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Preliminaries to a Study of Stance in News Broadcasts

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Aspects of stance have significant potential for information retrieval and filtering. This technical report is intended primarily to motivate and document details of the data and annotations used in the work reported in *Inferring Stance from Prosody* [Ward et al., 2016a]. It describes the process of identifying 14 important aspects of stance, describes two radio-broadcast corpora for investigating stance, describes the annotation of those corpora, presents some preliminary observations, and lists a set of useful prosodic features.

keywords: corpora, English, Mandarin, attitude, retrieval, filtering, speech, audio

1 Motivation

Most work on speech for information retrieval and filtering has focused on content plus a small handful of other aspects, notably including topics, emotion, and dialog acts. While familiar to the research community and useful for many purposes, these they do not exhaust the information relevant for retrieval [Ward et al., 2015].

As seen in the Lorelei concept of operations [DARPA, 2014], there is a need to filter and prioritize speech data as a source of information for disaster-relief planning. Accordingly we are exploring aspects of “stance,” information relating to the speaker’s attitude towards what he or she is talking about. This information may complement that available with current

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techniques, providing new ways to help an analyst with filtering, prioritizing and interpreting data.

While it is sometimes thought that news is purely factual, with emotion and opinion suppressed, actually news announcers strive also to “humanize” the news. Given that newsreaders typically do not deviate from the script, they do this is largely by prosodic means [Cotter, 1993].

2 Scenarios

Here are eight scenarios where stance information could be useful. These were developed in stages: some prior to any examination of data, and some informed by the data.

Scenario A (based on old Scenario 2). During a flood, the Lorelei heatmap shows relevant talk across Valleys C and D, with satellite imagery also showing both hard-hit. The mission planner applies various stance-related filters, and finds that D mostly disappears from view after culling out talk with a *typical* stance. He asks his assistant to first start planning an intervention for Valley C. Later he discovers that in Valley D had a long history of flooding, and there the well-drilled population was calmly evacuating, but C was unprepared.

Scenario B In a famine situation, the analyst is looking for information on where the need is. Lorelei’s heatmap shows blobs in the northern hills and also in one southern valley. Knowing that people will talk about a famine even if it is not affecting them directly, he varies the *locally relevant* slider, expecting to see an effect on the blob shapes and densities. However the blobs don’t change. He suspects that the initial heatmap is untrustworthy, so he switches off the “famine-related” topic filter and turns on the stance-related filters *bad situation*, *immediate action needed*, *factual*, and *locally relevant*. This time the display shows that the need is only in the northern hills. Later he discovers that in the dialect spoken in the southern valley, the word for “rice” is also slang for a bribe, explaining the spurious result.

Scenario C After a flooding affecting a wide area, the analyst looks at a Lorelei heat map, trying to get an overview of the effects on the population and the human geography. While experimenting with various stance-aspect filters, he discovers that the distribution of feelings mostly matches what he’d expect from the location of the flooding, plus the general tendency of the population in that part of Africa to create conspiracy theories to explain any bad luck. But he also notes that from one city, just outside the affected area, the mood is different: high on stance *immediate action* and low on stances *deplorable* and *controversial*. He pulls out his shoebox of news clippings on that city, and finds an article about a mega-mosque with an active charity arm and youth league. He then shifts to a social-organization view, and chooses for display only material by and about the mega-mosque and its iman. Selecting as the comparison group recent tweets from the rest of the province, and looking at the stance distributions side by side, the difference in tone is even clearer on stances *praiseworthy action*, and *factual*. Hoping that this means that the mega-mosque community has a “can do” attitude and good organizational skills, he googles it. He finds no web presence except a blog with one English post, a crudely-worded plea for the international community to “let us help you help our brothers.” In

his report for the local commander he notes the potential opportunity. Later he finds that agreement was reached and the mosque's youth league traveled in with the convoy to help distribute supplies in the flooded area.

Scenario D After a major wildfire, ethnic group A petitions the government to protect them from attacks by ethnic group B. To determine how this might complicate aid operations, the analyst examines material originating from group A on the topic of group B. From past experience, he expects to see stances high in *controversy*, low in *subjectivity*, and high in *immediate action needed*, but finds these mostly lacking in this case. He then opens the timeline view and examines the stance profiles of material originating from group A over the past year. Detecting an increase in volume, but no big changes in tone before or after the wildfire, he decides that this is not a high-priority concern. Later he learns that Group A had exploited the attention about the wildfire to try to enlist public opinion against Group B.

Scenario E (based on old Scenario 3) After a storm hits power lines around cities E and F, there is lots of messaging from both relating to electricity. Attempting to determine where the situation is most severe, the analyst applies the *relevant to a large group* stance filter. Finding that F almost disappears from the heatmap, he gives priority to translating messages from E. Later he finds that most of the messaging from city F was about a bizarre but heartwarming event involving a little girl, a downed power line, and the family pet.

Scenario F (based on old Scenario 4) Trying to assess the scale of a marketplace bombing in City G, the analyst also finds a lot of messaging on the topic of violence in nearby City H. Applying the *immediate action needed*, *factual information*, and *new information* filters, he decides that the talk in H is less relevant and decides to focus on G. Later he finds that the messaging in H was about a bombing they had experienced years ago, and opinions about the way that the authorities, including some politicians now up for re-election, had handled it.

