Affective Computing
ATCM State-of-the-Art
Theoretical Presentation

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“Emotion” was been studied by psychologists since the 19 century (James (1884))

Artificial Intelligence area:
- came with the idea of the possibility to understand people and bring emotions to the systems
- computer programs designed to recognise what users are experiencing
Affective Computing

“Affective Computing” was established in 1997 by Rosalind Picard (Picard (1997)).

Since then...

several branches/modifications were created

Interdisciplinary field spanning:

- computer sciences
- psychology
- cognitive science
- among others
Affective Computing

- **Computer science** believes that the human intelligence can be described to the point that it can be simulated by a machine.

- **Aims to** design AI programs capable of:
  - recognise
  - respond
  - interpret and simulate human emotional states
  - ultimate goal is simulating empathy

- Although **machines do not feel emotion**, they must be able to express and interpret emotions to interact better with us.
Emotion Theories

- Emotions in humans are complex and must be studied interdisciplinary.

- Word “emotion” has no unique and clear meaning.

- Emotions can be distinguished as:
  - primary
  - secondary
  - mixed
Emotion Theories
Primary, Secondary and Mixed Emotions

- **Primary**
  - involves physiological reactions, e.g., related to fleeing, attacking, freezing, etc.
  - sensors measuring physiological changes, e.g., facial expression and posture, can detect primary emotions

- **Secondary**
  - semantically rich affective states generated by cognitive processes
  - reactions from primary emotion
    - for example “feel” – “a flush of embarrassment” and “growing tension”

- **Mixed**
  - e.g., jealousy and guilt at feeling jealous – coexisting emotions
“I just had a car accident”

- does not contain any emotional keyword, but contains affective information

- a person that just had a car accident is certainly not happy, and most probably sad or even frightened

- emotional content in text need to be extracted by using common-sense knowledge
It has been created methods to estimate positive or negative sentiment.

State of the art in sentiment has been studied at three different levels:

- Turney (2002) - words
- Kim and Hovy (2006) - sentences
The role of emotions in cognitive processes is essential for planning or decision-making.

Question is:
   “Why do not agents take similar advantages from emotion?”

Affective artificial emotions field is in an initial phase...

The existing approaches can be organised into three main groups:
   - systems that recognise emotions
   - systems that express emotions
   - systems that generate emotions
Affective states of end users (in any stage of the interaction chain) can be detected in two ways:

- **explicitly**
  - it is an intrusive process that breaks the interaction process
  - more accurate

- **implicitly**
  - well suited for user interaction purposes since the user is not conscious of it
  - less accurate
The most relevant information for the user may not only depend on his preferences, but also in his context.

The very same content can be relevant to a user in a particular context, and completely irrelevant in a different one.

It is accepted that context can change the state for an item to be recommended, i.e., user mood can change and that is why it is a context of the user.
Some authors suggest to use affective labels for tagging the content by using unobtrusive emotion detection techniques (Vinciarelli et al. (2009))

However, RS based on affective user modelling are still in a early stage
Japanese develop ‘female’ android
AC is considered one fascinating new area of research emerging in computer science.

AC is concerned with the theory and construction of machines which can detect, respond to, and simulate human emotional states.

Requires a broad multidisciplinary background knowledge.

The book “Affective Computing” by Rosalind Picard (Picard (1997)) is considered a good start point, however best literature on this topic has yet to be written.


