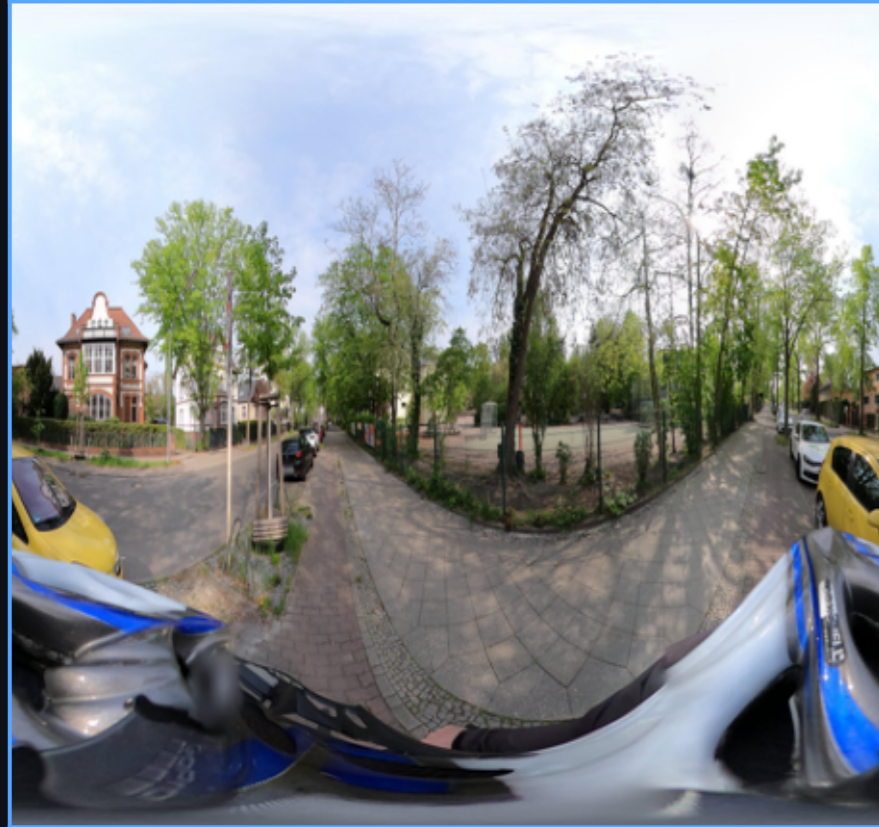


School Zone Speed Limit Enrichment Pipeline v2

HERE Berlin Hackathon 2026 · Partnered with Siemens Digital Logistics

2025-04-23



pt00002 · Spandau, Berlin

2026-01-19



pt00005 · Steglitz, Berlin

2022-06-12



pt00019 · Potsdam S

2025-05-24



pt00052 · Treptow, Berlin

MISSION

8 datasets → 1 decision tree →

corrects errors in HERE's data

THE PROBLEM

HERE already enriches ~80% of

school zones via fleet perception.

We solve the hard 20%:

- False positives
- Conditional vs permanent
- Missing end signs
- Confidence / QA ranking

