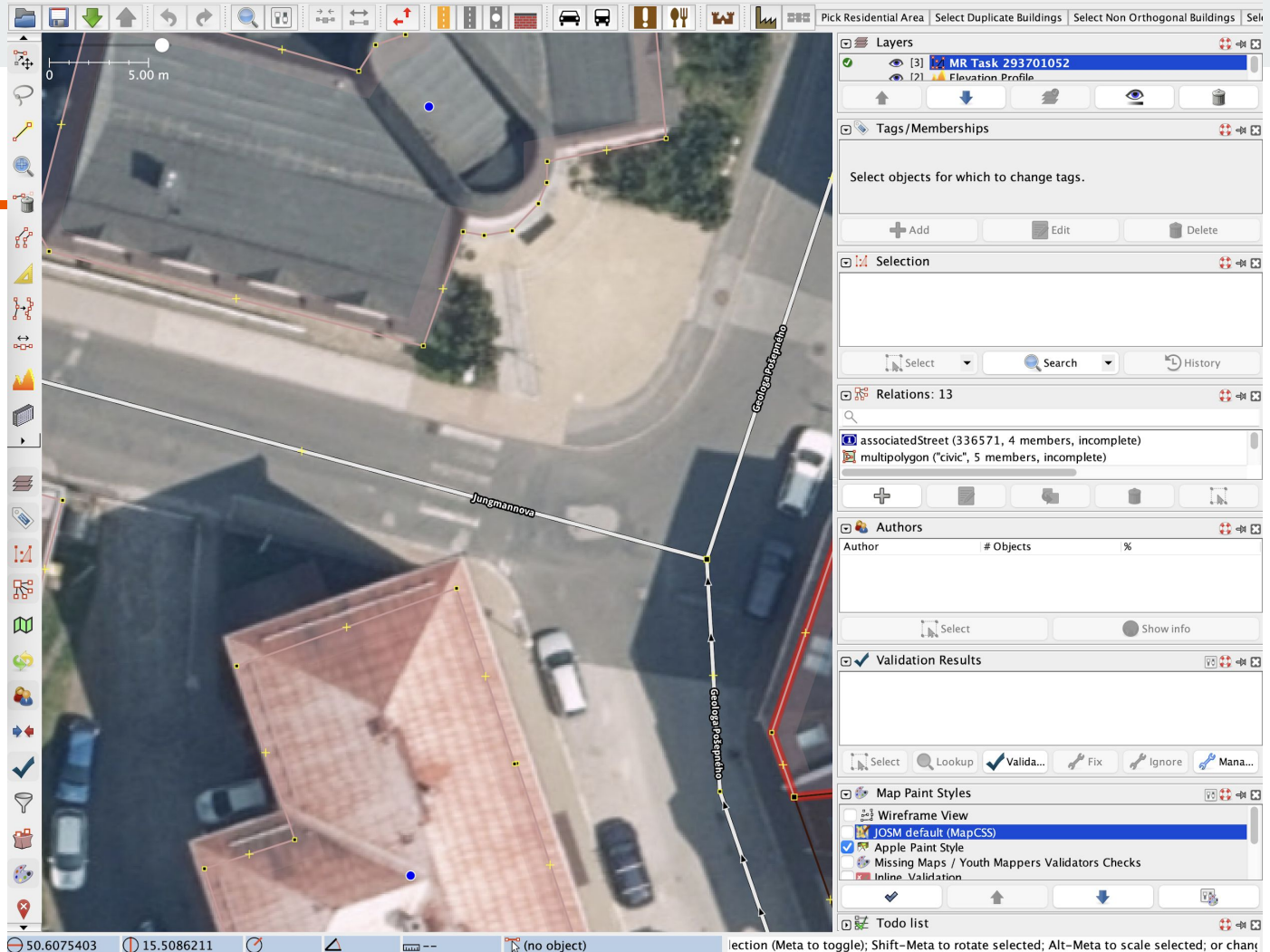
Proč přechody?

