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Categorizing Opinion in Discourse

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1 Categorizing Opinions

While research in the field of opinion analysis has focused on determining the orientation of opinion words in various lexical categories, almost no work to date has investigated the effects of rhetorical relations on the expression of opinion. We present a preliminary study for a discourse-based opinion categorization and propose a new annotation scheme for a fine-grained contextual opinion analysis using discourse relations. This study uses a lexical semantic analysis of opinion conveying expressions, based on the research of Wierzbicka [1], Levin [3] and Mathieu [4], coupled with an analysis of how clauses involving these expressions are related to each other within a discourse. Rather than providing a definition of opinion, we study how affective content is explicitly and lexically expressed in written texts.

An opinion expression belongs to one of our top-level categories: REPORTING, JUDGEMENT, ADVISE and SENTIMENT. In the REPORTING group, opinions are often expressed as the objects of verbs used to report the speech and opinions of others. These verbs convey the degree of the holders commitment to the opinion being presented, and some provide at least indirectly a judgment by the author on the opinion expressed. The opinion polarity is given by the verbs' complements. This category contains three subgroups according to the degree of commitment and the degree of veracity concerning the information in their complements. In the first subgroup, we find verbs that introduce information that (a) the author takes as established (INFORM group) or that (b) the holder is strongly committed to (ASSERT group). The second subgroup contains (c) the TELL group. Unlike ASSERT verbs, TELL verbs do not convey strong commitments of the subject to the embedded content; unlike INFORM verbs, they do not convey anything about the authors view of the embedded content. Finally, the last subgroup introduces an opinion with a certain degree of subjectivity. It contains (d) the THINK group verbs which express the fact that the subject has a strong commitment to the complement of the verb and (e) the GUESS group verbs which express a weaker commitment on the part of the agent. The veracity of the information from (d) is stronger than the information from (e). The JUDGEMENT group involves words that express a positive or negative assessment of something or someone. It includes verbs, nouns and adjectives. We consider two subgroups: judgments referring to a system of social norms -(f) the BLAME group and (g) the PRAISE group - and judgments referring to personal norms -(h) the APPRECIATION group-. ADVISE expressions urge the reader to adopt a certain course of action or opinion. We find here (i) the RECOMMEND group which expresses a good/bad opinion and a stronger push for some course of action and (j) the SUGGEST group used to say what the writer suggests or speculates on without being absolutely certain; finally, (k) the HOPE group expresses the wish that some desire will be fulfilled. Expressions in (i) are stronger than in (j) and (k) whereas expressions (k) are weaker. Finally, words in the SENTIMENT group express an attitude toward something usually based on feeling or emotion rather than reasoning. They have a polarity as well as a strength. We distinguish here between positive sentiments expressed by words in the CALM DOWN, ENTERTAIN, JOY, LOVE and FASCINATE groups and negative sentiments expressed by words in the ANGER, BORE, OFFENSE, SADNESS, FEAR, HATE and DISAPPOINT groups. Some groups, such as ASTONISHMENT and TOUCH generally express a neutral polarity, although the polarity and the strength are given by the context.

2 Rhetorical relations between clauses containing opinion expressions

The rhetorical structure (RS) is an important element in understanding opinions conveyed by a text. Our four opinion categories are used to label opinion expressions within a discourse segment. Using the discourse theory SDRT [2] as our formal framework, we define a basic segment as a clause containing an opinion expression or a sequence of clauses that together bear a rhetorical relation to a segment expressing an opinion. We have segmented conjoined NPs or APs into separate clauses for instance, *the film is beautiful and powerful* is taken to express two segments: *the film is beautiful* and *the film is powerful*. Segments are then connected to each other using a small subset of "veridical" discourse relations. For example, there are three opinion segments in the following sentence, *S:[Even if the product is excellent]a, [the design is very basic]b, [which is disappointing in this brand]c*. There is a CONTRAST relation between a and b that renforces sentiment expressed in segment c. We use five types of rhetorical relations. CONTRAST and CORRECTION indicate a difference of opinion. CONTRAST(a, b) implies that a and b are both true but there is some defeasible implication of one that is contradicted by the other, whereas CORRECTION(a, b) involves a stronger opposition and implies that b is true while a is false. To find these relations in text, we use specific discourse markers, such as: *although, but*, etc. for CONTRAST and *protest, deny*, etc. for CORRECTION. EXPLANATION(a, b), marked by *because* indicates that b offers a (typically sufficient) reason for a. ELABORATION(a, b), marked by *for example, in particular* implies that b gives more details on what was expressed within a. We have merged EXPLANATION and ELABORATION within a single relation called SUPPORT, as both of these relations are used to support opinions. RESULT(a,b) indicated by markers like *so, as a result*, indicates that b is a consequence or result of a. Finally, CONTINUATION(a, b) means that a and b form part of a larger thematic whole. For example, the RS of S is RESULT(CONTRAST(a,b),c). We also took account of disjunctions, conditionals and negations in

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evaluating opinions.

