



Aspect Oriented Sentiment Analysis in Software Engineering



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Abstract

Discussions of experienced software engineers in various social forums (e.g., Stack Overflow) become valuable information for other software engineers to perform software development activities. These discussions centered around software-specific entities (e.g., tools, libraries, and APIs) where software engineers provide their opinions on the various aspects (e.g., bug, performance, and security) of the entities. Such opinions are often embedded with sentiments (i.e., positive or negative) that play crucial roles to a considerable degree in the perceptions of other software engineers about those entities. That perceptions influence the decisions they make about whether and how they should use those entities for software development. However, given the plethora of information posted in unstructured formats in technical social forums, it is a challenging task for a software engineer to mine the opinions manually and make informed decisions about those entities. Here, we envision an automated software system that will mine the technical discussions from the unstructured content of social forums and generate opinions on the various aspects of the entities.

Influence of Opinion on Making Decisions

Examples of Opinion in Software Engineering (SE) Social Form

Opinion Mining Challenges

- Infinite amount of knowledge
- Highly unstructured data
- SE texts often deviate from stylistic, and grammatical conventions
- SE texts are often mixed with technical data (e.g., code snippets)

Detection of Entity

- S-NER
Ye et al. (SANER 2016)
- B-NER
Zhou et al. (ICPC 2018)
- Stanford NLP

Detection of Sentiment

- SentiStrength-SE
Islam & Zibran (MSR 2017)
- Senti4SD
Calefato et al. (ESE 2017)
- Senticr
Ahmed et al. (ASE 2017)
- MarValous
Islam & Zibran (SAC 2019)

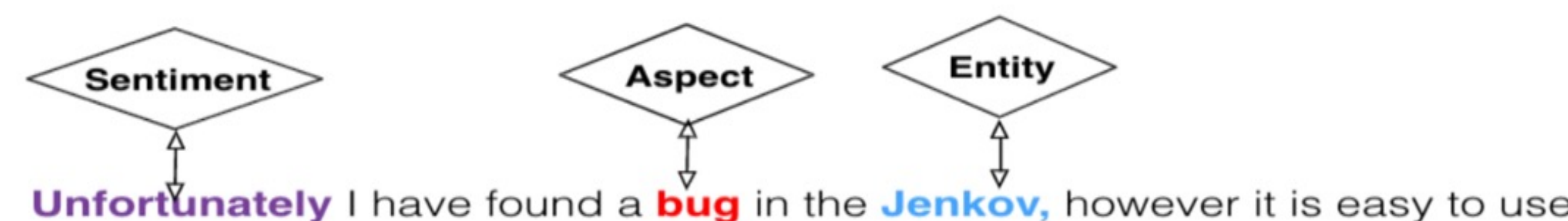
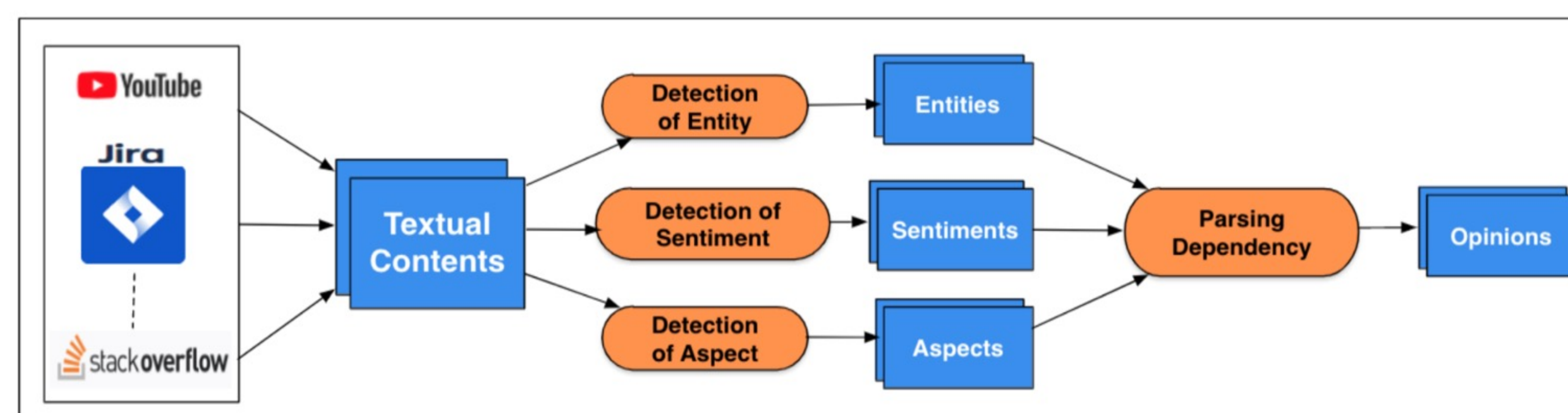
Detection of Aspect

- Deep-CNN
Porla et al. (KBS 2016)
- POME
Lin et al. (ICSE 2019)
- Opiner
Uddin & Khomh (ASE 2018)

Parsing Dependency

- DD-CNN
Liu et al. (BIBM 2016)
- Deep Biaffine
Dozat & Manning (ICLR 2017)
- Stanford NLP

Development of a New Opinion Mining System



Conclusion

- We state the motivation of Aspect Oriented Sentiment Analysis (AOSA) in SE
- Identify the limitations of the existing tools/techniques
- Developed advanced tools for sentiment detection in SE
- Formalized a comprehensive solution for an improved tool for AOSA in SE

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Limitation of the State-of-the-art Tools and Techniques

- POME suffers from low recall in detecting aspects and sentiments
- Opiner suffers from low precision in detecting aspects and sentiments
- Both the tools are limited to only API detection
- No evaluation of dependency parsing as tested against short texts