

Universität Stuttgart Institut für Maschinelle Sprachverarbeitung

Emotions are Events and Events trigger Emotions

Appraisal Theories for Emotion Classification in Text

DFKI, Berlin/Online

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Summary 00

Institute for Natural Language Processing



- Part of computer science department at Uni Stuttgart
- 3 full professors, 3 associate professors/lecturers, 2 independent research groups, 1 assistant professor
- Research across many areas of computational linguistics
- Computational Linguistics B. Sc. and M. Sc. programs
- Contribute to programs in Digital Humanities, Computer Science, Data Science

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Chair for Theoretical Computational Linguistics



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Current Ph.D. students and project staff



Felix Armbrust financial management



Laura Oberländer role labeling



Enrica Troiano emotion transfer



Amelie Wührl biomedical fact checking



Aswathy Velutharambath style transfer





Flor Miriam Plaza Del Arco zero shot learning

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Slides and Collaborators





https://www.romanklinger.de/ talks/Klinger-DFKI-2021-06.pdf

Felix Casel, Jan Hofmann, Amelie Heindl, Sebastian Padó, Kai Sassenberg

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Outline



Emotions and Emotion Analysis



Emotions are Events



Events trigger Emotions

Cognitive Appraisal Emotion Components



Summary, Critical Assessment, Future Work

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Emotion Examples

Which emotion is associated with each example? How did you recognize that?

- "She became angry."
- "A tear was running down his face."
- "We will go for a walk."
- "What was that?"
- "Sometimes I want to run away."
- "He raised his hand."

With this exercise, we discussed two things:

- What is an appropriate set of emotions? (what we do next)
- How are they expressed/recognized? (later today)

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Emotion Models – Basic Emotions

How to define a categorical system of emotions?

- Distinctive universal signals
- Presence in other primates
- Distinctive physiology
- Distinctive universals in antecedent events
- Coherence among emotional response
- Quick onset
- Brief duration
- Automatic appraisal
- Unbidden occurrence

Ekman (1992): An argument for basic emotions.



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Emotion Models – Basic Emotions

Are these categories structured?



Plutchik, R. (1980). A general psychoevolutionary theory of emotion.

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Emotion Models – Valence-Arousal Model of Affect

- Perhaps predefined emotion categories do not make sense?
- Perhaps mixtures and opposites do not make sense, but there are other ways to explain the relations between emotions?





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Emotion Analysis: What we want to do.



Interesting from different perspectives:

- Computational linguistics and modelling:
 - How to represent emotions as they occur in language?
- Psychology/Social sciences:
 - Better understand emotions and their effects
- Applications ranging from humanities, social sciences over pharmacovigilance to robotics and intelligent agents.

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Literary Studies: Kim et al., 2017



Kim et al., 2017. Investigating the Relationship between Literary Genres and Emotional Plot Development. Institut für Maschinelle Sprachverarbeitung. Universität Stuttgart Roman Klinger June 24, 2021

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Happiness in Art and Public: Dodds 2009



Dodds et al. 2009. Measuring the Happiness of Large-Scale Written Expression: Songs, Blogs, and Presidents.

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How do these emotion models help NLP?

- Ekman:
 - Serves as a categorical system for text classification.

Introduced the role of events and to study emotions based on observable characteristics (following ideas of Darwin).

- ٠
- Plutchik:
 - Serves as a categorical system for text classification.
 - Models have been proposed which build classifiers that consider the structure of the wheel. (e.g., Suttles/Ide (2013): Distant Supervision for Emotion Classification with Discrete Binary Values. CICLING.)
- Russel:
 - Serves as a basis for regression tasks.

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Emotions and Events

Emotions and Events are linked in (at least) two ways:

Emotions are events

- "Donald is happy about his birthday present."
- FrameNet Emotion Directed Frame:
 - Event: "happy"
 - Experiencer: "Donald"
 - Stimulus: "his birthday present"
 - ...
- ⇒ Motivated the task of emotion semantic role labeling (we'll talk about that now for a bit)

Events cause emotions

- "There is a car on fire."
 - Relevant event for the speaker, might cause fear.
 - Requires interpretation of events to infer possible emotions.
 - Little previous work
 - Udochukwu/He (2015), Shaikh et al. (2009), Balahur et al. (2011)
- (coming up next)

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Emotions are Events: Literature



