SENTIMENT ANALYSIS

90 MIN WORKSHOP

Robin Rojowiec

https://www.linkedin.com/in/rojowiec/

robin.rojowiec@de.ibm.com

https://twitter.com/Robin_it_is

https://www.instagram.com/robinlphood/

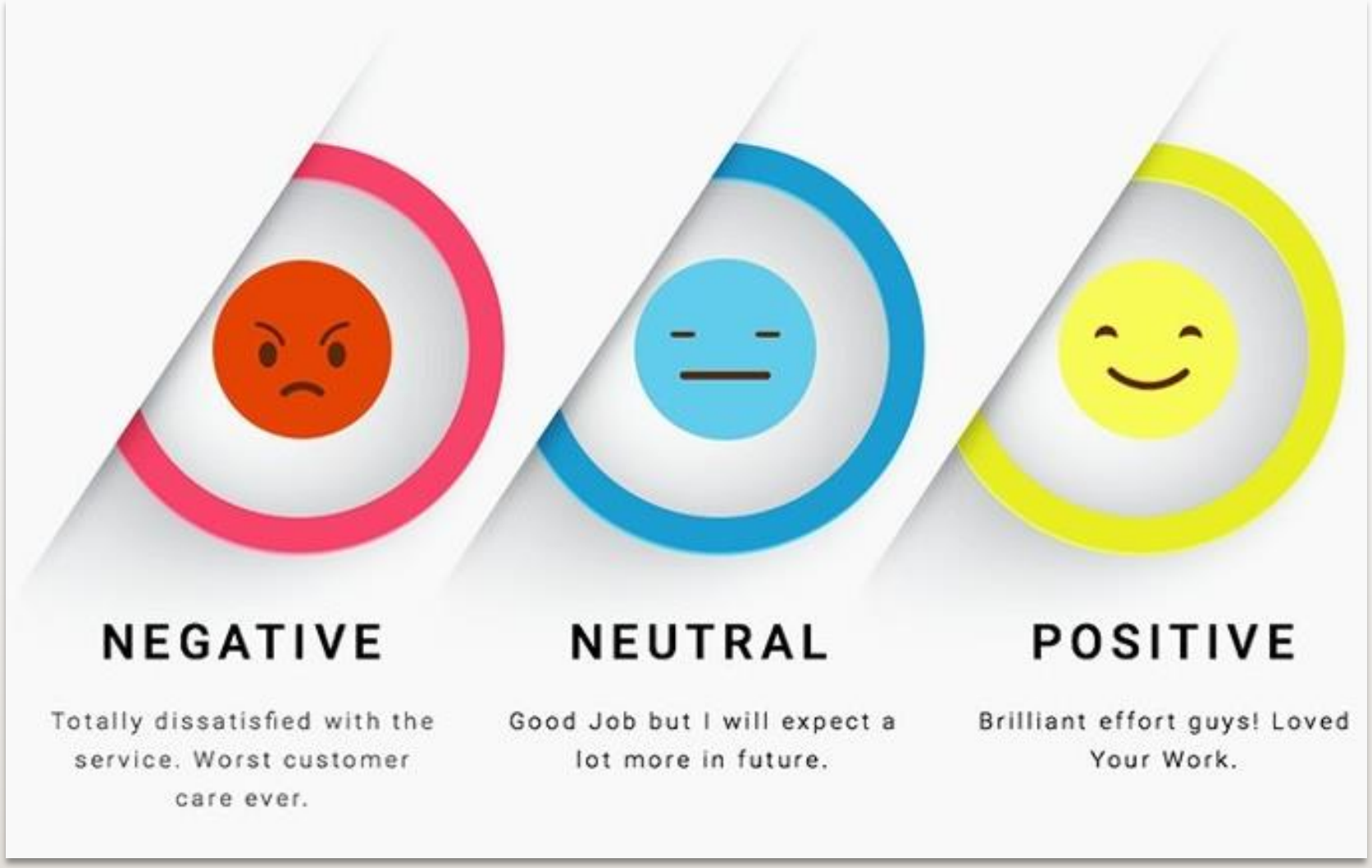
Cognitive Engineer,
IBM Watson and Cloud Platform

Computational Linguistics,
Master of Science (ongoing)

#nlp #ml #cognitive #Watson #linguistics #java
#climbing #drums #moredrums #coding #travel

