

# WT2.4: Delft University of Technology

## Report

Activities performed during the visit

in Department of Systems and Computer Networks,  
Wroclaw University of Technology

period: 29.06.2014-04.07.2014

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## 1 Personal Information

Mr./Ms. David Tax, faculty member of Delft University of Technology, Delft, Netherlands  
visited *Department of Systems and Computer Networks, Wrocław University of Technology*

in the period from 29.06.2014 to 04.07.2014 in

order to carry out research and training activities in the field of machine learning, one-  
class classification, novelty detection, classifier ensembles, machine vision and multi-  
instance learning.

## 2 Information about Seminars

The seminar presentation was organized on 01.07.2014.

the date

It was entitled:

Extending standard Pattern Recognition: Multiple-Instance Learning

### 3 Description of scientific activities

(Please describe value added to the ENGINE project i.e. new knowledge, new skills with respect to the objectives of the project, the assigned common area of future cooperation with the partner, plans for common research, projects, publications and how it could be used in the scope of ENGINE)

Prof. David Tax delivered a seminar, entitled “Extending standard Pattern Recognition: Multiple-Instance Learning” in front of a large audience consisting of ENGINE participants and external auditors. The seminar was connected with the topic of learning with bags of objects with unknown labels, one of the proposed joint research topics between ENGINE Centre and : Delft University of Technology. Additionally, during the stay prof. Tax attended several meeting with ENGINE members, during which the plans for future collaborations were established. Three main research topics were selected:

- Introducing novel and robust one-class classifiers for difficult data with overlapping, unknown labels and lack of counterexamples. Here, local detection of outliers will be implemented in order to efficiently filter out noisy samples from the training set.
- Developing novel methods for multi-class classification in the context of dynamically changing number of classes. Here, methods will be proposed for scenario with non-stationary objects incoming as a data stream, in which new classes may appear and old ones may disappear from the learning task.
- Applying Multiple-Instance Learning methods in real-life task of early breast cancer diagnosis with the usage of machine vision and ensemble algorithms.

### 4 Information referring to the intellectual property

(the generally binding law in this area in the visited country and procedures of patenting);

The patenting procedure is governed by The Netherlands Patent Office, a department of the Netherlands Enterprise Agency.

Intellectual Property is divided into two categories:

1. Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source.
2. Copyright, which includes literary and artistic works.

The main categories of patents are as follow:

Right		Protection
Copyright		For works of literature, art and science
Industrial Property Rights	Patent law	For new products or processes
	Trademark law	For word trademarks and pictorial trademarks
	Designs and models law	For the exterior of an implement
	Plant breeders' right	For crops
	Topographies of semiconductor products	For 'chips'

## 5 Description of the cooperation between universities and industry

(how it is organized in partner's organization, the sources of funding, the opinions about drawbacks and strengths of existing solution).

Currently, the Delft University of Technology carries out a large number of cooperation with industrial partners. They are conducted both in a form of direct collaboration and creation of spin-offs. Creation of spin-offs by University members is a normal procedure and is fully accepted by the directorate of the Delft University of Technology. There are several projects conducted together, financed from mixed sources. In such cases, a consortium is being created.

## 6 Other activities

**REMARK:** Apart from this information also a program of the visit and the presentation in electronic version should be given to the project office (please send all of them to Urszula.Markowska-Kaczmar@pwr.wroc.pl). Please respond to the points 1-5 for outgoing visit and points 1-3 for incoming visit. Point 6 is for extra activities that are not put in points 1-5.