Affective Computing and Human-Robot Interaction (COMP0053)

Description

Aims:
The module targets students who have no previous knowledge in cognitive science and emotion theory and therefore the aim of Part A of the module is to give a basic introduction to the theory of emotion from physiological and psychological viewpoints and to understand its importance in human decision and communication processes. Part B will concentrate on the application of machine learning techniques to automatic emotion recognition by looking at current applications (e.g. in entertainment, education, and health) and available sensing technology. Part C will focus on the challenges in designing robots that are capable of socially interacting with humans. Examples of current applications (e.g. in entertainment, health, rehabilitation, service robotics) will be used to identify problems and discuss affective computing challenges and approaches for the topics taught in Parts A and B.

Learning outcomes:
To have a basic knowledge of emotion models and of how technology (e.g., robot) can be endowed with the ability to affectively and socially interact with its user. To understand the challenges that affective computing and social HRI pose to the machine learning field and identify the advantages and disadvantages of different approaches to address those issues.

Content:
Emotion theory:
- What is affect, emotion, mood?;
- Why do we have emotions?;
- Neurological and psychological perspectives;
- How do humans express and recognise emotions?;
- Emotion expression models, appraisal theories;
- Affective and social interaction;

Affective computing:
definition;
aims and current challenges;
applications; Emotion Recognition:
How to select and use sensors for data collection;
How to build an automatic emotion recognition system from: single modality: facial expressions, body expressions, touch expressions, voice, biosignals and multimodal fusion;

Introduction to Physiological computing:
key concepts (physiological sensing, affect recognition, biofeedback);
how to build low-cost physiological computing systems (e.g. emergent wearable devices, low-cost cameras).
types of affect-related physiological signals and how to obtain features (cardiovascular, respiratory, perspiratory etc).

Human-Robot Interaction (HRI):
Social robotics: motivation and emotions in robots;
Emotion based architecture;
Ethical issues in Affective Computing and HRI research;

Requisites:
In order to be eligible to select this module, a student must be registered on a programme for which it is a formally-approved option or elective choice AND must have (i) some machine learning background, for example from COMP0078, COMP0088, and COMP0090; (ii) some programming skills (for example, Python, Matlab, Java, C, C++).
There is no imposed programming platform.
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Affective computing:

Key information

Year 2019/20
Credit value 15 (150 study hours)
Delivery UGM L7, Campus-based
Reading List View on UCL website
Tutor Prof Nadia Berthouze
Term Term 2
Timetable View on UCL website

Assessment

Report: 40%
Report: 60%

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