Pattern Recognition in SS 2013

Programming of Machine Learning Algorithms
for Smartphone Sensors
Exercises

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http://www.pr.informatik.uni-siegen.de/en/teaching

Exercises In the exercises we will realise programming projects on smartphones with Android, iOS, and Microsoft-based OS in small groups. Today's smartphones are equipped with a number of sensors providing data that can be used for learning of the user behaviour and condition models as a function of the sensor values (profiling). Using appropriate pattern recognition techniques these models can be then used for automatic detection of abnormal situations with regard to users' behaviour or condition. For example, we will develop prototypical apps for driver condition analysis, depression detection and prediction, etc.

1 Project Topics, Materials and Information

1. Please prepare your own project topic for the first exercise (16.04)
2. Please bring your own laptop (and smart-phone) to the exercises
3. Please install the newest version of Android SDK on your laptop
   http://developer.android.com/sdk/index.html

2 The Rules of Completing the Course

All Students are obliged to respect the following rules:

1. Since the Summer Term 2013 a Registration for the Course in the LSF is obligatory.
2. Exercises are held every two weeks (according to the schedule given in Section 3).
3. Presence on classes is mandatory.
4. Each Student is allowed one unexcused absence during the semester. Each subsequent absence should be confirmed by a sick leave.
5. For each class the Student should present the progress of the work.
6. On the last class, Students should submit the results of their work (5-10 min presentation).
7. Students are required to work independently in the classroom.
8. Ready source code along with a brief specification in English (1-2 typed pages) should be sent to the tutor up to a week after the last exercise.
9. Evaluation of the course is an arithmetic mean of the ratings for the presentation and the source code (with the specification).

3 Schedule of the Exercises

Day and Time	Topic of the classes
16.04	Introduction to the course, topics presentation, introduction to the Android SDK software.
30.04	Smart-phone sensor data acquisition – part 1.
14.05	Smart-phone sensor data acquisition – part 2. Presentation of the state of the art and methodology connected with the individual topics.
28.05	Data analysis – features selection and generation.
11.06	Data analysis – supervised algorithms.
25.06	Data analysis – unsupervised algorithms.
9.06	Presentation of the results.

4 Contents

I. Supervised Algorithms

- Classifiers Based on Bayes Decision Theory
- Linear Classifiers
- Nonlinear Classifiers
- Feature Selection
- Feature Generation
- Template Matching

II. Unsupervised Algorithms

- Context-Dependent Classification
- Clustering: Basic Concepts
- Clustering: Sequential Algorithms
- Clustering: Hierarchical Algorithms
- Clustering: Schemes Based on Function Optimisation

5 Organisational

Course No. in LSF	Lecture: 1122431311 Exercise: 1122431312
Semester	SS 2013
Who	Studiengang: Master Informatik Studiengangsvarianten: Visual Computing, Medizinische Informatik, Alan Turing
Dates and Times	Lectures: Monday 08:30 - 10:00 Exercises: Tuesday 08:30 - 10:00
Begin	Monday, 8 April 2013
End	Tuesday, 16 July 2013
Where	H-F 001
Language	English
Questions?	Marcin Grzegorzek Office: H-F 012 Phone: 0271 740 3972 Email: marcin.grzegorzek@uni-siegen.de `http://www.pr.informatik.uni-siegen.de`