

Emotion recognition using non-invasive biometrics

Prof. Nicole Novielli - University of Bari

Course duration: 16 hours (2 CFU)

<http://collab.di.uniba.it/nicole/>

Course Overview. Research on affective computing investigates emotion recognition and simulation since decades. Indeed, emotions are a fundamental component of our everyday life: they influence our cognitive skills, influence the outcome of activities requiring creativity and problem-solving skills, and contribute to the success of communication and collaborative activities.

Early recognition of negative emotions, such as stress, frustration, and anger can enable just-in-time corrective actions in many application fields, including wellbeing of knowledge workers, assistive technologies, computer-mediated communication, human-computer interaction, and so on. Thus, we envision the emergence and adoption of tools for enhancing emotion awareness during software development.

In this study, we will focus on the problem of reliable identification of the emotions using non-invasive biometrics. We will survey the state-of-the-art in biometric-based emotion recognition, with particular focus on the use of non-invasive sensors and examines to what extent they are able to detect affective expressions when used by individuals during their daily activities

A discussion is offered about the advantages and limitations of relying on self-reported, self-assessed emotions as gold standard and on the open challenges due to differences between individuals, towards the development and deployment of reliable sensor-based emotion classifiers for real use scenarios. Finally, we will discuss recent advances in applied research that leverage biometric-based emotion recognition for supporting emotion awareness in computer-supported cooperative work, with specific focus on the emotions experienced by developers engaged in collaborative software development tasks.

The course will feature both lectures and practical sessions. The latter, in particular, will show how to process the raw signal obtained by biometric sensors in order to extract features to be used for training emotion classifiers based on supervised machine learning.

Course Syllabus

- Background and Theoretical models of emotions
 - What is emotion recognition? Fundamentals and background
 - Theoretical background on affect modeling and operationalization of emotions
- Biometrics for emotion recognition
 - Which data source? EEG, EDA, Heart-related metrics
 - Emotion recognition based on facial expressions
 - Voice analysis
- Sensor-based emotion detection in practice
 - State-of-the-art devices
 - Preprocessing of raw signal and feature extraction
 - Training and evaluating emotion classifiers using biometrics
- Sensor-based emotion detection in computer-supported cooperative work: applications, opportunities, and open challenges