02 – Opinion mining, sentiment analysis

IA161 Advanced Techniques of Natural Language Processing

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Opinion mining, sentiment analysis

So boring. I enjoyed the first book but this one really didn't work for me. The story, characters, and relationships all fell flat.

Lair of Dreams like everything else Miss Bray writes is mind-boggling. It's big. It's insanely atmospheric and it's creeptastic.

–goodreads.com

this book: boring
first book: enjoyed
this book: did not work
story: flat
characters: flat
relationships: flat

Lair of Dreams: mind-boggling
LoD: big
LoD: insanely atmospheric
LoD: creeptastic

Opinion mining, sentiment analysis

Opinion mining / sentiment analysis:

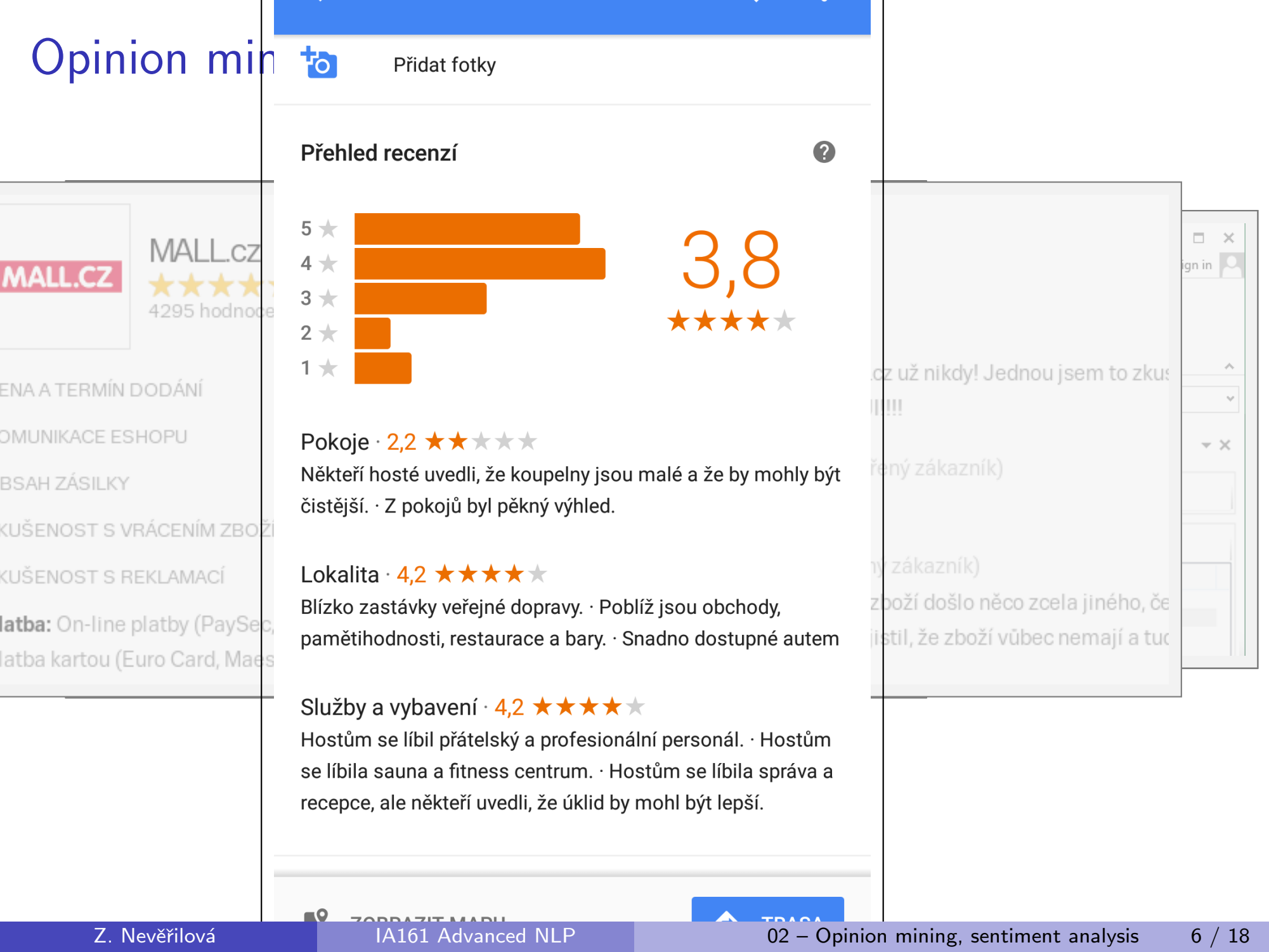
> *Given a set of subjective texts that express opinions about a certain object, the purpose is to extract those attributes (features) of the object that have been commented on in the given texts and to determine whether these texts are positive, negative or neutral. [Dinu and Iuga, 2012]*

