Automatic identification of emotions and their causes in texts

Gustave Cortal\textsuperscript{1}, Alain Finkel\textsuperscript{1,4}, Patrick Paroubek\textsuperscript{2}, Lina Ye\textsuperscript{3}

\textsuperscript{1} Université Paris-Saclay, ENS Paris-Saclay, CNRS, LMF
\textsuperscript{2} Université Paris-Saclay, CNRS, LISN
\textsuperscript{3} Université Paris-Saclay, ENS Paris-Saclay, CNRS, CentraleSupélec
\textsuperscript{4} Institut Universitaire de France, France
Summary

1. Sentiment and emotion analysis

2. Cognitive Analysis of Emotions

3. Corpus composed of written emotion episodes

4. Emotion prediction based on its components

5. Semantic role labeling for emotions inspired by psychology theories
Natural language processing meets psychological theories of emotion
Sentiment and emotion analysis in text

“Gustave loves carnivorous plants because they are beautiful” → joy

Limitations [9]

▶ Annotated corpora are mostly small and limited to a few domains and languages.

▶ Often simplified as a sentence-level classification problem → Solution: Structured Sentiment and Emotion Analysis.

Cognitive Analysis of Emotions

- It studies how emotions appear in a written emotion episode.
- It helps people improve their emotion management.


Gustave Cortal et al. “Natural Language Processing for Cognitive Analysis of Emotions”. In: *Semantics, Memory, and Emotion 2022*. Paris, France, Sept. 2022. URL: https://hal.inria.fr/hal-03805702
Corpus composed of written emotion episodes

Emotion as a multicomponent process (Scherer, 2005)

<table>
<thead>
<tr>
<th>Component</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEHAVIOR</td>
<td>I’m teaching a lecture hall class on a Friday morning at 8:30. A student goes out and comes back a few moments later with a coffee in his hand.</td>
</tr>
<tr>
<td>FEELING</td>
<td>My heart compresses, and I freeze, waiting to know how to act.</td>
</tr>
<tr>
<td>THINKING</td>
<td>I think this student is overreacting and disrupting my class.</td>
</tr>
<tr>
<td>TERRITORY</td>
<td>The student attacks my ability to be respected in class and my recognition.</td>
</tr>
</tbody>
</table>

Table: Example of a written emotion episode structured according to the components. The author identified that he was angry.
Emotion prediction based on its components

To what extent a component influence the prediction of discrete emotion? Is the contribution of the components to the performance improvement equal or unequal? Does taking into account all the components lead to the best performance?

<table>
<thead>
<tr>
<th>Component</th>
<th>Model</th>
<th>Accuracy</th>
<th>Recall</th>
<th>$F_1$ score</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>RL</td>
<td>71.2 ± 2.6</td>
<td>69.1 ± 2.2</td>
<td>67.8 ± 2.3</td>
</tr>
<tr>
<td>All</td>
<td>DCBERT</td>
<td>85.1</td>
<td>84.8</td>
<td>84.7</td>
</tr>
<tr>
<td>Without BEHAVIOR</td>
<td>RL</td>
<td>77.4 ± 2.3</td>
<td>75.8 ± 2.4</td>
<td>74.5 ± 2.6</td>
</tr>
<tr>
<td>Without BEHAVIOR</td>
<td>DCBERT</td>
<td>80.3</td>
<td>79.8</td>
<td>79.7</td>
</tr>
<tr>
<td>Without FEELING</td>
<td>RL</td>
<td>64.3 ± 1.9</td>
<td>61.5 ± 1.2</td>
<td>61.3 ± 2.2</td>
</tr>
<tr>
<td>Without FEELING</td>
<td>DCBERT</td>
<td>81.6</td>
<td>79.8</td>
<td>79.9</td>
</tr>
<tr>
<td>Without THINKING</td>
<td>RL</td>
<td>70.9 ± 1.8</td>
<td>69.1 ± 2.0</td>
<td>68.3 ± 2.2</td>
</tr>
<tr>
<td>Without THINKING</td>
<td>DCBERT</td>
<td>79.6</td>
<td>78.5</td>
<td>78.7</td>
</tr>
<tr>
<td>Without TERRITORY</td>
<td>RL</td>
<td>64.3 ± 4.1</td>
<td>64.5 ± 2.4</td>
<td>62.3 ± 2.8</td>
</tr>
<tr>
<td>Without TERRITORY</td>
<td>DCBERT</td>
<td>78.7</td>
<td>78.5</td>
<td>78.6</td>
</tr>
<tr>
<td>BEHAVIOR</td>
<td>RL</td>
<td>52.1 ± 3.5</td>
<td>54.6 ± 2.9</td>
<td>51.7 ± 2.9</td>
</tr>
<tr>
<td>BEHAVIOR</td>
<td>DCBERT</td>
<td>68.4</td>
<td>67.1</td>
<td>66.6</td>
</tr>
<tr>
<td>FEELING</td>
<td>RL</td>
<td>69.6 ± 1.5</td>
<td>68.9 ± 2.1</td>
<td>68.4 ± 2.0</td>
</tr>
<tr>
<td>FEELING</td>
<td>DCBERT</td>
<td>67.8</td>
<td>68.4</td>
<td>67.7</td>
</tr>
<tr>
<td>THINKING</td>
<td>RL</td>
<td>50.1 ± 3.4</td>
<td>53.8 ± 2.3</td>
<td>50.6 ± 2.7</td>
</tr>
<tr>
<td>THINKING</td>
<td>DCBERT</td>
<td>70.5</td>
<td>70.1</td>
<td>70.1</td>
</tr>
<tr>
<td>TERRITORY</td>
<td>RL</td>
<td>68.2 ± 1.8</td>
<td>66.8 ± 2.2</td>
<td>66.6 ± 2.3</td>
</tr>
<tr>
<td>TERRITORY</td>
<td>DCBERT</td>
<td>71.4</td>
<td>68.4</td>
<td>68.9</td>
</tr>
</tbody>
</table>

**Table:** Scores ($\pm$ stdev) obtained from the linguistic realizations of the components for the prediction of discrete emotion. Logistic regression (LR) and DistilCamemBERT (DCBERT) [3] were trained.
Semantic role labeling for emotions

Annotation scheme (Campagnano, Conia, and Navigli, 2022)

- **CUE**: a marker indicating the presence of an emotion
- **EXPERIENCER**: an entity who feels an emotion
- **TARGET**: an entity targeted by an emotion
- **CAUSE**: an event that triggers an emotion

“Gustave loves carnivorous plants because they are beautiful” → Gustave (EXPERIENCER) exposes his love (CUE) towards carnivorous plants (TARGET) because they are beautiful (CAUSE).
Next step: Semantic role labeling for emotions inspired by psychological theories

Clarify and refine semantic roles

▶ **CUE**: can be **SUGGESTED** (“I just got my master’s degree”), **SAID** (“I’m angry”), or **SHOWN** (“Ah!”).
Expression modes of an emotion [8, 4].

▶ **TARGET**: an **ATTACKER** of a **TERRITORY**.
Cognitive analysis of emotions [5].

▶ **CAUSE**: an **EVENT** evaluated by an **EXPERIENCER** based on appraisal criteria (e.g., relevance, implication, coping, normative significance).
Appraisal theories [7, 6].
Conclusion and future works

Natural language processing for emotion analysis using psychological theories of emotion

▶ New French dataset for emotion analysis
▶ Emotion prediction based on linguistic realizations of emotion components
▶ (Soon) Semantic role labeling for emotions with a new annotation scheme

Contact: gcortal@ens-paris-saclay.fr
References


References III


References IV