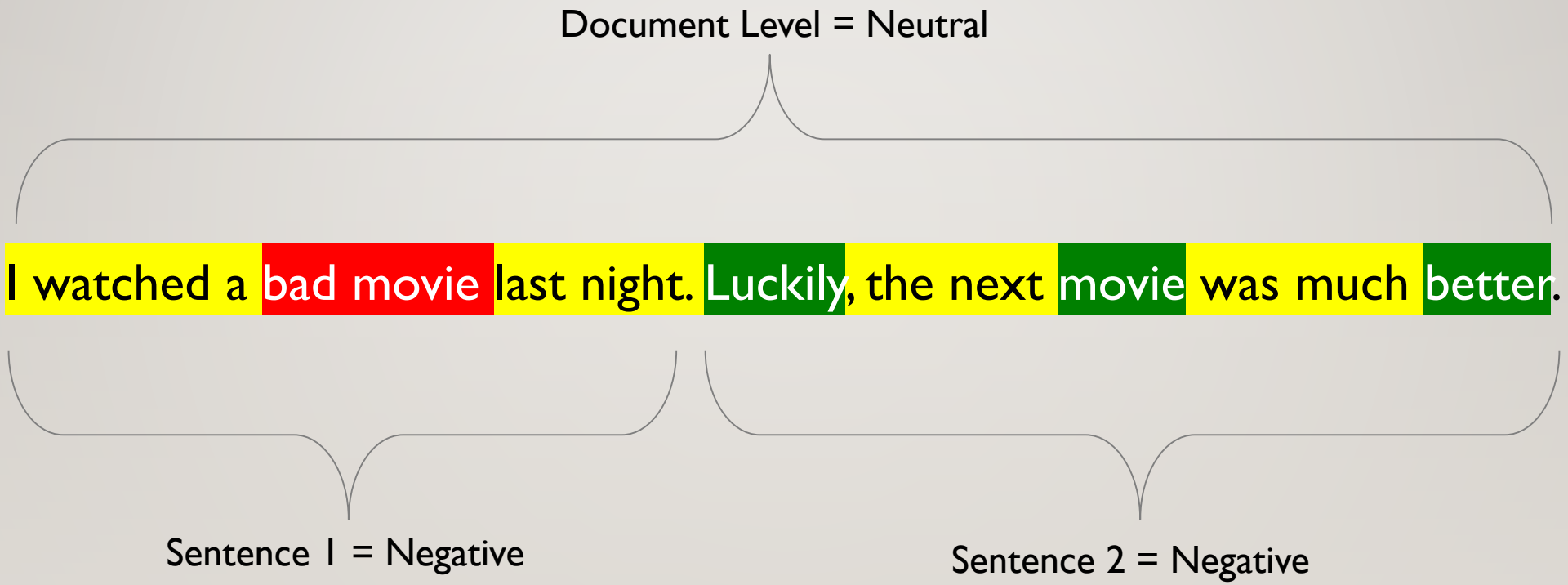
AGENDA

- Introduction 10 min
- Excercise 70 min
  - Task
  - Implementation
  - Testing and Improvements
- Conclusion 10 min



Quelle: https://www.kdnuggets.com/2018/03/5-things-sentiment-analysis-classification.html

SENTIMENT BASED ON WORDS



SENTIMENT BASED ON WORDS (ASPECTS)

I watched a bad movie last night. Luckily, the next movie was much better.

Movie: Negative

Movie: Positive


LIVE DEMO!
WHAT COULD GO WRONG?
memegenerator.net

EXERCISE

Task

WORD BASED BINARY SENTIMENT CLASSIFICTION

- Predict sentiment of unseen movie reviews
  - 25 000 reviews for training, equal split positive/negative

    (You can reduce the amount for training/test to speed up development)

- Calculate class probability, feature probability and the probability of each word belonging to each class
- Use logarithmus naturalis (ln) to avoid underflow
- discard unknown or zero-frequent tokens!

WORD BASED BINARY SENTIMENT CLASSIFICTION

Class Probability

$$P(Class \mid Document) = log\, P(Class) + \sum_{i=0}^{n} log\, p_{Word_i}$$

Word probability

$$P(Class \mid Word) = P(Word) + P(Word \mid Class)$$

WORD BASED BINARY SENTIMENT CLASSIFICTION STEPS

1) Load text files
2) Tokenize and remove stopwords
3) Calculate for each token:
    1) Number of occurences in the documents
    2) Number of occurences per class (positive/negative)
4) Write prediction function which normalizes the probabilites
5) Run test script and modify your code to improve results

(You should end up with around 70% accuracy)

WORD BASED BINARY SENTIMENT CLASSIFICTION BONUS

Bouns 1)

Calculate integrate the TF/IDF value (document frequency ratio to word frequency) to improve accuracy

Bonus 2)

Change granularity to sentence level or aspect-level (rule-based)

Bonus 3)

Try to improve performance with word bi- and trigrams as well as character bi- and trigrams

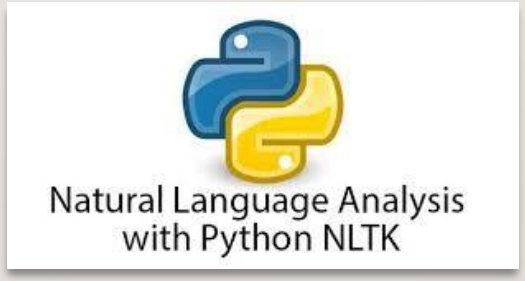
EXERCISE

Implementation

CONCLUSION

CONCLUSION

- ~ 70 % Accuracy => 7/10 Classifications are correct
- Simple Algorithm which uses probabilistic Properties
- Nice Excercise, in practice you would use on of these:



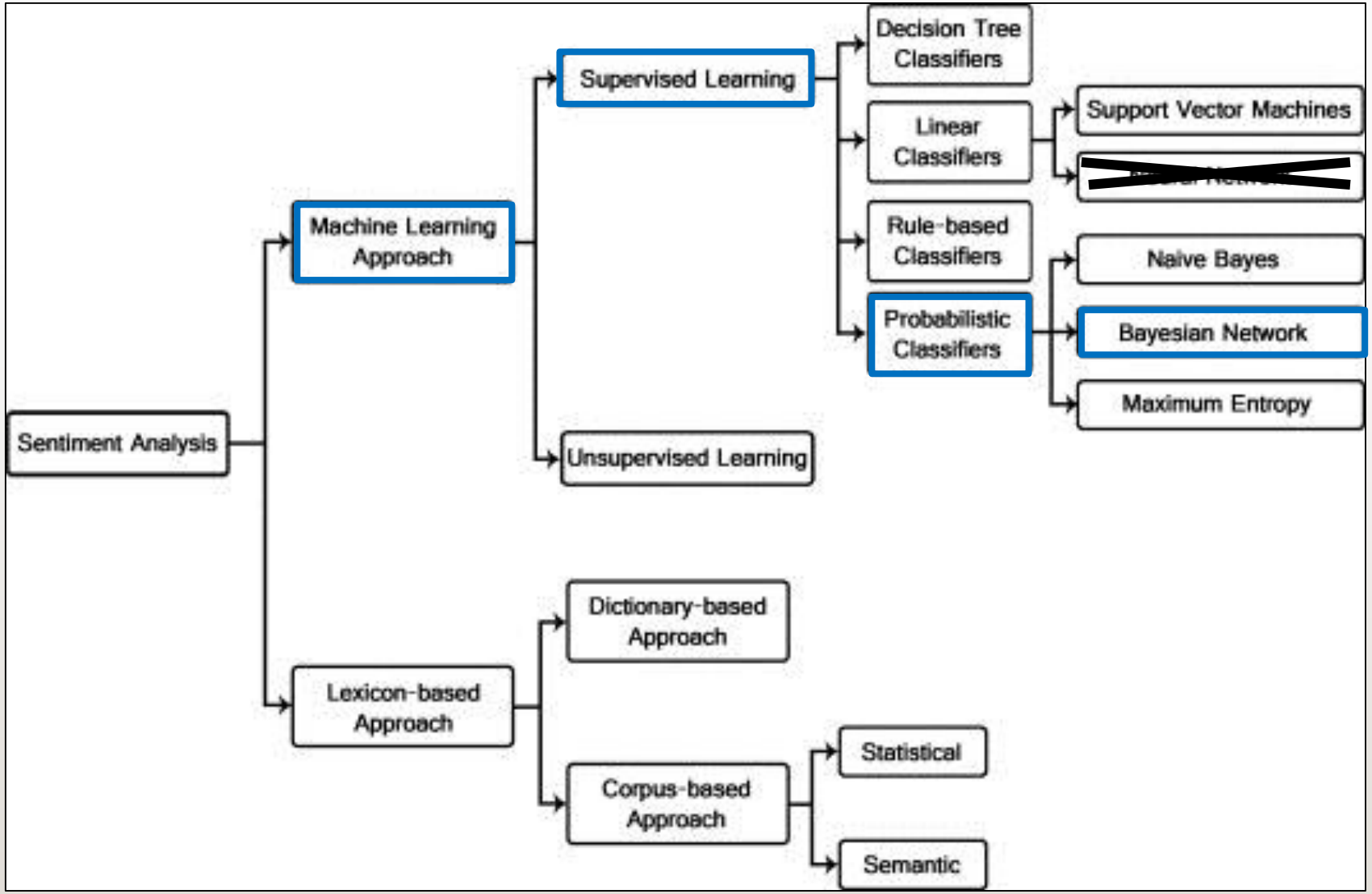
And many more!

FURTHER QUESTIONS ?

FEEDBACK

1. „I liked...“
2. „For future workshops it would be nice...“
3. „Overall the ... was very good“

BACKUP


Sentiment Analysis
Machine Learning Approach
Supervised Learning
Decision Tree Classifiers
Linear Classifiers
Support Vector Machines
[redacted]
Rule-based Classifiers
Probabilistic Classifiers
Naive Bayes
Bayesian Network
Maximum Entropy
Unsupervised Learning
Lexicon-based Approach
Dictionary-based Approach
Corpus-based Approach
Statistical
Semantic

PROBAIBILISTIC SENTIMENT CLASSIFICATION

- Word-based (Unigram, 1 Word = 1 Feature)
- Probability -> Frequency for xi / Frequency x
- Granularity:
  - Word-Level (Aspects)
  - Sentence-Level
  - Document-Level
- Unseen words:
  - Backoff / Laplace Smoothing
  - Discard words