Automatic opinion mining: why?

- many subjective texts exist
- mostly because of social media
  - people express their opinions in texts
  - one's opinions influence others' opinions
  - aggregation of opinions
- emotions make part of a decision process (see [Minsky, 2007])

"Opinions" are key influencers of our behaviors. [Liu, 2012]

Opinion min


Přidat fotky
Přehled recenzí
5
4
3
2
1
3,8
Pokoje · 2,2
Někteří hosté uvedli, že koupelny jsou malé a že by mohly být čistější. · Z pokojů byl pěkný výhled.
Lokalita · 4,2
Blízko zastávky veřejné dopravy. · Poblíž jsou obchody, pamětihodnosti, restaurace a bary. · Snadno dostupné autem
Služby a vybavení · 4,2
Hostům se líbil přátelský a profesionální personál. · Hostům se líbila sauna a fitness centrum. · Hostům se líbila správa a recepce, ale někteří uvedli, že úklid by mohl být lepší.

Opinion mining: related applications

- document sentiment classification:
  This document contains a lot of negative statements.
- sentence subjectivity classification:
  This sentence is objective.
- aspect-based opinion summarization/aggregation:
  Most customers of your company think that the communication is not good.
- mining comparative opinions:
  Many people think that iPhone is better than SG.
- utility or helpfulness of reviews:
  This review is useless.
- cross-lingual opinion mining

Problem definition

What is an opinion?

- an evaluating proposition: *Linux is great.*
- a comparative proposition: *Linux is better than Windows.*

An opinion is simply a positive or negative sentiment, view, attitude, emotion, or appraisal about an entity or an aspect of the entity from an opinion holder. [Liu, 2012]

entity *e* is a product, person, event, organization, or topic: iPhone, Madonna, Microsoft ...
aspect *a* (feature) is a component of *e* or attribute of *e*: battery, price, appearance, communication skills ...

Problem definition

opinion $= (e_j, a_{jk}, so_{ijkl}, h_i, t_l)$, where

- e_j is a target entity.
  named entity recognition
- a_{jk} is an aspect/feature of the entity e_j.
  information extraction
- so_{ijkl} is the sentiment value of the opinion from the opinion holder h_i on feature a_{jk} of entity e_j at time t_l.
  sentiment identification
- h_i is an opinion holder.
  information extraction
- t_l is the time when the opinion is expressed.
  information extraction

not just one problem
anaphora resolution + synonym matching

Problem definition

Generally, find structure in unstructured data (text)

- document level opinion mining: *The document is negative.*
- sentence level: *The sentence is negative.*
- object/entity and feature/aspect level: *iPhone is expensive.*

Classification task:

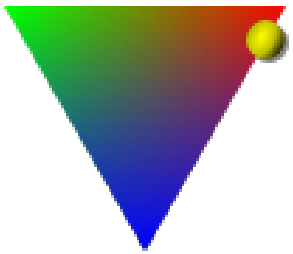
- 2-classes: positive/negative
- 3-classes: positive/negative/neutral
- 5-classes ...

