Semi-automated traffic counting method for forest roads

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Background

- Mixed use of forest roads
- No data on public use
- Pilot project to take digital photos of road users
- 70,000 digital still images since 2012
- Need of automation
The counter system
The counter system

- Digital security camera
- Reflexive photo electric sensors
- Photo and date stored
- 150 photos daily
The counter system
Image analysis

- 11,000 photos analysed by interpreters
- Database for testing automation

- 1\textsuperscript{st} step: Locate users
- 2\textsuperscript{nd} step: User classification
- Aforge.NET and Accord.NET frameworks
Road user location

- Background - Foreground separation
- Diversity map
- Diverse areas are interesting
- Patches of interesting areas
- Road users included
Road user location
Road user classification

- Machine learning
- Bag of Visual Words model for image description
- Support Vector Machine for classification
- 3 main categories: pedestrians, cyclists, cars
Results
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![Bar chart showing the distribution of different transportation modes.](chart.png)

- **Pedestrian:** 93.6%
- **Cyclist:** 73.1%
- **Car:** 77.8%

**Legend:**
- Yellow: Pedestrian
- Red: Cyclist
- Green: Car
Conclusion

- Human supervised image analysis needed for research purposes
- Semi-automated process can distinguish between cars and humans
- Automation can be improved by:
  - Better image quality
  - Background image or video
  - Better software
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