

Towards an Event-centric Interpretation of Emotions

Roman Klinger

February 8, 2021

Bibliography

Previous work on event-interpretation (Slide 10):

- M. A. M. Shaikh, H. Prendinger, and M. Ishizuka (2009). "A Linguistic Interpretation of the OCC Emotion Model for Affect Sensing from Text". In: *Affective Information Processing*. Ed. by J. Tao and T. Tan. London: Springer London, pp. 45–73. DOI: 10.1007/978-1-84800-306-4_4
- O. Udochukwu and Y. He (2015). "A Rule-Based Approach to Implicit Emotion Detection in Text". In: *Natural Language Processing and Information Systems*. Ed. by C. Biemann, S. Handschuh, A. Freitas, F. Mezziane, and E. Métais. Cham: Springer International Publishing, pp. 197–203. DOI: https://doi.org/10.1007/978-3-319-19581-0_17
- A. Balahur, J. M. Hermida, and A. Montoyo (2012). "Detecting implicit expressions of emotion in text: A comparative analysis". In: *Decision Support Systems* 53.4, pp. 742–753. DOI: 10.1016/j.dss.2012.05.024

Emotion role labeling and stimulus detection (Slide 10 ff.)

- D. Ghazi, D. Inkpen, and S. Szpakowicz (2015). "Detecting Emotion Stimuli in Emotion-Bearing Sentences". In: *Computational Linguistics and Intelligent Text Processing*. Ed. by A. Gelbukh. Cham: Springer International Publishing, pp. 152–165. DOI: 10.1007/978-3-319-18117-2_12
- S. Mohammad, X. Zhu, and J. Martin (June 2014). "Semantic Role Labeling of Emotions in Tweets". In: *Proceedings of the 5th Workshop on Computational Approaches to Subjectivity, Sentiment and Social Media Analysis*. Baltimore, Maryland: Association for Computational Linguistics, pp. 32–41. DOI: 10.3115/v1/W14-2607. URL: <https://www.aclweb.org/anthology/W14-2607>
- L. A. M. Bostan, E. Kim, and R. Klinger (2020). "GoodNewsEveryone: A Corpus of News Headlines Annotated with Emotions, Semantic Roles, and Reader Perception". In: *Proceedings of the 12th International Conference on Language Resources and Evaluation (LREC'20)*. Ed. by N. Calzolari, K. Choukri, et al. Marseille, France: European Language Resources Association (ELRA). URL: <https://www.aclweb.org/anthology/2020.lrec-1.194/>

- E. Kim and R. Klinger (2018). "Who Feels What and Why? Annotation of a Literature Corpus with Semantic Roles of Emotions". In: *Proceedings of the 27th International Conference on Computational Linguistics*. Santa Fe, New Mexico, USA: Association for Computational Linguistics, pp. 1345–1359. URL: <http://aclweb.org/anthology/C18-1114>
- Q. Gao, J. Hu, R. Xu, G. Lin, Y. He, Q. Lu, and K.-F. Wong (Dec. 2017). "Overview of NTCIR-13 ECA Task". In: *Proceedings of the 13th NTCIR Conference on Evaluation of Information Access Technologies*. Tokyo, Japan, pp. 361–366. URL: <http://research.nii.ac.jp/ntcir/workshop/OnlineProceedings13/pdf/ntcir/01-NTCIR13-0V-ECA-GaoQ.pdf>
- L. Gui, J. Hu, Y. He, R. Xu, L. Qin, and J. Du (2017). "A Question Answering Approach for Emotion Cause Extraction". In: *Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing*. Copenhagen, Denmark: Association for Computational Linguistics, pp. 1593–1602. URL: <http://aclweb.org/anthology/D17-1167>
- L. A. M. Oberländer and R. Klinger (Dec. 2020). "Token Sequence Labeling vs. Clause Classification for English Emotion Stimulus Detection". In: *Proceedings of the Ninth Joint Conference on Lexical and Computational Semantics*. Barcelona, Spain (Online): Association for Computational Linguistics, pp. 58–70. URL: <https://www.aclweb.org/anthology/2020.starsem-1.7>

Appraisal Theories, Formalization and Annotation (Slide 12 ff.)

