Opinion Mining and Lexical Affect Sensing

Promotionsvortrag
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Outline

- Introduction
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- Studied approaches
  - Statistical
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  - Hybrid
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- Summary
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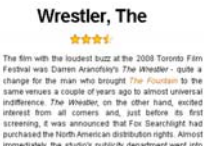
Opinion Mining

- Movie Review (long text) – www.reelviews.net


Wrestler, The

The film with the loudest buzz at the 2008 Toronto Film Festival was Darren Aronofsky's *The Wrestler* - quite a change for the man who brought *The Fountain* to the same venues a couple of years ago to almost universal indifference. *The Wrestler*, on the other hand, excited interest from all corners and, just before its first screening, it was announced that Fox Searchlight had purchased the North American distribution rights. Almost

- Grammatically correct text
- Definitely expressed opinion, but emotionally different words

Affect Recognition

- Natural-language utterances (short text)

- We have, Prudence.
- I'm okay.
- Erm, well, it's been reasonable day so far. Erm, bit boring, but, er, hopefully the day will pick up.

- Not always grammatically correct text
- Repetitions, repairs, fill words, incorrect wordings
- Text is important, but not everything

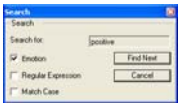
Challenges

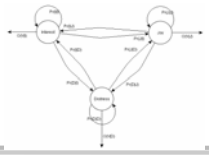
- Big variability in expression of emotions
  - Speaker- and autorspecific
  - Situationspecific
  - Genrespecific: movie reviews, chats, emals etc.
- Emotions are expressed not always clearly
  - Irony
  - Unterdrückte Emotions
  - Mixed Emotions
- Corpora are difficult to obtain
  - Many texts and talks don't contain emotions that are interesting for us
  - It is not always easy to Es ist nicht immer einfach, eine Grundwahrheit zu finden.

Challenges (Software)

According to taxonomy of applications using emotional awareness (Batliner et al., 2006):

- Recognition
- Simulation
- Modelling



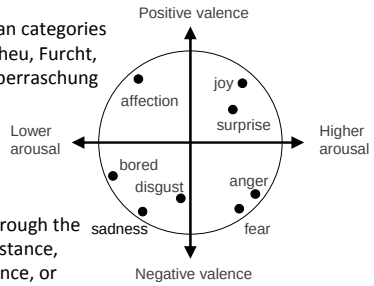


Challenges (Applications)

- **Opinion Mining**
  - Sort documents not according to the topic, but rather according to the opinion
- **Emotion recognition in call centers**
  - For choosing the appropriate dialogue strategy
  - Should the caller speak with a human operator?
- **Emotion recognition in a car**
  - Entertainment software considers the emotional state of the driver and her driving style

Emotion models

- **Discrete categories**
  - For instance, Ekman categories (1999): Wut, Abscheu, Furcht, Freude, Trauer, Überraschung

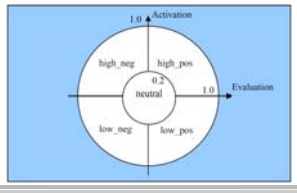


- **Continous emotions**
  - Representation through the dimensions (for instance, Erregung und valence, or Evaluation and activation)

Emotions in the thesis

negative ⟷ positive

Mapping of continious emotions onto discrete categories



Existing approaches

- Information classification
  - Statistical approach:
    - Movie reviews: [Pang et al., 2002] , [Pang, B., Lee, L. 2004]
    - Product reviews: [Dave et al., 2003]
    - Weblogs: [Riloff et al., 2006]
    - Articles from newspapers: [Diederich et al., 2000]
    - Conversation abstracts: [Mairesse F. et al., 2007]
  - Semantic approach:
    - Sentences from weblogs: [Neviarouskaya et al.,2007]
  - Acoustic approaches:
    - Berlin database, Danish corpus, SmartKom corpus: [Vogt et al., 2008]
  - **Lexical, stylometric, acoustic features**
  - **Emotion words, negations, intensifers**

→ No systematic combination of information

→ No study of multiple text genres

Research questions according to emotion recognition from speech

1. What linguistic features should be extracted for automatic opinion mining and how to evaluate them?
2. Datadriven or knowledge-based emotion recognition?
3. How could other modalities, for instance, acoustic information contribute to improvement of recognition rates?