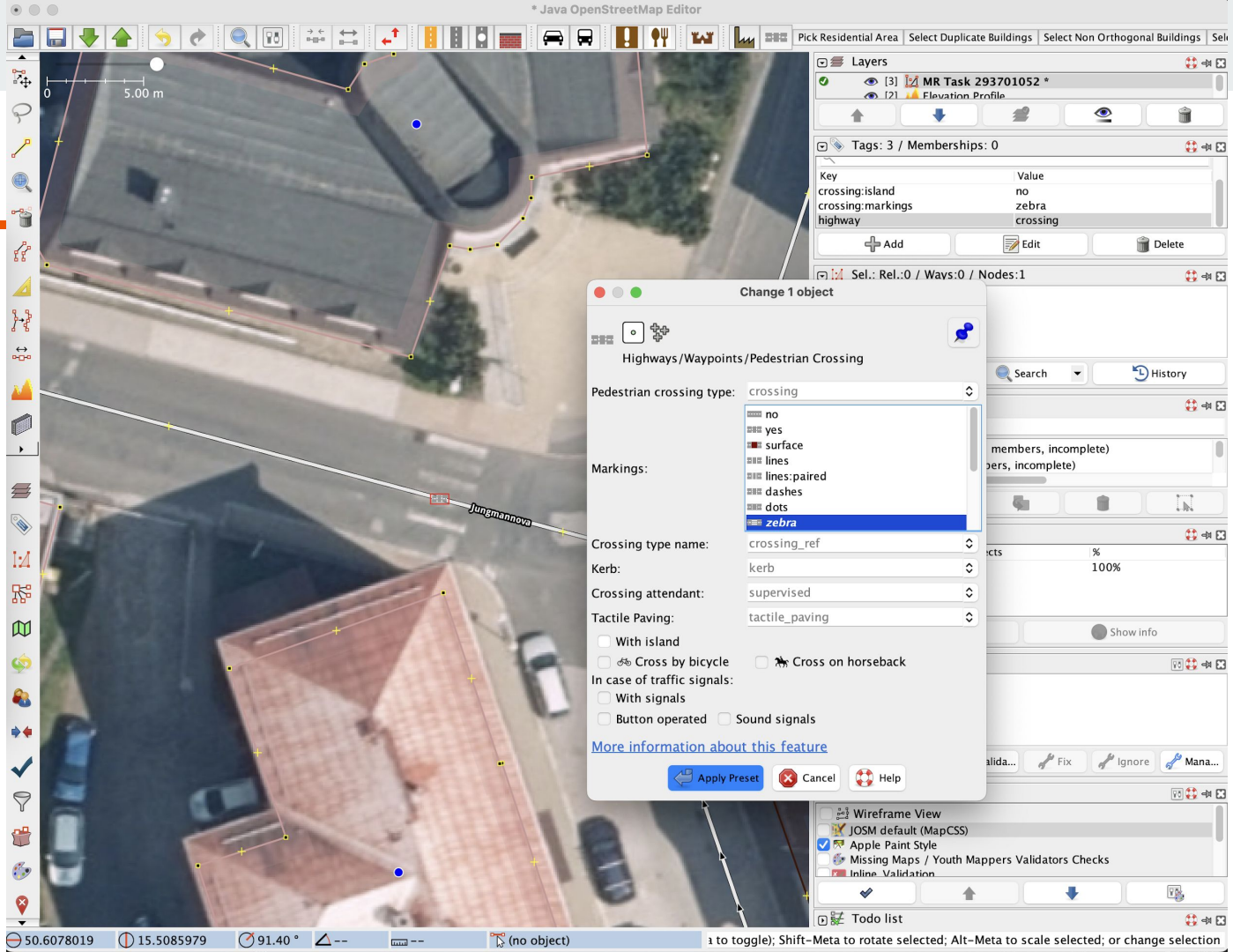


- Kvalita dat OpenStreetMap
- Vyhledání chybějících přechodů
- Komunitní doplnění

