Master-Seminar “physiological data analysis for educational technologies”  
(WiSe 2016/17)

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Contents

physiological data analysis for educational technologies

- Roots from BioMedical research (healthcare or public health)
- Improving learning and teaching with eustress and distress detection
- Stila Project: http://stila.pms.ifi.lmu.de/

Seminar

- This course will introduce basic concepts, methods, and interesting projects in physiological data analysis, especially stress, eustress and distress detection.
- The participants have the opportunity to use fitness tracker to measure their own heart rates and to exam heart rate features with real data.
- We will also brainstorming ideas of how to improve learning and teaching at universities with the knowledge of stress detection.
- And will fulfil online questionnaire at the end of each session to simulate a study for stress detection
Consultation-hour: François Bry
- By arrangement (please, ask for an appointment e.g. via email)
- Room: E104

Consultation-hour: Yingding Wang
- By arrangement: (please, ask for an appointment e.g. via email)
- Room: L103
Schedule

- 21.10. – Topics
- 28.10. – Introduction to Data Analysis Tooling (Jupyter/IPython and Stila Portal)
- 04.11. – First Topic Presentation + Data Analysis Demo with Own Data
- ... (each Friday) ...
- 10.02. – Last Presentation
Organisation 3/4

Examination: Participation

- Continuous, active, and independent participation

Examination: Presentation, Demo, Report, and Questions

- Presentation (30min - 45min)
  - Please send the slides two days before the presentation to Yingding
- Data Analysis Demo (20min - 30min)
  - Demo shall relate to Presentation Topic
  - Analysis Demo of 1-2 heart rate features in Topic
  - Using Jupyter/IPython or Stila Portal Tools (very limited at current stage)
- Written Report (7 pages)
  - Deadline: one week after the presentation
  - Including Charts from Demo with heart rate feature
- Questions
  - A short questions session after each presentation with the audience
Organisation 4/4

Tasks during Participation (Speaker)
- Shall at least wear fitbit from 6-12 on Friday
- Regularly wear fitbit and use stila app
- Fufill an online questionnaire of 8 questions at the end of lecture session

Tasks during Participation (Audience)
- Shall at least wear fitbit from 6-12 on Friday
- Regularly wear fitbit and use stila app
- Fufill an online questionnaire of 8 questions at the end of lecture session

Next Session
- Introduction to heart rate data analysis with python
- Introduction to Stila online analysis tool
- Test run of online questionnaire
# Publications

<table>
<thead>
<tr>
<th>No.</th>
<th>Author(s)</th>
<th>Title</th>
<th>Demo HR Feature</th>
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<tbody>
<tr>
<td>1</td>
<td>Jing Zhai and Armando Barreto</td>
<td>Stress Recognition Using Non-invasive Technology</td>
<td>meanHR</td>
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<tr>
<td>2</td>
<td>Sakr et al.</td>
<td>Multi level SVM for subject independent agitation detection</td>
<td>meanRR</td>
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<td>3</td>
<td>Nandita Sharma et al.</td>
<td>Objective measures, sensors and computational techniques for stress recognition and classification: A survey</td>
<td>SDHR</td>
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<td>4</td>
<td>Sun et al.</td>
<td>Activity-aware Mental Stress Detection Using Physiological Sensors</td>
<td>SDRR</td>
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<tr>
<td>5</td>
<td>Liu et al.</td>
<td>Listen to Your Heart: Stress Prediction Using Consumer Heart Rate Sensors</td>
<td>meanHR and SDHR</td>
</tr>
<tr>
<td>6</td>
<td>Boonnithi et al.</td>
<td>Comparison of heart rate variability measures for mental stress detection</td>
<td>RMSSD</td>
</tr>
</tbody>
</table>
Wang et al.: SDNN/RMSSD as a Surrogate for LF/HF: A Revised Investigation. Demo HR Feature: SDNN/RMSSD

Valenza et al.: Dominant Lyapunov exponent and approximate entropy in heart rate variability during emotional visual elicitation. Demo HR Feature: ApEn

PLARRE et al.: Continuous inference of psychological stress from sensory measurements collected in the natural environment. Demo HR Feature: CVRR


LI et al.: Eustress or Distress: An Empirical Study of Perceived Stress in Everyday College Life. Demo HR Feature: pRR50

THARION et al.: Short-term heart rate variability measures in students during examinations. Demo HR Feature: pRR50 + meanHR
Analyzing Data

**Device**
- Fitbit Charge HR – [https://www.fitbit.com/de/chargehr](https://www.fitbit.com/de/chargehr)

**Apps to collect heart rate data**
- Downloading Fitbit Android App and synchronize heart rate data (hr data) every three days to fitbit (Fitbit keeps 7 day data)
- Downloading Stila App (Beta) from [https://play.google.com/apps/testing/lmu.pms.stila](https://play.google.com/apps/testing/lmu.pms.stila) and download hr data to see your stress
- Log into Stila portal [http://stila.pms.ifi.lmu.de:8080/](http://stila.pms.ifi.lmu.de:8080/) to download your daily hr data in json for further analysis (Demo nächste Session)
## Schedule

**One Talks per Day, with a Data Demo**

- 04.11.2016 (SW-03)
- 11.11.2016 (SW-04)
- 18.11.2016 (SW-05)
- 25.11.2016 (SW-06)
- 02.12.2016 (SW-07)
- 09.12.2016 (SW-08)
- 16.12.2016 (SW-09)
- 13.01.2017 (SW-11)
- 20.01.2017 (SW-12)
- 27.01.2017 (SW-13)
- 03.02.2017 (SW-14)
- 10.02.2017 (SW-15)
Handing out Fitbit

- Fitbit not water resistant
- Need to be charged every 3 or 4 days
- Return back on 10.Feb.2017 at good condition
- Don’t lost the charge cable and bluetooth adaptor