326 signs · 1,850 images · 4 gates

Gate 0 — What Our Data Looks Like

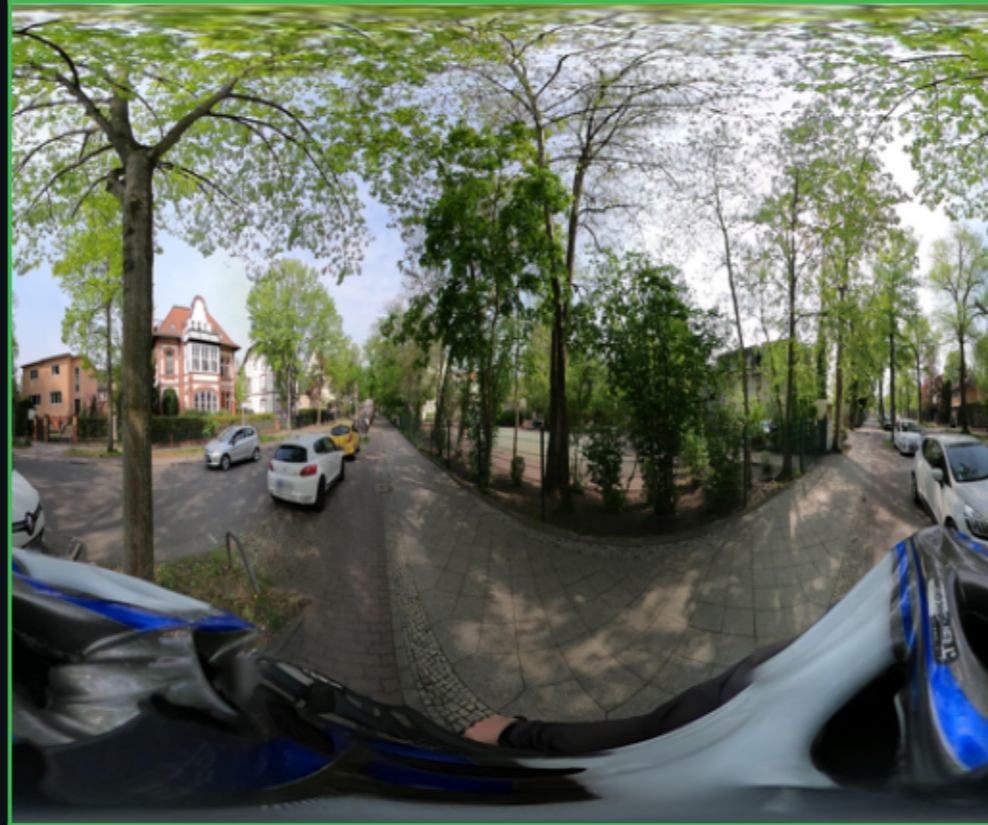
Multiple street-level views of the same sign location · pole pt00002 · Spandau / NW Berlin

lat 52.43408 lon 13.26434



Date: 2025-04-23

lat 52.43397 lon 13.26441



Date: 2025-04-23

lat 52.43404 lon 13.26429



Date: 2025-02-05

lat 52.43397 lon 13.26433



Date: 2025-02-05

lat 52.43399 lon 13.26429



Date: 2024-07-31

lat 52.43400 lon 13.26430



Date: 2020-10-25

Gate 1 — Zone 30 Exclusion Rule

Signs inside an existing Tempo-30-Zone (Zeichen 274.1) are advisory only — excluded from speed enforcement layer

VALID SCHOOL ZONE — included in enforcement layer



pt00107 · ndetections=2568 · bearing=262°

EXCLUSION RULE

German traffic law (StVO §41):

Zeichen 274.1 (SpeedLimitZoneV30)

defines a ZONE — not a linear

restriction on a single road link.