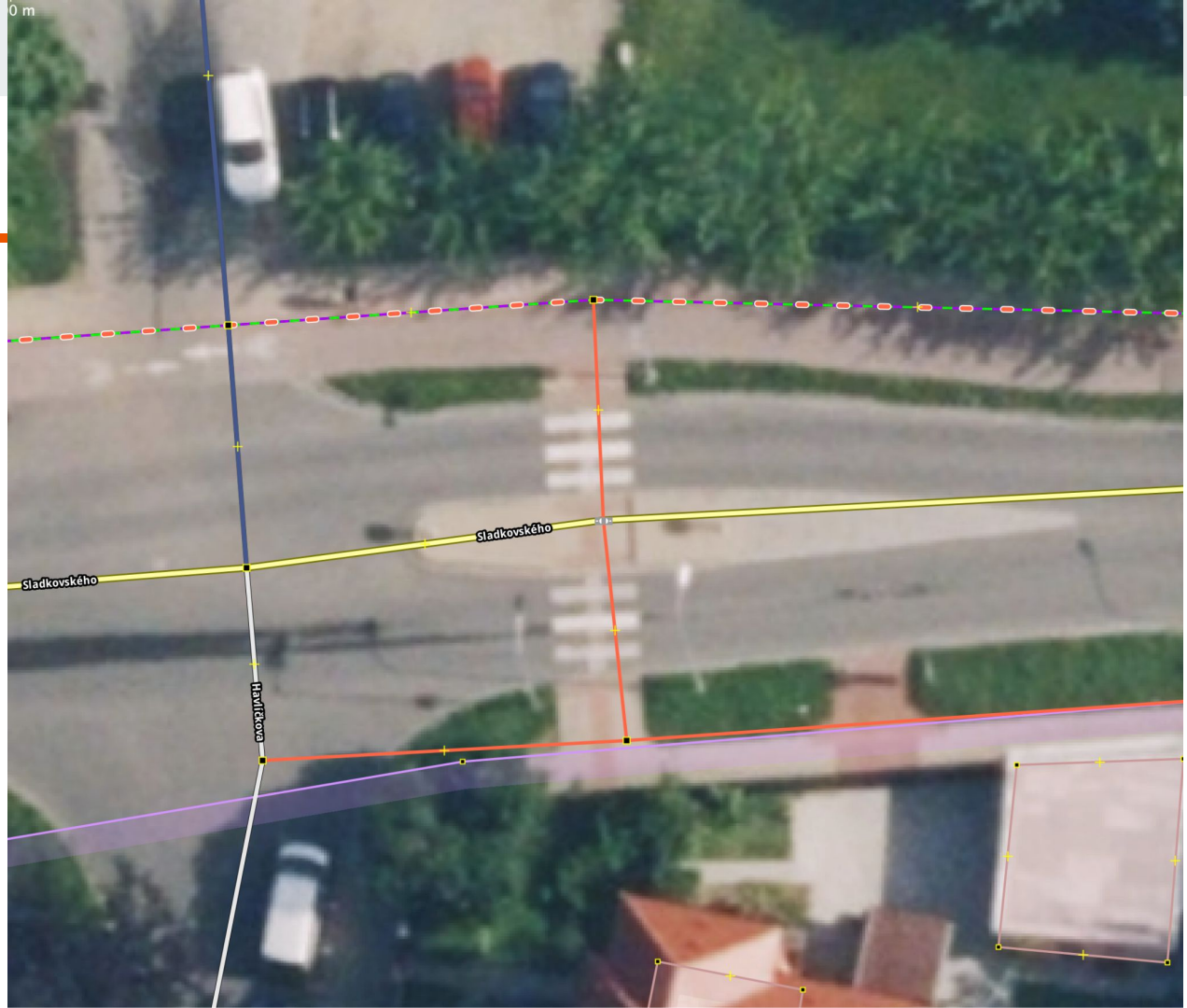



MapRoulette
Dashboard
Find Challenges
Leaderboard
Learn
Blog
Donate
MY POINTS
1606
DNL852
Adding highway=crossing in Czechia
Crossings in Czechia
INSTRUCTIONS
MAP WITH THE LATEST ČÚZK ORTHOIMAGERY (ČÚZK ORTOFOTO)!
This task focuses on adding the highway=crossing tag on nodes. Please follow the instructions on the OSM Wiki to map the crossing properly (https://wiki.openstreetmap.org/wiki/Tag:highway%3Dcrossing). Also, add corresponding crossing and
COMPLETION
Add MR Tags
Edit in JOSM
I fixed it!
Already fixed
Not an Issue
Can't Complete
Skip
LOCATION
Switch to:
Lat/Lon
Current Mode:
Classic Mode
Jungmannova
Doleni
Geologa Pošepného
Sport Bar
P
141
153
215
152
188
151
282
263
297
198
1223
290
162
485
289


Java OpenStreetMap Editor
Pick Residential Area
Select Duplicate Buildings
Select Non Orthogonal Buildings
0
5.00 m
Jungmannova
Geologa Pošepného
Geologa Pošepného
Layers
[3] MR Task 293701052
Elevation Profile
Tags/Memberships
Select objects for which to change tags.
Add
Edit
Delete
Selection
Select
Search
History
Relations: 13
associatedStreet (336571, 4 members, incomplete)
multipolygon ("civic", 5 members, incomplete)
Authors
Author
Objects
%
Select
Show info
Validation Results
Select
Lookup
Valida...
Fix
Ignore
Mana...
Map Paint Styles
Wireframe View
JOSM default (MapCSS)
Apple Paint Style
Missing Maps / Youth Mappers Validators Checks
Todo list
50.6075403
15.5086211
(no object)