A hard problem (sometimes)

- opinion mining in tweets is relatively easy (short texts, hashtags)
  usually 3-classes classification for each tweet
- opinion mining in reviews is harder but still the form contains aspects and the reviewer has to mark the review positive/negative
  usually 2-classes classification for each aspect (e.g. high price)
- opinion mining in discussions, comments, blogs is very hard

sentiment lexicon

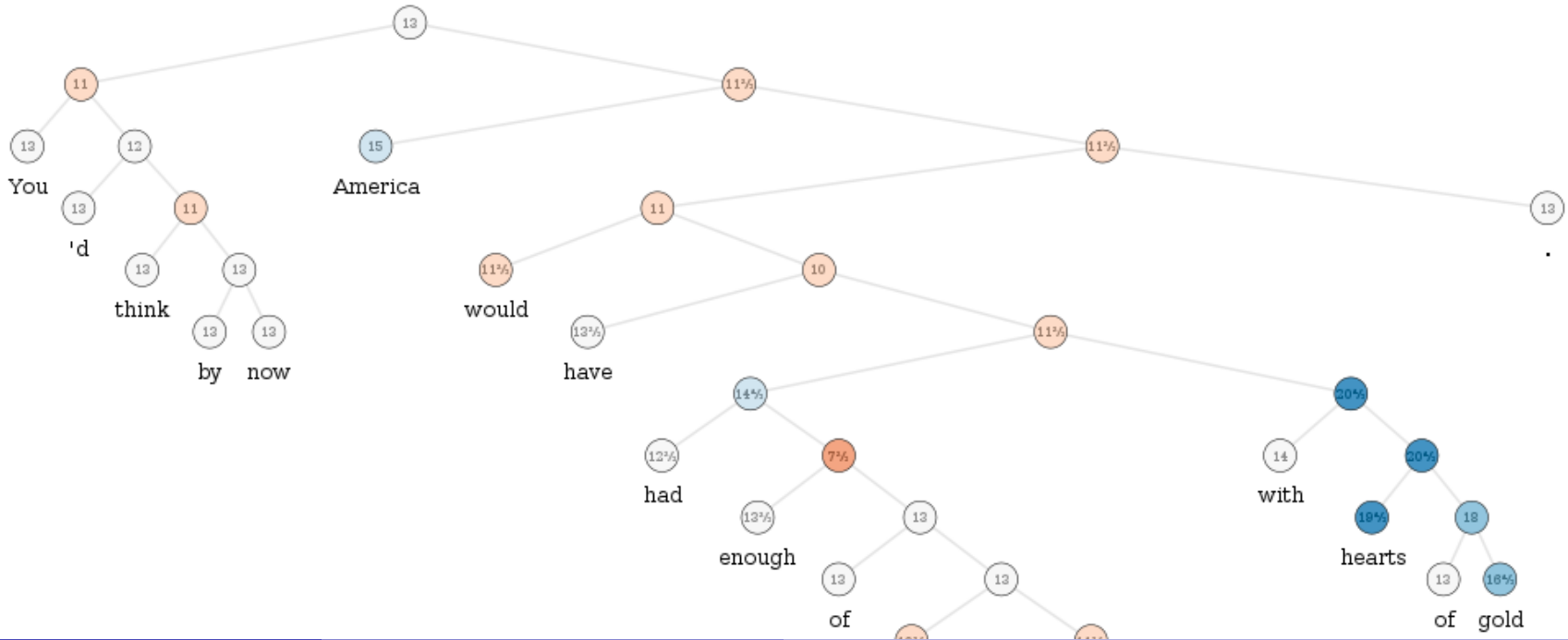
evaluative words: nice, cool, shit, bad...
SentiWordNet [Baccianella et al., 2010]



Positive: 0 Objective: 0.125 Negative: 0.875
blue = filled with melancholy and despondency

A hard problem (sometimes) II

evaluative word	aspect	sentiment
thin	phone	good
thin	steak	bad
high	value	good
high	price	bad
flat	story	bad
flat	phone	good



Opinion mining methods: supervised machine learning

1. get example data with labels
2. extract features from the data, i.e. convert the documents to feature vectors
3. train the parameters (choose an algorithm: SVM, Naive Bayes, Neural Networks . . .)
4. test the model

Opinion mining methods: supervised machine learning

[Dinu and Iuga, 2012] report best results on Naive-Bayes with tokens as features and bigrams as features
[Liu, 2012] reports best results with SVM on balanced (English) data

what features, feature extraction methods, training algorithm, parameters of training algorithm to use for Czech data?

let's see during the workshop

Opinion mining methods: state-of-the-art results

- OM on political tweets, [Maynard and Funk, 2012] report 78% precision and 47% recall
- on document level OM (movie reviews), [Richa Sharma and Jain, 2014] report 63% accuracy and 70% recall

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