If a school sign sits INSIDE an

existing Tempo-30-Zone, the 30 km/h

limit comes from the zone, NOT

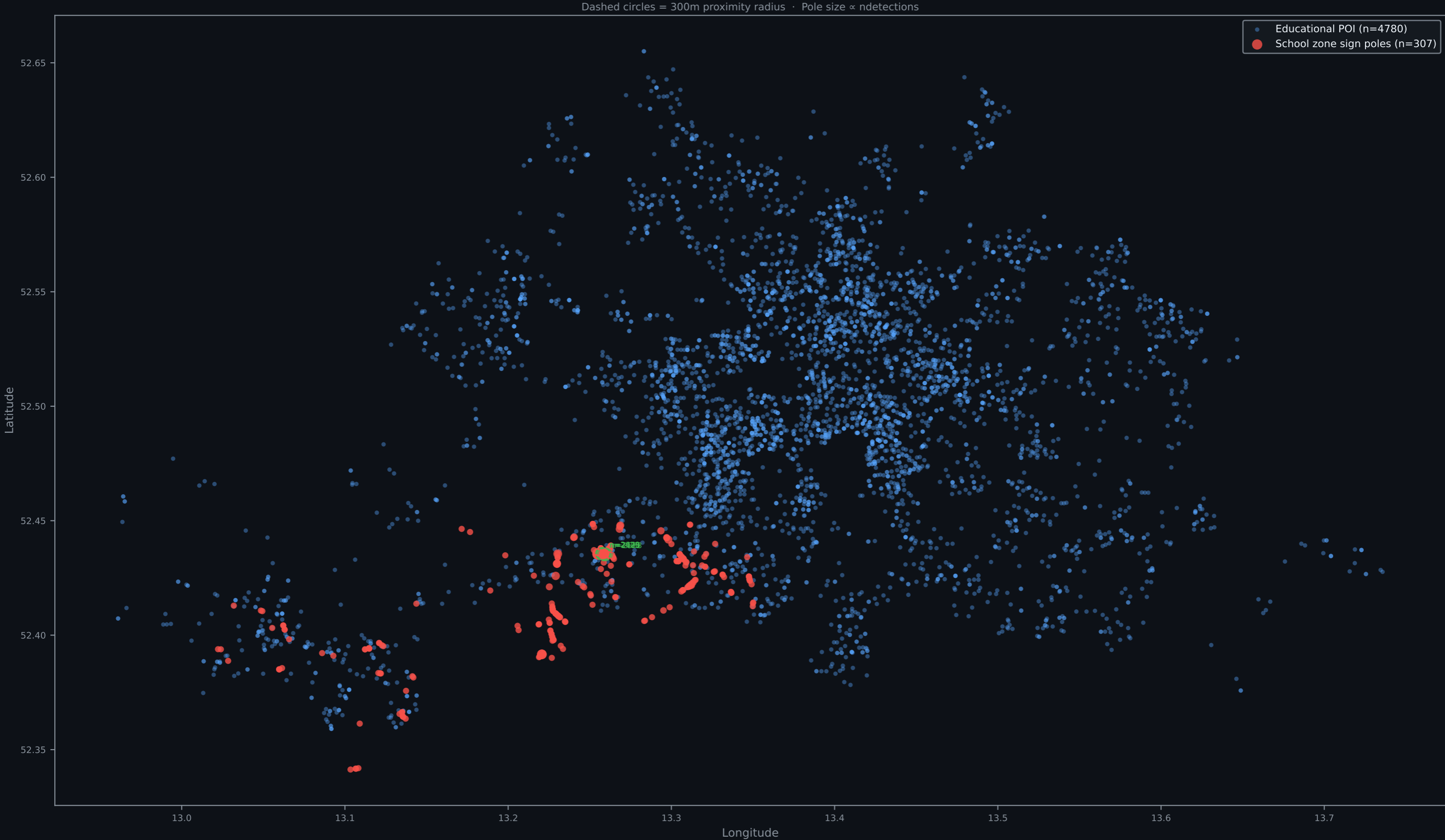
the school sign.

→ Mark as **EXCLUDED (advisory sign)**

→ **Do NOT walk topology for extent**

Gate 2 — School Proximity Scoring

Each sign pole scored by distance to nearest filtered educational facility · Potsdam + SW Berlin



Gate 3 — Visual Evidence Pipeline

Street-level images → preprocess → sign detection → classification → OCR time text · pole pt00052

Raw image
(Mapillary)