- K. R. Scherer (2005). "What are emotions? And how can they be measured?" In: *Social Science Information* 44.4, pp. 695–729. DOI: 10.1177/0539018405058216
- C. A. Smith and P. C. Ellsworth (1985). "Patterns of cognitive appraisal in emotion". In: *Journal of Personality and Social Psychology* 48.4, pp. 813–838. DOI: 10.1037/0022-3514.48.4.813
- J. Hofmann, E. Troiano, K. Sassenberg, and R. Klinger (Dec. 2020). "Appraisal Theories for Emotion Classification in Text". In: *Proceedings of the 28th International Conference on Computational Linguistics*. Barcelona, Spain (Online): International Committee on Computational Linguistics, pp. 125–138. URL: <https://www.aclweb.org/anthology/2020.coling-main.11>
- E. Troiano, S. Padó, and R. Klinger (2019). "Crowdsourcing and Validating Event-focused Emotion Corpora for German and English". In: *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics*. Florence, Italy: Association for Computational Linguistics, pp. 4005–4011. URL: <https://www.aclweb.org/anthology/P19-1391>

Models for Text Classification (Slide 24 ff.)

- Y. Kim (Oct. 2014). "Convolutional Neural Networks for Sentence Classification". In: *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*. Doha, Qatar: Association for Computational Linguistics, pp. 1746–1751. DOI: 10.3115/v1/D14-1181. URL: <https://www.aclweb.org/anthology/D14-1181>
- Y. Liu, M. Ott, et al. (2019). *RoBERTa: A Robustly Optimized BERT Pretraining Approach*. arXiv: 1907.11692 [cs.CL]. URL: <https://arxiv.org/abs/1907.11692>


Future work (Slide 29)

- L. A. M. Oberländer, K. Reich, and R. Klinger (Dec. 2020). “Experiencers, Stimuli, or Targets: Which Semantic Roles Enable Machine Learning to Infer the Emotions?” In: *Proceedings of the Third Workshop on Computational Modeling of People’s Opinions, Personality, and Emotion’s in Social Media*. Barcelona, Spain (Online): Association for Computational Linguistics, pp. 119–128. URL: <https://www.aclweb.org/anthology/2020.peoples-1.12>

Universität Stuttgart
Institut für
Maschinelle Sprachverarbeitung

Towards an Event-centric Interpretation of Emotions

February 8, 2021
Roman Klinger
roman.klinger@ims.uni-stuttgart.de
@roman_klinger | romanklinger
http://www.romanklinger.de/



Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Slides, Bibliography, and Collaborators



https://www.romanklinger.de/IPHSE-Klinger.pdf



Evgeny Kim



Laura Oberländer



Enrica Troiano

Felix Casel, Jan Hofmann,
Amelie Heindl, Valentino Sabbatino

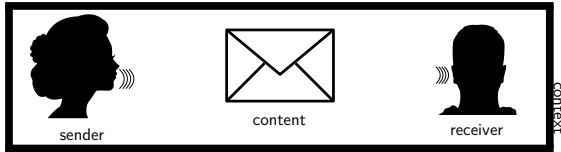
Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 2 / 31

Outline

- 1 Introduction
- 2 Emotion Analysis Motivation
- 3 Appraisal-based Emotion Interpretation
 - Emotion Components
 - Cognitive Appraisal
- 4 Outlook

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Introduction



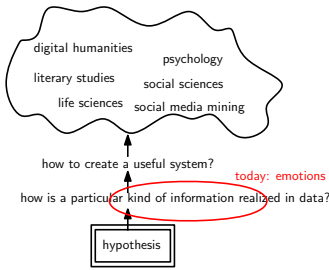
My research is about understanding and changing the message regarding ...:

- ...the content
- ...properties of the sender
- ...impact on the receiver
- ...impact of context
- ...the relation between sender and receiver

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 4 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Research Life Cycle



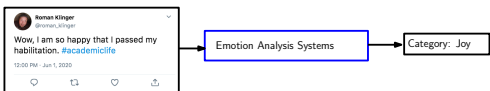
Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 5 / 31

Outline

- 1 Introduction
- 2 Emotion Analysis Motivation
- 3 Appraisal-based Emotion Interpretation
 - Emotion Components
 - Cognitive Appraisal
- 4 Outlook

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Emotion Analysis



Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 7 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Emotion Analysis

Interesting from different perspectives:

- **Computational linguistics:**
 - Challenging and not well explored how emotions are realized in languages.
 - State of the art: Transfer learning from pretrained contextualized representations
- **Computational modelling:**
 - Challenging classification and representation learning task
 - World knowledge might be required (shared-task systems often use dictionaries)
- **Psychology/Social sciences:**
 - Better understand emotions and their effects
- **Applications** ranging from humanities, social sciences over pharmacovigilance to robotics and intelligent agents.
- Is **Hate Speech** about **Anger**?