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Emotions are Events: News



GoodNewsEveryone: A Corpus of News Headlines Annotated with Emotions, Semantic Roles, and Reader Perception

Laura Bostan, Evgeny Kim, Roman Klinger

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Emotion Semantic Role Labeling as Sequence Labeling

Example

$\begin{bmatrix} John \\ EXPERIENCER \end{bmatrix} \begin{bmatrix} hates \\ CUE \end{bmatrix} \begin{bmatrix} cars \\ TARGET \end{bmatrix} because they [pollute the environment]."$

Corpora

- Tweets with Cue, Stimulus, Experiencer, Target: Mohammad et al. (2014)
- Literature, with Cue, Stimulus, Experiencer, Target: Kim/Klinger (2018) with Stimuli: Gao et al. (2017)
- News headlines with Cue, Stimulus, Experiencer, Target: Bostan/Kim/Klinger (2020)
- Blogs with Stimuli: Ghazi et al. (2015)

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Emotion Stimulus Detection

Token Sequence Labeling vs. Clause Classification

| 0 | 0 | 0 | 0 | 0 | В | | I | 0 |
|------|-------------------|------------------|----------|--|---------|-----|-------------|---|
| John | hates | cars | because | they | pollute | the | environment | |
| [. | No Sti John ha | mulus tes car | s] [beca | Stimulus ause they pollute the environment. | | | | |

- Clause classification is standard formulation in Mandarin (Gui et al., 2017)
- We showed that token sequence labeling outperforms clause classification in English.
- Clauses are not the appropriate unit for stimuli in English.

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Token Sequence Labeling vs. Clause Classification for English Emotion Stimulus Detection

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Application Example: Automatic Relation Extraction for Network Analysis



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Knowledge of Emotion Roles helps Emotion Classification

We can tell a BERT classifier of emotion categories about the position of roles.



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Definition of emotions and their linguistic realizations

Emotion (Scherer, 2005)

Emotions are "an episode of interrelated, synchronized changes in the states of [...] five organismic subsystems in response to the evaluation of a [...] stimulus-event ..."



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Appraisal-based Emotion Classification



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Appraisal Annotation

Most probably, at the time when the event happened, the writer...

- ...wanted to devote further attention to the event.
- ...was certain about what was happening.
- ...had to expend mental or physical effort to deal with the situation.
- ...found that the event was pleasant. (Pleasantness)
 ...was responsible for the situation. (Responsibility)
 ...found that he/she was in control of the situation. (Control)
 ...found that the event could not have been changed/influenced by anyone. (Circumstance)
 (following concepts by Smith/Ellsworth, 1985)

(Attention) (Certainty)

(Effort)

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Corpus Selection



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Annotation Results



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Machine Learning Models



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Modelling Results

How well can we predict appraisal dimensions from text?



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Modelling Results





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Emotion Components



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Does Component Knowledge help Emotion Classification?

- Annotation of two corpora: TEC (Tweets) and REMAN (literature) for components
- Labels of TEC (one-of): anger, disgust, fear, joy, sadness, surprise
- Labels of REMAN (many-of):

anger, disgust, joy, sadness, fear, surprise, trust, anticipation, other, neutral

• 2041 Tweets, 1000 sentence triples from Project Gutenberg

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Does Component Knowledge help Emotion Classification?

Examples

Cognitive

- I can't stop.
- found my old lava lamp!

Bodily Reaction

- She did not know; she trembled.
- Apparently i might have alcohol poisoning. #stupidgirl

Subjective

- Woman-woman-I love thee!
- bad day

Motivation

- We're going out tonight.
- Sometimes I wanna take your head and ram it into mirrors.

Expression

- An expression of annoyance appeared on the emperor's face.
- Finals tomorrow... ugh

Corpus Statistics

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TEC/Twitter REMAN/Literature Cognitive Cognitive Subjective Physiological Subjective Physiological Expression Action Expression Action

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Machine Learning models



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How well can we predict components?



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Does Component Prediction help Emotion Categorization?



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Summary

- We presented the first work that combines
 - emotion component process model,
 - appraisal classification

with emotion classification

- Emotion component prediction helps to improve emotion classification
- Appraisal prediction has potential to improve emotion classification

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Check out our whole lecture on emotion analysis!



www.emotionanalysis.de

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Thank you for your attention. Questions? Remarks?



Thanks to

- Ph.D. Students
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 - Valentino Sabbatino



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