Studied corpora

	Genre	Emotion classes	Data amount
Pang Movie Review	Movie reviews	Positive, negative	2000 movie reviews
Sensitive Artificial Listener (SAL)	Natural-language dialogues	Positive-aktive, negative-aktive, positiv-passive, negative-passive, neutral	574 Äußerungen
CwPR	Product reviews	1 – 5 stars	300 product reviews
BMRC	Movie reviews	0-4 stars in increment 0.5 stars	215 movie reviews
BMRC-S	English sentences	Positive-aktive, negative-aktive, positiv-passive, negative-passive, neutral	1010 sentences
Fifty Word Fiction (FWF)	English sentences	Positive, negative, unclassifiable	759 sentences

Main idea of the thesis

- No explicit rules for mapping texts onto emotions → Statistical Approach
  - Extract relevant features from texts and train classifiers
- Emotion recognition difficult without meaning consideration → Semantic Approach
  - Search for emotional patterns in relevant parts of sentences and map them onto emotions
- Combination of the semantic and the statistic approaches → Hybrid Approach
- Classification improvement through consideration of additional modalities → Fusion

Statistical approach

- **Learning phase**

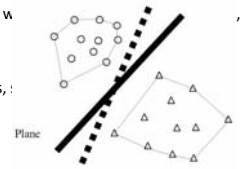
Learning data → (Preprocessing) → Feature extraktion/ Feature evalutation → Classifier training

- **Testing phase**

Testing data → Classification → Opinion

Statistical Approach (Dissertation)

- Corpora (2, 5, 5 and 9 classes)
- Features
  - Lexikalical features:
    - (Lemmatized) words in the frequency list, Whissell, BNC
  - Stylometric features:
    - Features such as statndard deviation of w digrams etc.
  - Deictic features:
    - Time and location references, pronouns,
  - Grammatical features:
    - Interjections, repetitions etc.
- Klassifizierung (SVM)



SAL results

Corpus/Features	*SAL*
Non-lemmatized word lists	**60.21%**
Lemmatized word lists	**59.6%**
Stylometrical features	**58.97%**
Deictic features	**59.65%**
Grammatical features	31.35%

- Best results: words, but their number is very big
- Word features are not known for every corpus in contrast to other feature groups

Semantic Approach

- Recognition of typical patterns in emotional utterances
  - Interjections: **Oh!** It is **disgusting**!
  - Repetitions: It is **very very expensive**!
  - Intensifiers: It is **very unplesant**!
  - Negations: No movie is **so good** as this one! vs. It is not a good movie.

Semantic Approach (Dissertation)

I am not happy.

→ Syntactic Analysis - Stanford Parser -

Output of Stanford Parser: (ROOT (S (NP (PRP I)) (VP (VBP am) (RB not) (ADJP (JJ happy))) (. .)))

→ Semantic Analysis - SPIN Parser-

Output of SPIN parser: Negation(not) EmotionalWord(happy) → EmotionalPhrase(semCat: low_neg)

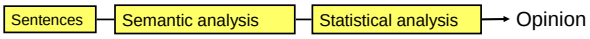
FWF results

Granularity	Strategy	R
Majority	First phrase	47.20
	Last phrase	**47.64**
	Average	45.92
Whole text	First phrase	45.41
	Last phrase	47.45
	Average	42.79
Subsentences	First phrase	47.20
	Last phrase	47.24
	Average	46.04
Phrases	First phrase	44.79
	Last phrase	45.21
	Average	44.22

Statistical approach: 37.20%

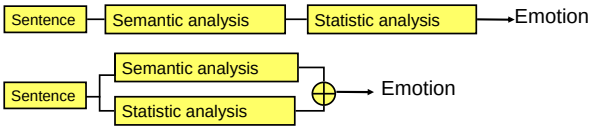
Hybrid Approach

- **Long texts**



Result ≈ double choice by chance

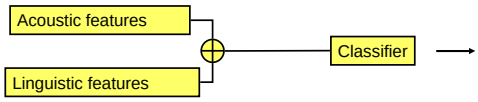
- **Short texts**



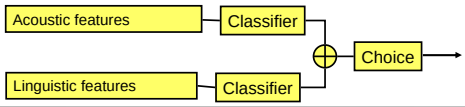
Result: better than statistic approach but worse than semantic approach

Fusion

- **Feature fusion**: combines features from different modalities



- **Deicision fusion**: makes choice of decisions of multiple classifiers



Fusion (Dissertation)

1. Corpus (additionally acoustic information)
2. Feature and Decision fusion
3. Visualization as tree

- Fusion is beneficial especially if no language context is considered.

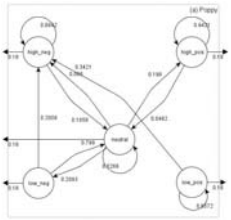
Contributions

- Comprehensive analysis of approaches to opinion mining and lexical affect sensing using different corpora → realization in a new software
- Extraction and evaluation of features to opinion mining and lexical affect sensing
- Differentiated semantic approach
- Implementation of introduced approaches in EmoText
- Hybrid approach
- Multimodal fusion

Outlook

1. New modalities
2. Application development
3. Combinated emotion and personality modeling

Big Five ↔



Dissertation defence

Thank you!