2025-05-24

Preprocess
+ undistort



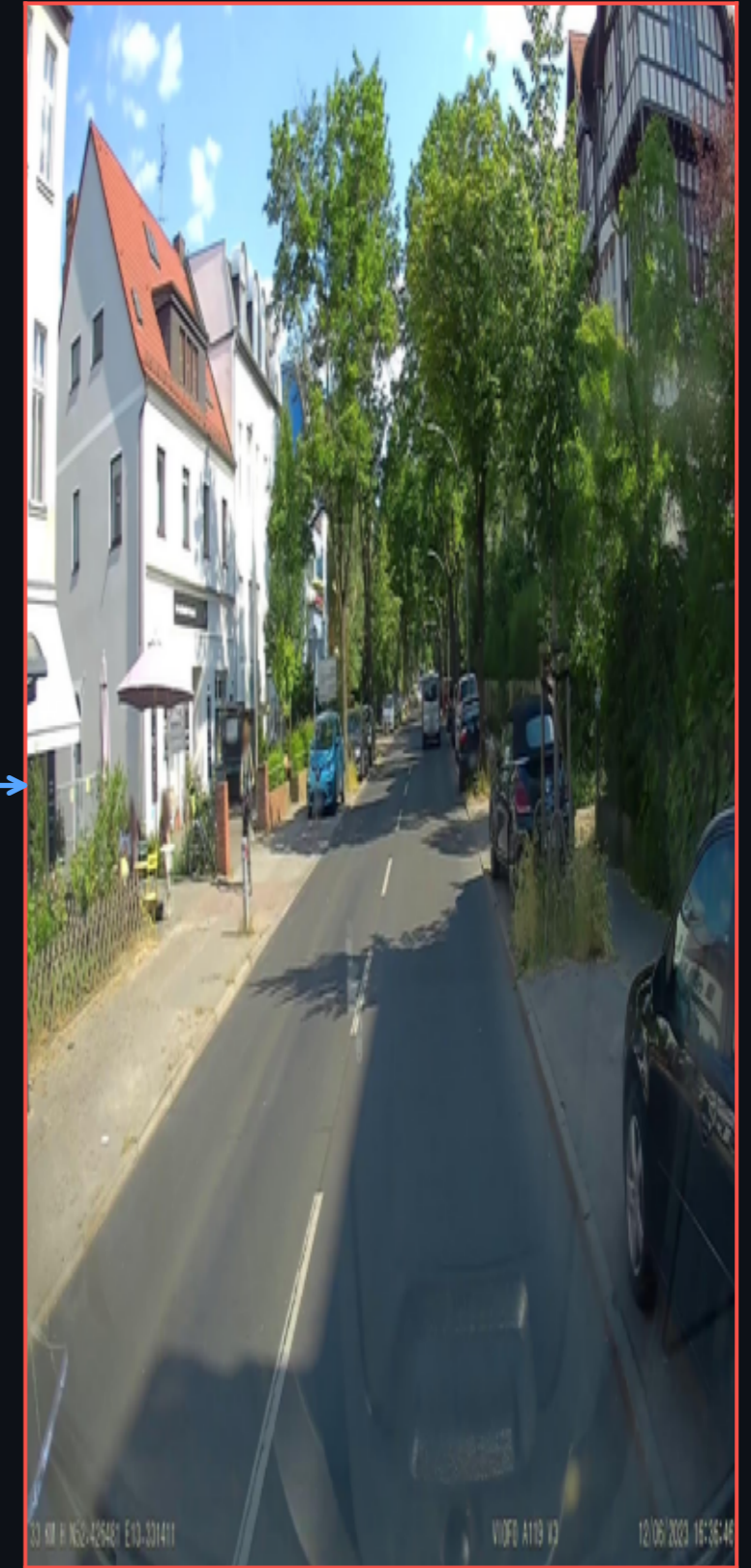
2025-05-12

Sign region
detected



2025-05-12

Classified +
OCR text

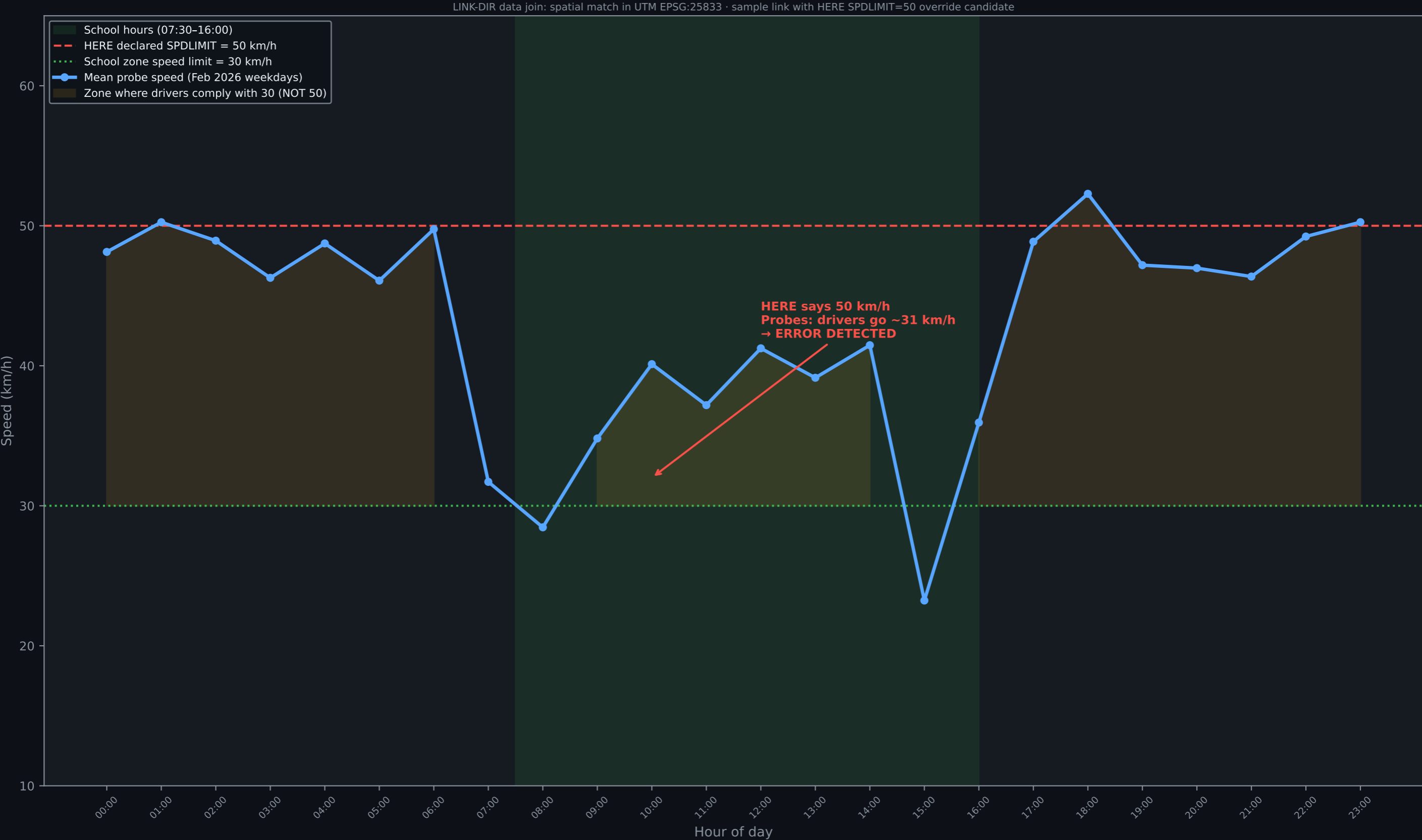


2023-06-12

Fallback strategy: if OCR confidence < 60%, use German school hours heuristic (07:00–16:00 Mon–Fri) for temporal classification

Gate 4 — Speed Evidence Layer

44M probe vehicles · hourly mean speed vs HERE declared speed limit · error detection