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 8 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Emotions and Emotion Analysis

Which emotion did the sender feel when writing a message?

Which emotion is expressed in the text? Towards whom? What caused the emotion?

Which emotion is the message likely to cause in the reader?

context

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 9 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

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 (happy to talk about in Q&A part)

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)
- (main part of today's talk, coming up next)

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 10 / 31

Outline

- 1 Introduction
- 2 Emotion Analysis Motivation
- 3 Appraisal-based Emotion Interpretation
 - Emotion Components
 - Cognitive Appraisal
- 4 Outlook

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Definition of emotions and their linguistic realizations

Emotion (Scherer, 2005)

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

Feeling: "I feel bad." Expression: "Uh, FU!!" Bodily symptom: He was trembling.

Cognitive Appraisal: "This situation is not in line with my goals." Action tendency: "Let's run away."

Ekman (1999) Plutchik (2001)

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 12 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Appraisal-based Emotion Classification

Emotion Analysis Systems → Category: Joy

Feeler: "I" Cue: "so happy" Cause: "passed my habilitation"

Report of subjective feeling Vocal Expression Event appraisal (No report of bodily symptoms, action tendencies)

Semantic Role Labeling

Pleasantness: High Expected Effort: Low Attention: Medium Responsibility: High Certainty: High Sit. Control: Low

Appraisals

Category: Joy

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 13 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

Emotion Components

Emotion Analysis Systems → Category: Joy

Feeler: "I" Cue: "so happy" Cause: "passed my habilitation"

Report of subjective feeling Vocal Expression Event appraisal (No report of bodily symptoms, action tendencies)

Semantic Role Labeling

Pleasantness: High Expected Effort: Low Attention: Medium Responsibility: High Certainty: High Sit. Control: Low

Appraisals

Category: Joy

A Multi-Task Learning-based Evaluation of the Usefulness of the Emotion Component Process Model for Emotion Recognition in Text

Felix Caelel, Amelie Heindl, and Roman Klinger
Institut für Maschinelle Sprachverarbeitung, University of Stuttgart
Pfaffenwaldring 5b, 70569 Stuttgart, Germany
{firstname.lastname}@ims.uni-stuttgart.de

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 14 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

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

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 15 / 31

Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

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

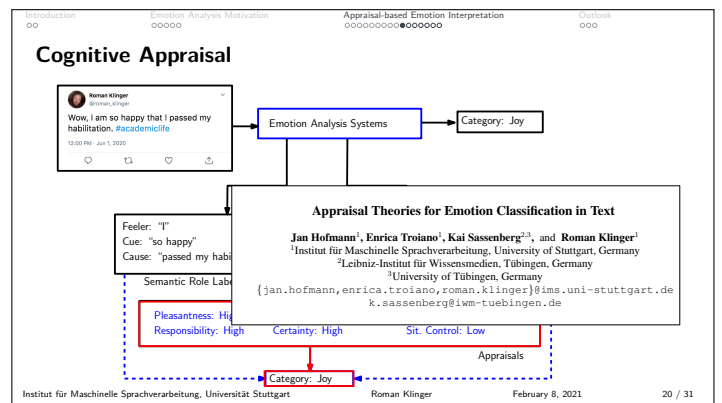
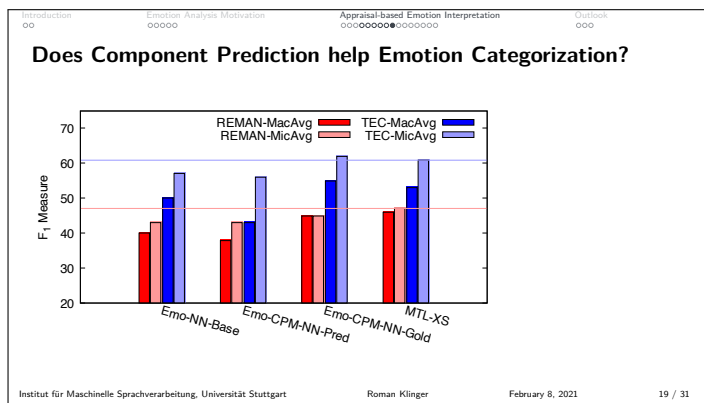
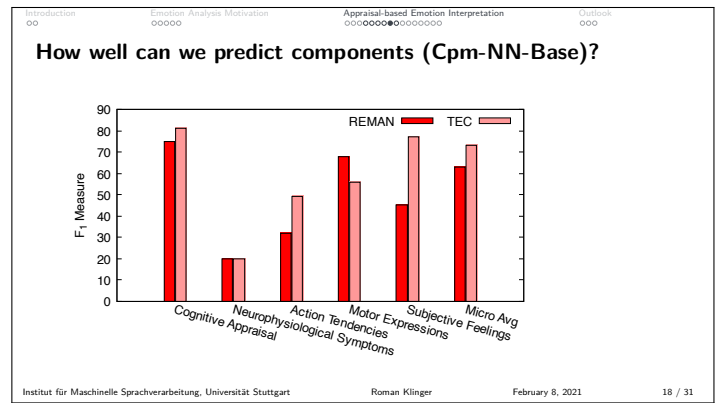
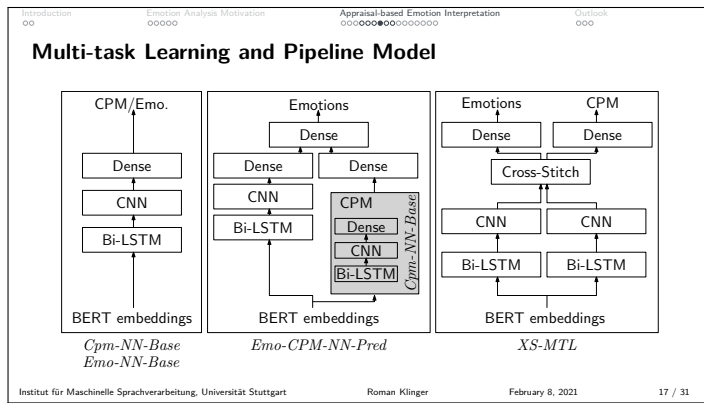
Motivation

