Emotion elicitation in socially intelligent services: the intelligent typing tutor study case

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Research question

- Is emotion elicitation using emoticon-like graphics feasible?
- How effective is it: from UI against other sources?

- Answers:
  - Yes
  - Effective to some extent

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Scope: socially intelligent applications

- What are socially intelligent applications?

- Emotion elicitation closes the loop!
Service/application: Touch typing tutor

- Test application: Touch typing tutor
- Touch typing tutor is **socially intelligent**: to improve learner’s sessions (more effective, less tedious)
  - Continuous human-machine communication
  - Capable to express emotions
  - Computational model of emotions is based on the Positive reinforcement assumption and learner’s attention estimation
  - Event driven model
Emotion elicitation model

- Emotion model: VAD, we model only V and A
- The model:
  - Linear model, independent for valence and arousal
  - No memory model

\[
\Phi_{uV} = \beta_{1V} \Phi_m + \beta_0V + \epsilon_V, \quad \Phi_{uA} = \beta_{1A} \Phi_m + \beta_0A + \epsilon_A
\]

- Effectiveness of elicitation: part of the explained variance \( R^2 \)
- When it occurs: \( H_0 = [R^2 = 0] \) is rejected.

- Why so simple model?
  - Linear versus non-linear: statistical power of fitting over nonlinearity
  - No memory model: to grasp the main effect
Experiment: touch typing lessons

- 32 female learners, students
- Average session duration is 17 minutes.
- Case study: only 5 users were analyzed on the 5 min. session subinterval
- Timeline:
  - Typing session
  - Sound distraction
  - Typing session (cont.)
  - Cognitive distraction
  - Typing session (cont.)
  - Self-report questionnaires
Results: time plots of valence and arousal

- Valence and arousal through time for the selected learner
- Between-learner comparison is difficult as each session is event driven and the individual session timelines are not comparable
Results: when is the elicitation on?

- P-values and risk level

**P-values: valence**

**P-values: arousal**

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Results: the efficiency of emotion elicitation (1)

- Part of the explained variance

\[
R^2 : \text{valence}
\]

\[
R^2 : \text{arousal}
\]
Results: the efficiency of emotion elicitation (2)

- A percentage q of times when the elicitation was on

<table>
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<tr>
<th>User id</th>
<th>Arousal</th>
<th>Arousal</th>
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<tr>
<td></td>
<td>q %</td>
<td>Red. q %</td>
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<tr>
<td>1</td>
<td>47.7</td>
<td>45.3</td>
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<td>2</td>
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<td>65</td>
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<tr>
<td>3</td>
<td>60</td>
<td>57</td>
</tr>
<tr>
<td>4</td>
<td>51.6</td>
<td>49.1</td>
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<td>5</td>
<td>62.3</td>
<td>59.4</td>
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Results: the efficiency of emotion elicitation (3)

- An average part of the explained variance $R^2$
- Due to the human emotion measurement noise, reported values are lower bounds

<table>
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<tr>
<th>User Id</th>
<th>Arousal All int.</th>
<th>Arousal Sig. int.</th>
<th>Arousal All int.</th>
<th>Arousal Sig. int.</th>
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Discussion

- Emotion elicitation, using emoticon-like graphic elements integrated into a GUI, can be effective to some extent.
- Human emotion measurement noise: it seems high.
- Emotion “expressionability” is an important factor: socially intelligent services will have to take it into account.
- The dynamics of emoticon-like inductor was not taken into account.
Future work and take away notes

- **Future work**
  - Elicitation model using memory: regression on time series
  - Emotion elicitation convolution kernel: to model the process of elicitation \( \rightarrow \) elicitation delay, the impact rate of change
  - Elicitation dynamics: how the elicitation goes on and off
  - Investigate emotion elicitation together with other modalities used in computer mediated communication
  - Investigate elicitation and personality

  - Public test set: physiological measurement, context, distractors, emotion elicitation, user responses

- **Take away notes**
  - Elicitation is effective to some extent
  - The elicitation goes on and off

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