3 A Semantic Representation

We represent each opinion word that belongs to a category with a shallow semantic feature structure (FS) that associates with a segment: the category it belongs to, the opinion holder, the opinion topic, the opinion expressions that enable us to identify the segment, and the associated modality. A modality is defined as a degree of preference(Pref) for expressions in the ADVISE category, or a combination of a degree of commitment (C) and a strength for expressions in the REPORTING category, or a combination of a polarity and a strength for expressions from the JUDGMENT and the SENTIMENT categories. For example, the groups (a) and (b) are associated to the modality C1, the groups (c) to C2 and the groups (d) and (e) to C3 such that $C1 \geq C2 \geq C3$. Simple scalar dimensions are used to represent strength. The values 2, 1 and 0 mean that the expression has a strong, a medium or a low strength, respectively. When verb arguments contain an opinion expression, we have an additional attribute in the FS describing the content of opinion expressions introduced by the verb. This attribute is mainly used for verbs in the REPORTING group. For example, the segment *[The French presidency confirmed congratulations sent to Vladimir Putin]* is represented as :

$$\left[\begin{array}{l} Category : [\,reporting : Assert] \\ Modality : [\,commitment : C_1, strength : 1] \\ Holder\,(1) : The\ French\ presidency \\ Opinion\ word : confirmed \\ Content\,(2) : \left[\begin{array}{l} Category : [\,judgment : praise] \\ Modality : [\,polarity : positive, strength : 1] \\ Holder : (1) \\ Topic : Vladimir\ Putin \\ Opinion\ Word : congratulations \end{array}\right] \\ Topic : (2) \end{array}\right]$$

Discourse relations tell us how to combine various opinions using a set of dedicated combination rules. SUPPORT strengthens the opinion in the first constituent. CONTINUATION strengthens the polarity of the common opinion. RESULT strengthens the polarity or opinion in the second argument. For CONTRAST, we distinguish two cases. If the two arguments are opinion segments, then the CONTRAST weakens the polarity of the first argument. If one of the arguments bears a rhetorical relation with the other argument, then the CONTRAST strengthens the opinion polarity as in:*[[I am an atheist], but [I totally agree with the priest]]*.

4 Annotation Methodology and Preliminary Results

We annotated three different types of on line corpora: movie reviews (M), Letters to the Editor (L) and news reports (N), written in French and English. M were taken from *Telerama, AlloCine* and *movies.go.com*, L from *La Depeche du Midi* and *The San Francisco Chronicle*, N from *Le Monde, 20 Minutes* and *the MUC 6 news* corpus. We randomly selected 150 articles for French corpora (around 50 articles for each genre). Two native French speakers annotated respectively around 546 and 589 segments. To check the cross linguistic feasibility of generalisations made about the French data, we also annotated opinion categories for English. We have annotated around 30 articles from M and L. For N, the annotation in English was considerably helped by using texts from the MUC 6 corpus (186 articles), which were annotated independently with discourse structures by three annotators in the University of Texas's DISCOR project (NSF grant, IIS-0535154); the annotation for our opinion expressions involved a collapsing of structure proposed in DISCOR. Our lexicon is then extended during the annotation process. Actually, we have categorized 200 verbs, 160 nouns and 195 adjectives for French and 187 verbs, 150 nouns and 170 adjectives for English. For each corpus, annotators annotate elementary discourse segments, define its shallow semantic representation and then connect discourse segments using the set of rhetorical relations we have identified. The average distribution of opinion expressions in our corpus across our categories in French (Bold font) and English (normal font) is shown in the table below.

Table 1. Distribution of categories by each annotator.

Groups	Movie (%)		Letters (%)		News (%)	
Reporting	**2.67**	2.12	**14.80**	13.34	**43.91**	42.85
Judgment	**60.53**	40.52	**52.50**	73.34	**39.23**	33.34
Advise	**6.92**	10.63	**10.05**	13.34	**7.27**	9.52
Sentiment	**27.30**	34.04	**33.08**	2.67	**11.35**	16.67

Opinions in N involve principally reported speech. As we only annotated segments that clearly expressed opinions or were related via one of our rhetorical relations to a segment expressing an opinion, our annotations typically covered only a fraction of the whole document. The Press articles were the hardest to annotate and generally contained lots of embedded structures introduced by REPORTING type verbs, as well as negations. To compute the inter-annotator agreements (IAG), we chose to focus, at a first step, only on agreements on opinion categorization, segment identification and rhetorical relations. We computed the IAG only on the French corpus. We have a kappa of 95% on opinion categorization.

5 Conclusions and Future Works

We think that refined categories are needed to build a more nuanced appraisal of opinion expressions in discourse. The preliminary evaluations of our annotations have shown the validity of the categorization of opinions we proposed. We are able to calculate an overall global opinion on a topic in a principled way, by taking account of logical and discourse structure. In future research, we plan to (1) extend our annotation scheme to other types of corpora and to deepen our opinion typology, (2) compute IAG on the opinion holder, topics, modality as well as polarity, (3) characterize each discourse segment with a deep semantic representation and (4) to compare our annotation scheme to the MPQA one. In terms of automatization, we plan first to exploit a syntactic parser to get the argument structure of verbs and then to use a discourse segmenter like that developed in the DISCOR project, followed by the detection of discourse relations using cue words. This will allow us to use the deep semantic analysis to provide a classification of texts according to their opinions on various topics and to compare this approach to the bag of words approach.

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