- 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

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 16 / 31



Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000

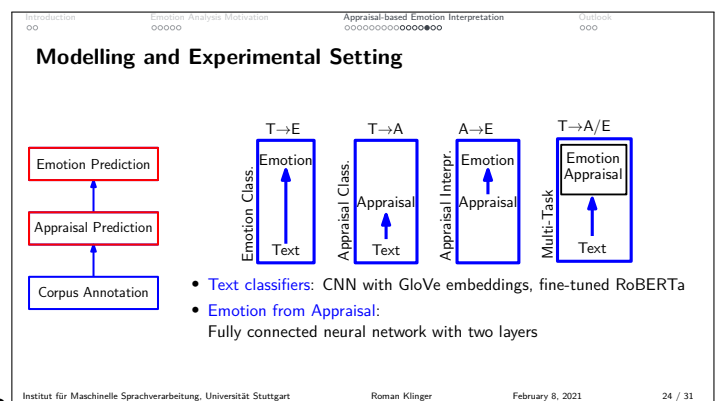
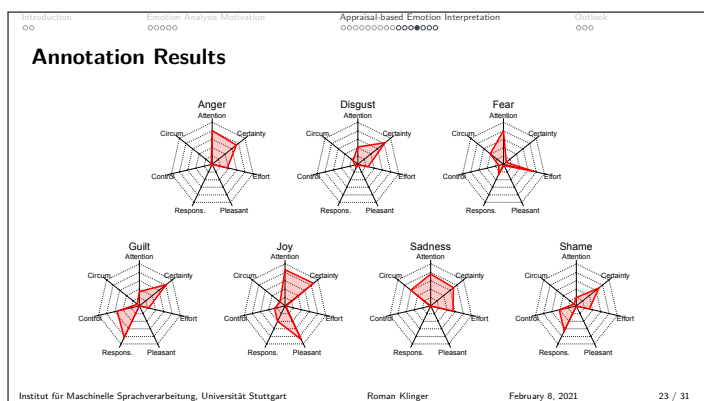
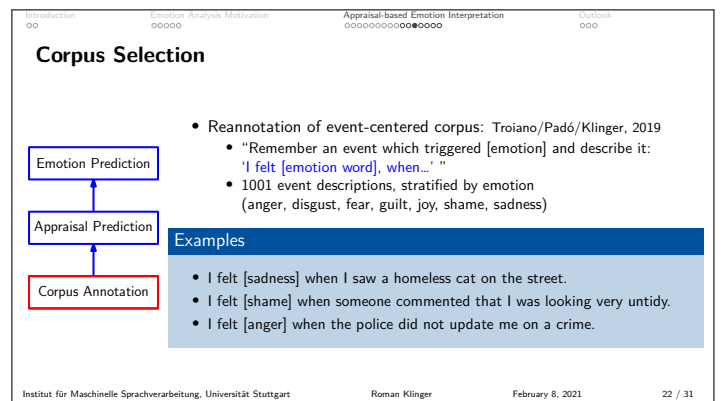
Appraisal Annotation

