Hypertext Summarization for Hotel Review

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Abstract

Nowadays, there is a huge amount of online reviews for almost every product and service. These reviews have largely contributed to the growth of e-commerce; however in place of a human, extracting related information from this mass of reviews in order to create an easy to understand summarization is not a trivial matter. In this study, we present the SuRe system to produce a textual summarization from hotel free-text reviews as well as a preliminary evaluation.

1 Introduction

Nowadays, there is a huge amount of customer reviews available online for almost every product and service. Commonly they are in the form of a short free-text, which contains not only general comments but also highly personal opinions or circumstances. It would be a very valuable source of information for both the customers and the producers if we could be able to extract related information from this large amount of review and present them in an efficient manner.

There have been different approaches in this field of research such as those purely based on frequency (Rotem, retrieved may 2014) or discover the overall polarity of a document (Sebastiani et al., 2006). Some tried to tackle with abstraction/natural language generation (Portet et al., 2007); however the abstractive summarize field of research is still quite weak and very open for research. Therefore we propose our SuRe system based on a pilot research by (Labbé and Portet, 2012). It not only extracts data from a set of text but also abstractively reforms those data to a textual output i.e. SuRe decides by itself "What to say?" and "How to say it?".

2 SuRe System

2.1 Architecture

A simple architecture for SuRe system can be visualized as several steps as seen in Figure 1 .
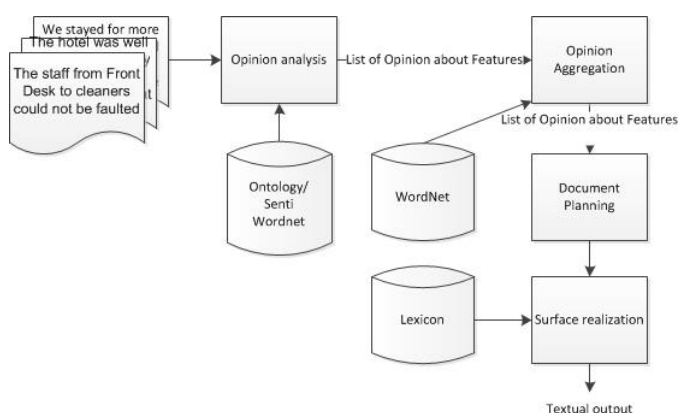

Figure 1: Overall Architecture of the SuRe system

2.2 Opinion Analysis

We consider a product to be composed of different features and these features are described by various opinions mentioned in the free-text reviews. Thus this step intents to extract as much relevant opinions as possible from the source. First the system extract words referencing features thanks to a pre-defined dictionary/ontology; then opinion tokens about these features are extracted using two different methods with slightly different architectures namely Sliding window and Dependency tree.

To account for the many synonyms; these opinions were then aggregated using WordNet relations between adjective synsets.

At the end of this step, the flowing data structure is obtained: $Feature\text{-}Name =< Aggregated\text{-}Op_1, Aggregated\text{-}Op_2, ..., Aggregated\text{-}Op_n >$

Where in turn each $Aggregated\text{-}Op$ has a general number of times that opinion has been mentioned along with a detail list of information for

each time it was mentioned (from which review, which sentence and what is the polarity).

2.3 Document Planning / Micro Planning

In this research we chose to separate features into positive or negative based on the most frequent opinion that linked to it. SuRe also tries to make a decision if the feature should be described using more than one opinion and in that case what should the conjunction be. Next step was to decide which would be the reference expression of the sentence (e.g that feature was mentioned by how many people) and how should they be referenced to.

2.4 Surface Realization

From the planning that has been made in the previous step; a tree structure for each feature is obtained. they are used to create a phrase for the feature by employ Simple NLG (Gatt and Reiter, 2009); then these phrases are grouped up using reference expressions to create sentences.

We chose to make the output as a small hypertext body code in order to be able to represent it better(with bold text, extra information in form of a pop-up box) as seen in Figure 2.
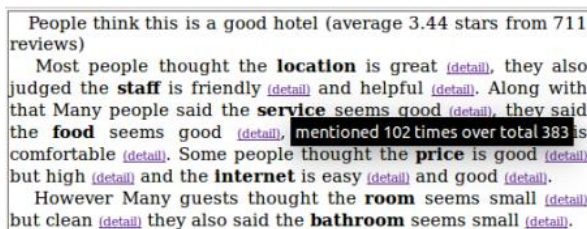

Figure 2: SuRe output example

3 Result and Evaluation

SuRe project has been implemented in Java and the output has been evaluated in order to give a complete assessment for the project. We closely assessed different aspects of two opinion analysis approaches(reliability, run-time, output). Later on we carried out a survey to collect people preferences between different type of presentations and linguistic quality of SuRe system base on the using a set of characteristic that were defined for the Document understanding conference (Baten and Dang, 2007) at NIST and presented in Figure 3.
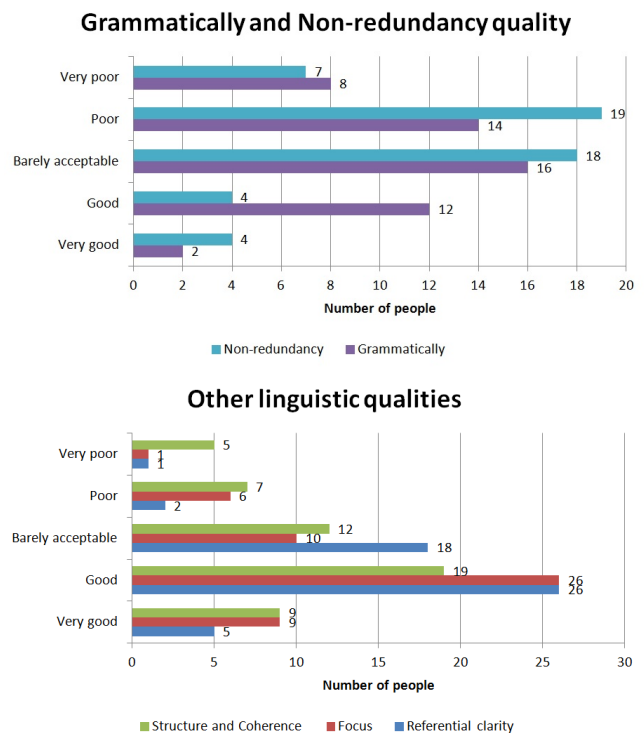

Figure 3: linguistic qualities the output

4 Discussion

SuRe system has been proven to be able to handle a large set of reviews to create a short, informative and easy to understand summary in an abstractive manner that is close to the way human process. However there are still problems with SuRe system that need to be taken in to consideration for future development such as:

- Aggregation can be filtered even more by different criteria to create even more concentrated summary; e.g. based on temporal information or by age, place, sex, etc.

- A clear word sense disambiguation before aggregation instead of blindly select similar words from WordNet.

- Referencing resolution would also enhance the opinion analysis step since in written review, people often use reference as "they" or "it" instead of remark again the feature, as well as double negation or even sarcasm.

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