Emotion Patterns in Music Playlists

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First Project meeting

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Sentimental Analysis (SA)

Definition

Sentiment Analysis (SA) is the computational study of people's opinions, attitudes and emotions toward an entity.

Entity = individuals, events or topics.

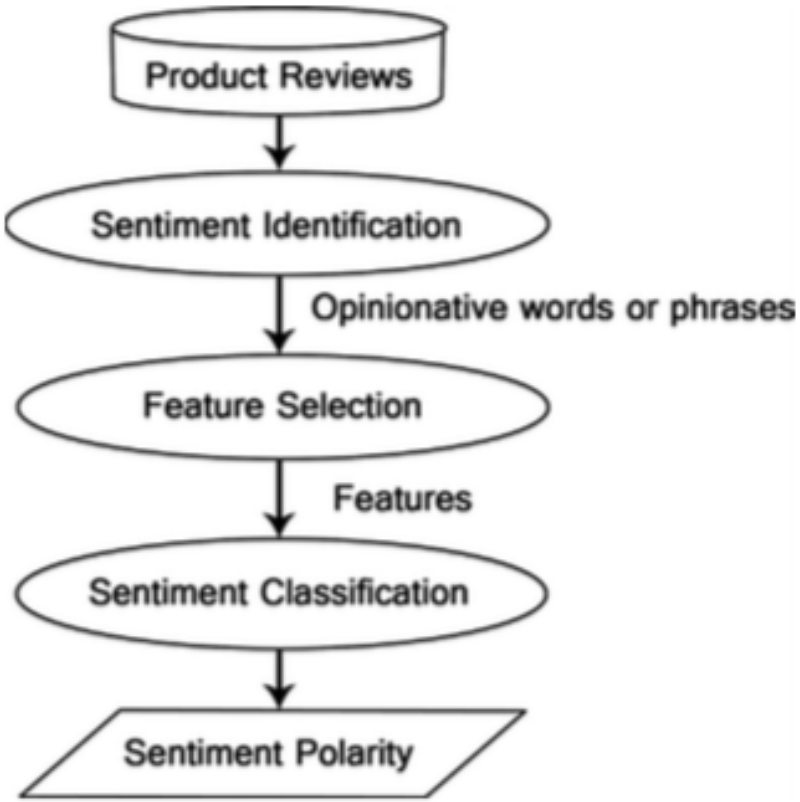

Figure 1: Sentiment analysis process on product reviews

Sentiment analysis: a classification problem

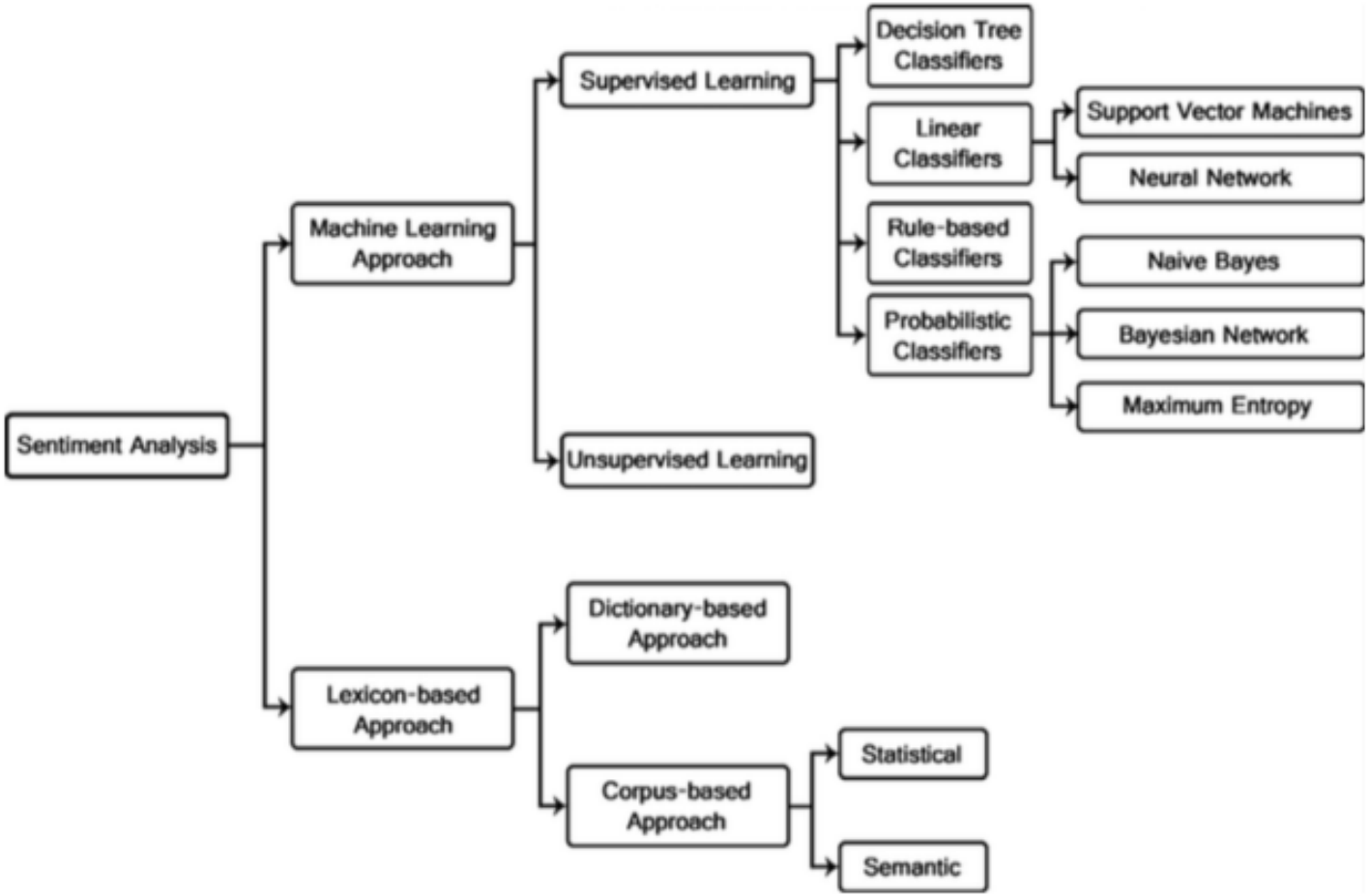

Figure 2: Sentiment classification techniques

Emotion Detection (ED)

Definition

Emotion detection is the process of identifying human emotions.

Remark

Emotion Detection (ED) is a SA task.

SA $\rightarrow$ detects positive or negative feeling from text.
ED $\rightarrow$ detects various emotions.

Emotion Detection: Why

Emotion detection has useful applications, such as:

- Measure citizens happiness
- Pervasive computing
- Understanding customers

Our goal

Unravel emotion patterns in the playlists

Emotion Detection: Challenges

(Some of the) Biggest challenges in ED:

- Context-dependence of emotions $\Rightarrow$ people use different emotion regulation strategies in different social contexts
- Word-sense disambiguation $\Rightarrow$ identifying which sense of a word (i.e. meaning) is used in a sentence, when the word has multiple meanings
- Co-reference resolution $\Rightarrow$ pronouns and other referring expressions must be connected to the right individuals
- Lack of labelled emotion database

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Methods for Emotion Detection

Methods used for text based emotion detection are:

1. Keyword Spotting
2. Lexical Affinity
3. Learning-based
4. Hybrid

1. Keyword spotting method

Finding occurrences of keywords from a given set. These words are classified into categories such as disgusted, sad, happy, angry, etc.