Gate Results — Classification Examples

Three representative outcomes from the 4-gate pipeline

AUTO_APPROVE



High confidence · sign visible pt00065 near=1323 brg=213°

MANUAL REVIEW



Conditional zone · time text unrept00002 sen=428 lkd brg=5°

LIKELY FALSE POSITIVE

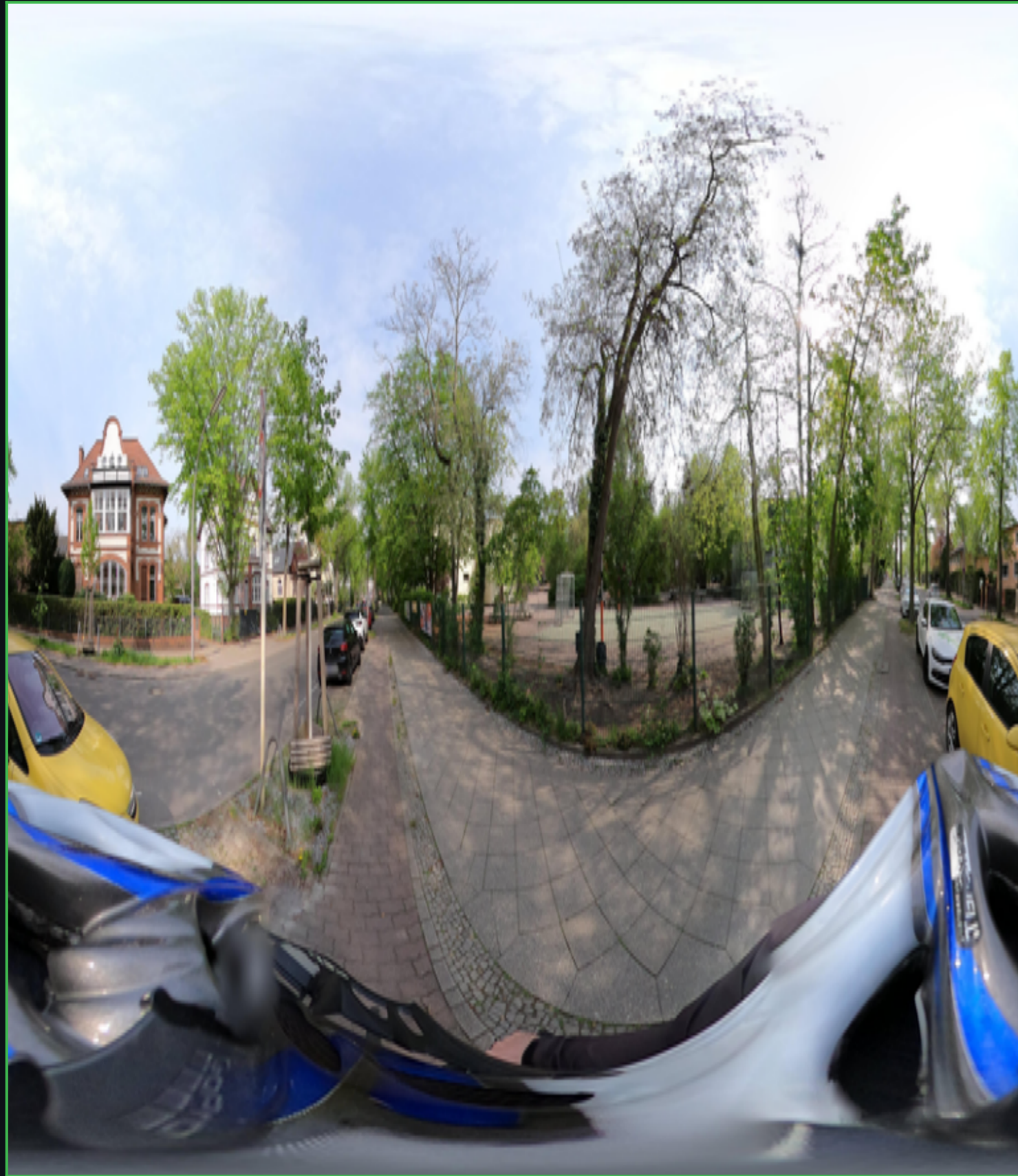


Low detections · no school within 5pt00012 in=7 sen brg=280°

Extent Calculation — Finding Where the School Zone Ends

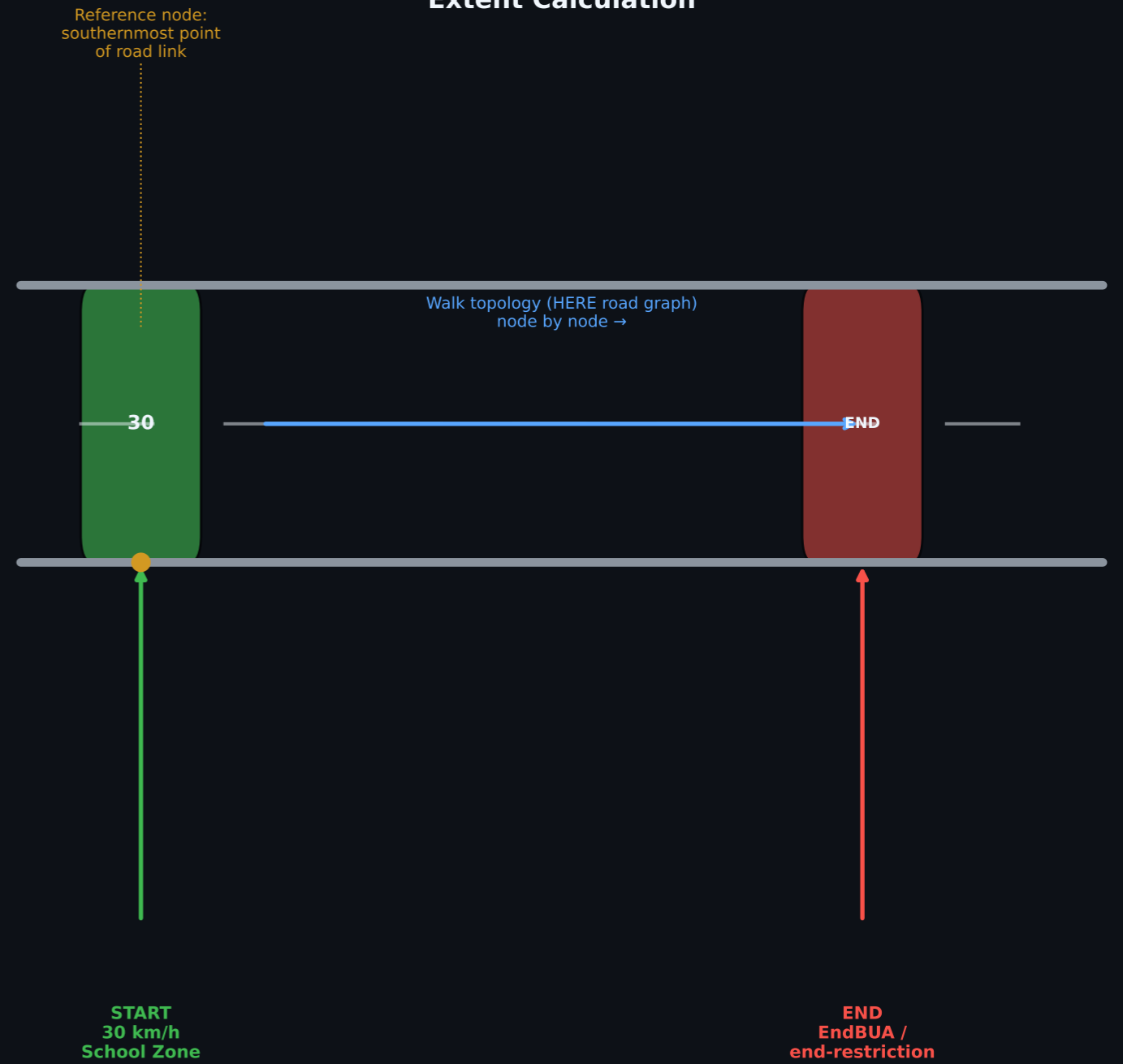
Map-match sign to road link → topology walk → find terminating sign or zone boundary

2025-04-23



pt00002 · School zone START sign · Spandau

Extent Calculation



Pipeline Summary — Stats & Architecture

HERE Berlin Hackathon 2026 · School Zone Speed Limit Enrichment · Confidence / QA Layer

DATASET SCALE

326 school zone sign records

315 unique sign poles

1,850 Mapillary images

11,607 remaining speed signs

27,943 road geometry links

48.5M probe speed records

4,780 school POI records

COVERAGE

57.1% permanent zones

42.9% conditional zones

94% signed at 30 km/h

10.4% no visual evidence

GEOGRAPHIC SCOPE

Potsdam + SW Berlin

lat 52.34–52.45

lon 13.01–13.36

4-Gate Decision Pipeline