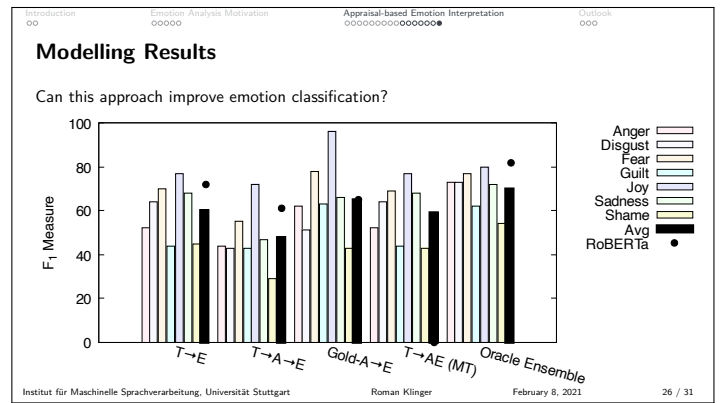
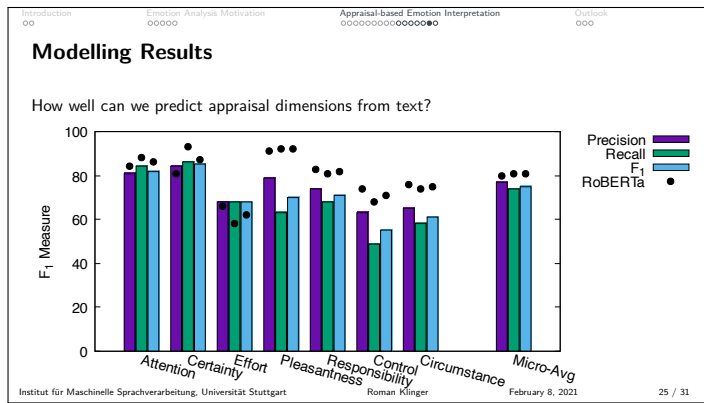
Most probably, at the time when the event happened, the writer...

- ...wanted to devote further attention to the event. (Attention)
- ...was certain about what was happening. (Certainty)
- ...had to expend mental or physical effort to deal with the situation. (Effort)
- ...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)

Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 21 / 31





Outline

- 1 Introduction
- 2 Emotion Analysis Motivation
- 3 Appraisal-based Emotion Interpretation
 - Emotion Components
 - Cognitive Appraisal
- 4 Outlook

- Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000
- ## 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
- Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 28 / 31

- Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000
- ## Outlook
- How to make appraisals help emotion classification? more data and other multi task learning methods (→ new DFG project)
 - Are the appraisal annotations meaningful? we study that by directly asking event experiencers (→ new DFG project)
 - Does knowledge of semantic role positions in text improve emotion classification? Yes, see Oberländer/Reich/Klinger (2020).
 - Can we exploit SRL information/stimulus together with appraisal? Maybe, that is a plan to investigate in the future.
 - Is text-only sufficient or do we need image information? It seems that mostly yes, but we look more into this.
- Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 29 / 31

- Introduction 00 Emotion Analysis Motivation 00000 Appraisal-based Emotion Interpretation 0000000000000000 Outlook 000
- ## Thanks to
- Ph.D. Students
 - Enrica Troiano
 - Evgeny Kim
 - Laura Oberländer née Bostan
 - Collaborators
 - Alexandra Balahur
 - Kai Sassenberg
 - Saif Mohammad
 - Sebastian Padó
 - Undergrads+Master Students
 - Amelie Heindl
 - Felix Casel
 - Jan Hofmann
 - Valentino Sabbatino
- Thank you for your attention.
Questions? Remarks?
- ?
- Institut für Maschinelle Sprachverarbeitung, Universität Stuttgart Roman Klinger February 8, 2021 30 / 31

Universität Stuttgart
Institut für
Maschinelle Sprachverarbeitung

Towards an Event-centric Interpretation of Emotions

February 8, 2021
Roman Klinger
roman.klinger@ims.uni-stuttgart.de

@roman_klinger in romanklinger
http://www.romanklinger.de/

IMS