Traffic sign detection and recognition

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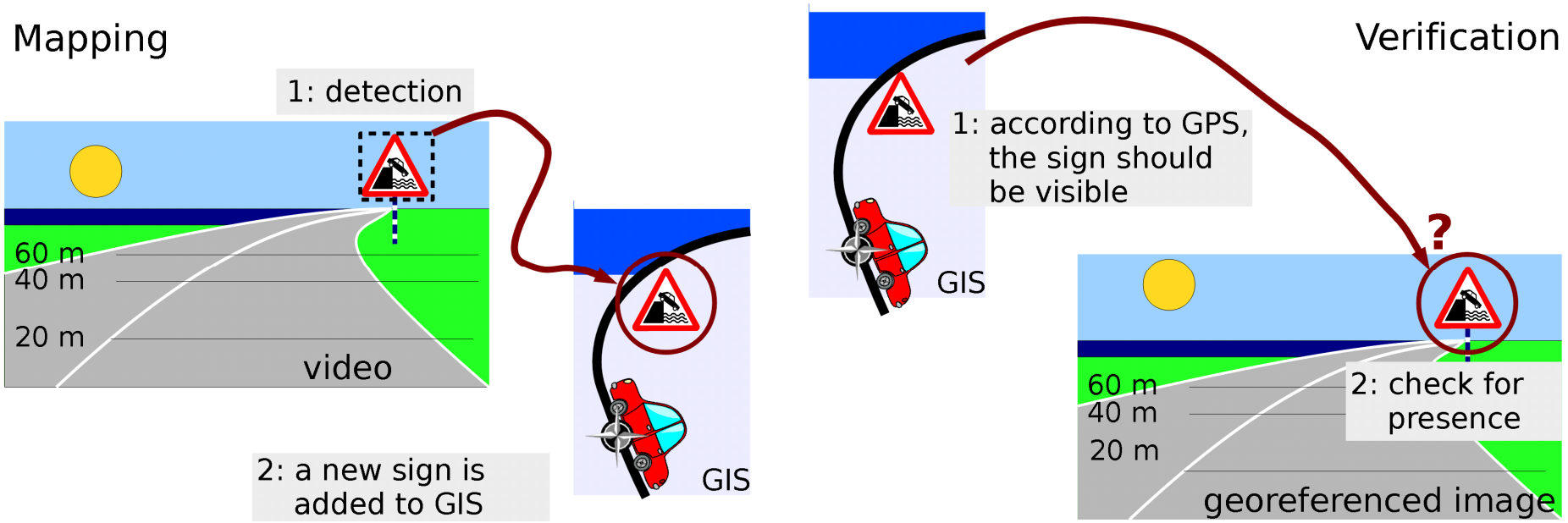
Motivation

- Mapping and Assessing the State of Traffic Infrastructure (project leader Siniša Šegvić)
  - HrZZ, IPV, FER, TU Graz

http://www.zemris.fer.hr/~ssegvic/mastif/index_en.shtml

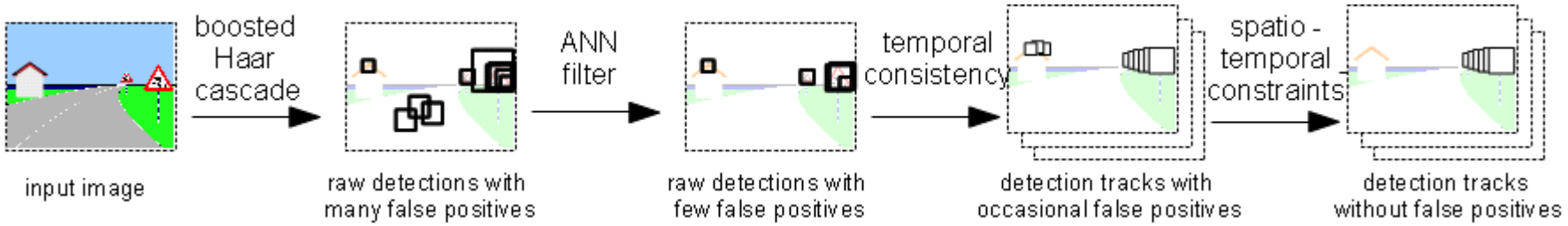


Problems

- large number of different traffic signs
- captured images are of very different quality

Detection and recognition of triangular warning signs

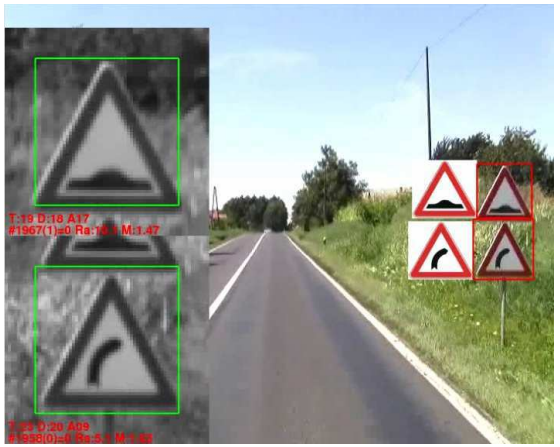
- detection:
  - boosted Haar cascade (without grouping responses)
  - ANN filter as additional stage in the cascade
  - enforcing temporal consistency by tracking detections



- results:
  - improved precision an location accuracy
  - improved subsequent recognition

Detection and recognition of triangular warning signs

- recognition:
  - 28 most frequent signs
  - LDA + 1-NN on normalized signs (64 x 64 grayscale)
  - > 90% on manually annotated signs, 80% on real detections



Detection and recognition of triangular warning signs

- recognition:
  - depends on number of training samples

the class appearance and id	 A03	A04	A05	A08	A09	A10	A11	A17	A33	A34	A44
n(training)	41	27	31	200	223	209	242	28	35	251	212
n(testing)	128	165	156	38	48	24	47	11	206	44	32
hit(manual)	111	136	145	37	48	23	44	8	198	44	30
pct(manual)	87%	82%	93%	97%	100%	96%	94%	73%	96%	100%	94%
hit(detection)	109	104	127	37	48	23	45	10	138	43	32
pct(detection)	85%	63%	81%	97%	100%	96%	96%	91%	67%	98%	100%

Speed limit sign detection and recognition

- trained Haar cascade for circular signs
- ANN classifier trained for 5 traffic sign categories

- Additional ANN classifier for reading numbers on speed limit signs

Challenges

- multiclass detection
  - there are many visually different sign classes
  - running a separate detector for each class
  - feature sharing
- more general object detection
- detection and reading direction tables