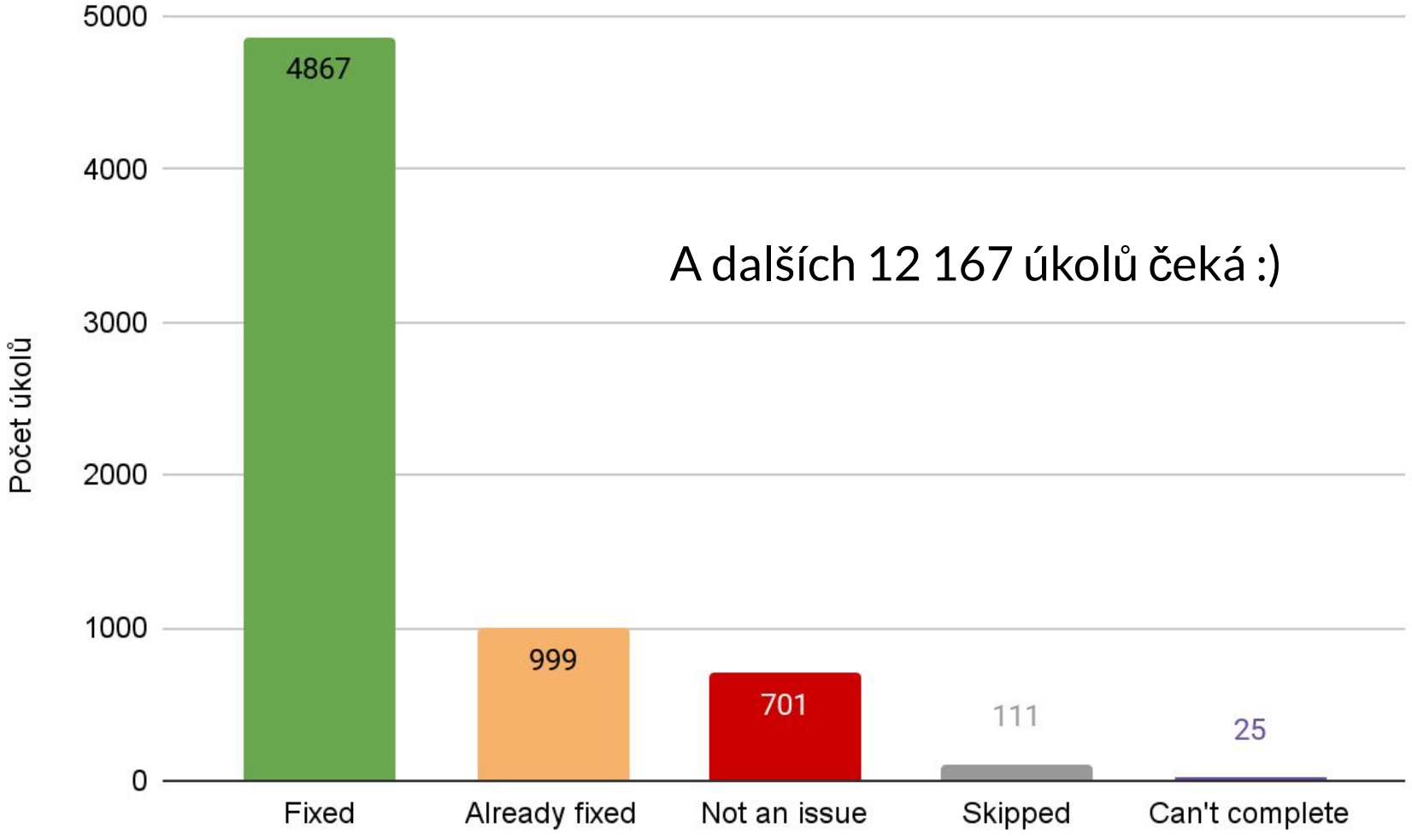

* Java OpenStreetMap Editor
Pick Residential Area
Select Duplicate Buildings
Select Non Orthogonal Buildings
0
5.00 m
Jungmannova
Layers
[3] MR Task 293701052 *
Tags: 3 / Memberships: 0
Key
Value
crossing:island
no
crossing:markings
zebra
highway
crossing
Add
Edit
Delete
Sel.: Rel.:0 / Ways:0 / Nodes:1
Search
History
Change 1 object
Highways/Waypoints/Pedestrian Crossing
Pedestrian crossing type:
crossing
Markings:
no
yes
surface
lines
lines:paired
dashes
dots
zebra
Crossing type name:
crossing_ref
Kerb:
kerb
Crossing attendant:
supervised
Tactile Paving:
tactile_paving
With island
Cross by bicycle
Cross on horseback
In case of traffic signals:
With signals
Button operated
Sound signals
More information about this feature
Apply Preset
Cancel
Help
Show info
Fix
Ignore
Mana...
Wireframe View
JOSM default (MapCSS)
Apple Paint Style
Missing Maps / Youth Mappers Validators Checks
Todo list
50.6078019
15.5085979
91.40 °
(no object)
Shift-Meta to rotate selected; Alt-Meta to scale selected; or change selection


Albrechtická
Albrechtická
Albrechtická
Albrechtická
Bezručova
STOP


0 m
Sladkovského
Sladkovského
Havlíčkova


Brněnská
Brněnská
Velké Němčice


361


5000
4000
3000
2000
1000
0
Počet úkolů
4867
999
701
111
25
Fixed
Already fixed
Not an issue
Skipped
Can't complete
A dalších 12 167 úkolů čeká :)