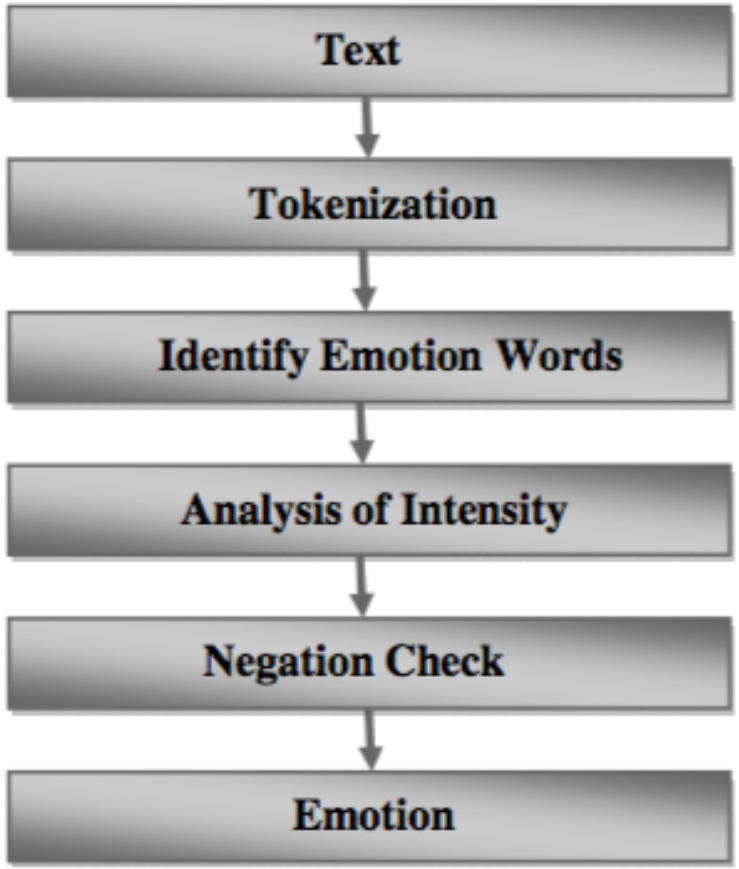

Figure 3: Keywork Spotting Technique

2. Lexical Affinity method

Is an extension of keyword spotting technique: apart from picking up emotional keywords it assigns probabilistic 'affinity' for a particular emotion to arbitrary words.
Disadvantages:

- assigned probabilities are biased toward corpus-specific genre of texts
- it misses out emotion content that resides deeper than the word-level

Example

"I avoided an accident"
"I met my girlfriend by accident"

3. Learning-based methods

Remark

FROM determine emotions TO classify the input texts into different emotions

Learning based methods try to detect emotions based on a previously trained classifier, which apply various theories of machine learning such as SVM.

Limitations

Major limitations:

- Ambiguity in keyword definition
- Incapability of recognizing sentences without keywords
- Lack of linguistic information
- Difficulties in determining emotion indicators

Example

"I passed my qualify exam today"
"Hooray! I passed my qualify exam today"

Example

"He laughed at me"
"I laughed at him"

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Feature Selection

Which textual features are we interested in?

- Terms presence and frequency
- Adjectives
- Opinion Words and Phrases
- Negation expressions

Classification Levels (I)

Three possible classification levels:

- Document Level
  - The whole document is the classification unit
- Sentence Level
  - Sentences are the basic classification units
- Aspect Level
  - Classify sentiments with respect to entities and their aspects

Classification Levels (II)

Document level classification suits our problem

- We will analyze lyrics
- Lyrics are (usually) small documents focused on a single topic
- We can treat lyrics as our classification unit

How many sentiments?

Human can have an enormous range of different sentiments and moods

- Anger
- Sadness
- Happiness
- Surprise
- Fear
- Disgust
- ... Which of them may be related to lyrics?

