



MOBILITY OBSERVER

AUTOMATIC FINE-GRAINED TRANSPORT MODE RECOGNITION FOR WEARABLE-BASED MOBILITY APPLICATIONS

+ WHAT IS MOBILITY OBSERVER?

Transport Mode Recognition is a data fusion process, which:

- Classifies automatically a person's or object's transport mode while on the go
- Leverages various measurements provided by sensors typically integrated into smartphones and wearables

Classification level refinement allows:

- Differentiation between similar usage cases, e.g. detailed rail or road transport modes, while conserving device autonomy

+ APPLICATIONS

Fine-Grained Transportation Mode Recognition is a compulsory tool to improve applications for intermodality, social and urban sensing uses and energetic efficiency

- Carbon footprint estimation
- Real-time door-to-door smart planning
- Smart mobility surveying
- Mobility behavior analysis for specific social groups
- Driving analysis
- Road user analysis and collision prevention
- Goods mobility tracking
- Mode-centric services and applications

+ WHAT'S NEW?

- Fine road, rail and airplane transport recognition
- Qualitative walking information

+ HOW DOES IT WORK?

- Sensor data mining for key power efficient characteristic extraction
- Machine learning classification
- High-level analysis by user group

		Prediction						
		bike	plane	rail	road	run	still	walk
Truth	bike	62%	0%	0%	15%	1%	13%	9%
	plane	1%	68%	4%	20%	0%	6%	0%
	rail	1%	5%	66%	16%	0%	12%	0%
	road	3%	15%	6%	69%	0%	7%	0%
	run	1%	0%	0%	0%	92%	0%	6%
	still	1%	5%	6%	1%	0%	88%	0%
	walk	1%	0%	0%	2%	2%	2%	93%

Observer prediction accuracy: confusion matrix with data ranging from true (rows) to predicted values (columns).

+ WHAT'S NEXT?

The "Bon Voyage" cooperation project, funded by the EU Horizon 2020 research and innovation program (Grant 635867), has successfully developed fine transport mode recognition and this will soon enrich a real-time journey planning application.

Leti researchers continue to pioneer affordable, innovative, smart solutions for users and operators in the global mobility market by fusing sensors, increasing Observer performances, device autonomy and developing crowd sensing functionality.

Leti's approach embraces

- Specification of requirements (latency, autonomy, etc.)
- Adjustment of fine-grained recognition (classified mode output)
- Integration, testing and transfer to industry.

PUBLICATION:

Lorintiu, O., & Vassilev, A. (2016, November). Transportation mode recognition based on smartphone embedded sensors for carbon footprint estimation in Intelligent Transportation Systems (ITSC), 2016 IEEE 19th International Conference on (pp. 1976-1981). IEEE.

HOW DO WE WORK TOGETHER?

- Requirements specification (latency, autonomy)
- Creation of dedicated database
- Fine-grained recognition adjustment (classified modes output)
- Integration, tests and industrial transfer

INTERESTED IN THIS TECHNOLOGY?

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