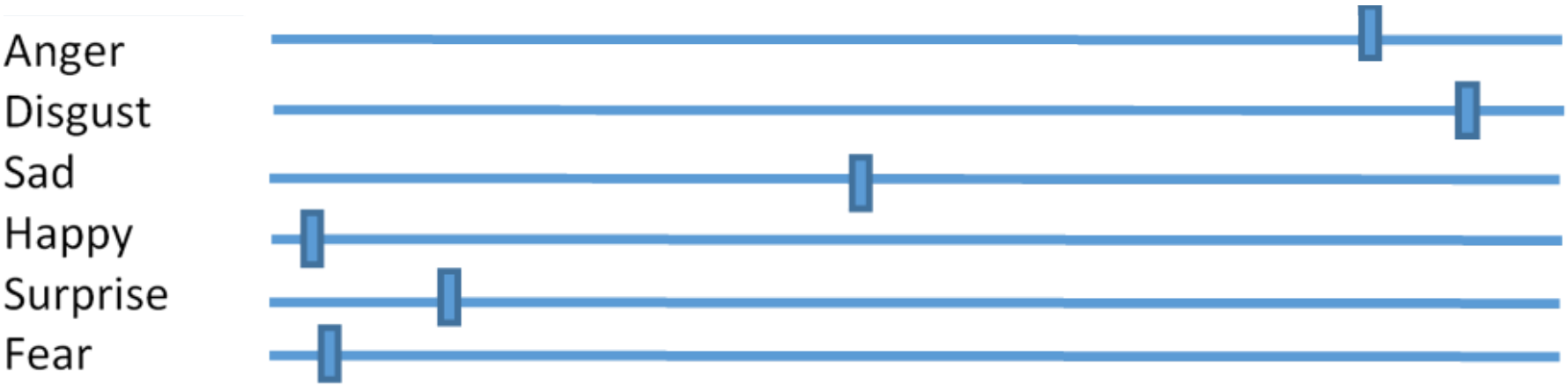
How to label them?

We may label lyrics to be exactly related to one mood/sentiment.

- Is it accurate?
- Is it possible that one song express more sentiments? $\rightarrow$ Sliders approach

The "sliders" approach

Assigning a value to each possible sentiment may be more flexible.

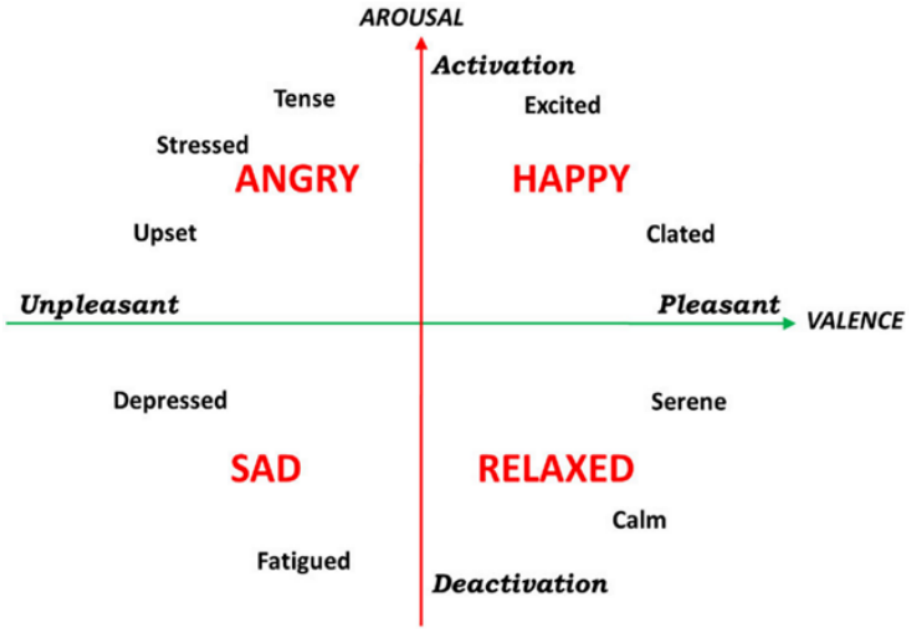


Do we really need this level of flexibility in our application?

Emotion Dimensions

Current systems tends to classify emotions according to two dimensions

- Arousal
- Valence



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Datasets

There are very few datasets which could suits our case

- MoodyLyrics is the most relevant example of that[1]
  - It uses only 4 emotions (Happy, Sad, Angry and Relaxed)
  - Is it enough?

[1] Look at the references for the releated article

What we learnt

- Defining the number of moods we want to consider is not an easy task but probably we don't need many of them because our analysis domain is restricted to songs
- The "sliders" approach is too general. Songs are usually linked with a single sentiment
- We should not overcomplicate our emotion range
- Using already annotated lyrics datasets could he helpful

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