Scenario G (based on old Scenario 1) After an earthquake, the Lorelei heatmap shows two dense clusters of talk about the topic, one in Province A and one in Suburb B. The analyst applies the *locally relevant* filter to cull out talk that has a second-hand/non-local stance, and infers that Province A is the actual location with need. Later he finds out that the suburb was populated by an ethnic group originally from Province A, and the talk there was mostly about concern for relatives in the province.

Scenario H Seismography suggests, and imagery confirms, a volcanic eruption in Province N. The analyst monitors chatter originating from that area, and finds the expected increase in volume of discussion and in negative affect. Viewing the stance profiles on a timeline, however, he notes that the *immediate action* is lacking, and that *deplorable* spiked three hours after the event. Feeling that this is oddly early, as people usually don't start blaming the authorities for things until a few days after a disaster, he suspects this may not be a true disaster, and decides not to wake up the decision-maker. Later he learns that the eruption had never posed a real threat, and the angry chatter was by tour guides and hotel owners upset about the government's decision to suspend tourist helicopter flights over the volcano.

3 Selecting Which Aspects of Stance to Include

There are many dozens of aspects of stance that could be considered. I wanted to identify aspects of stance that were:

1. Useful for Lorelei: both useful for analysts and common in Lorelei datasets,
2. Well defined, so that annotators can agree and quality can be reliably evaluated,
3. Non-redundant, both to each other and to other Lorelei thrusts, and
4. Automatically extractable.

This section explains how I iteratively developed a list of stance aspects.

3.1 Initial Conception, First List, Initial Feedback

From these sources we came up with an initial list of 28 aspects to consider. As these all, to some extent, relate to the attitude of the speaker towards the information, we refer to them using the umbrella term “stance.” In choosing which new aspects to examine, we used three sources of ideas. The first was some results on what people find interestingly similar in dialog data [Ward et al., 2015]. These included things like giving advice, seeking empathy, describing someone’s actions as praiseworthy or deplorable, and presenting something as novel, typical, or useful-to-know. The second source was examples of what non-content information are present in human communication. For this we again used dialog data, and, since prosody is known to be especially informative about non-content dimensions of meaning, we considered the functions expressed by prosodic patterns found by unsupervised discovery methods [Ward and Vega, 2012, Ward et al., 2016b]. These included things like signaling degree of involvement, empathy bids, expressing empathy, grounding, contrast, and importance. The third source was an operational scenario.

The idea of using stance came while I was tabulating the things that prosody can convey, and noticed that many of the same aspects of stance were showing up across languages [Ward and Vega, 2012, Ward et al., 2016b, Ward and Gallardo, 2015]. This was observed initially for dialog data, but also seemed to be true of prosody and attitude in local news broadcasts in Japanese and English. I also considered other researchers’ lists of aspects of stance, although such work has so far addressed mostly only decision-making dialogs and smalltalk [Rambow and Wiebe, 2015, Chindamo et al., 2012, Freeman et al., 2015].

After several iterations, I came up with a list of 28 stance aspects, organized as 14 binary oppositions, as seen in Table 1. A telephone conference with Darpa confirmed that several of these dichotomies were likely to be useful (in particular *situation-under-control* versus *outcome unpredictable*, *deplorable action* versus *praiseworthy action*, and *complicated situation* versus *simple situation*).

3.2 First Trial Annotation

I then prepared a simple Stance Annotation Manual, and experimented to explore its adequacy for obtaining reliable annotations.

As data I chose to use local news broadcasts. This is because national news reports are

- 1 **Locally relevant to the listening audience** *versus* Distant event related
- 2 **Bad Implications** *versus* Good Implications
- 3 Situation under control *versus* **Outcome unpredictable**
- 4 Background information *versus* **Information requiring immediate action**
- 5 **Deplorable action** *versus* **Praiseworthy action**
- 6 **New information** *versus* Continuation of an existing situation
- 7 **Factual information** *versus* Reporting opinions
- 8 **Controversial issue** *versus* Generally-shared feeling
- 9 Complicated situation *versus* Simple situation
- 10 Relevant to an individual *versus* **Relevant to a large group**
- 11 Quirky or odd behavior or situation *versus* **Typical/representative**
- 12 Predictable/formulaic *versus* Surprising/unusual
- 13 Part of a larger story *versus* **Independent facts**
- 14 Likely future developments *versus* Current situation

Table 1: Some Possible Dichotomies of Stance in News Broadcasts. Bolded items are mentioned in a scenario.

more polished, more detached, and less immediate for both newsreaders and the audience. In contrast, local news usually contain more things directly relevant to the local audience, which means a) more indications of stance, b) better relevance to the Lorelei scenario. Specifically, I chose 8 minutes from the Voice Canada collection, downloaded from the Dataverse (<http://dataverse.library.ualberta.ca/dvn/dv/VOICE>). This contained 12 stories (12 news segments).

With two other people, in under an hour, including training, the three of us labeled each story on each of the 28 stance aspects (items). The scale was 0 to 3, depending on whether that stance is absent, barely present, present, or strongly present.

For each aspect, I computed the agreement (weighted Kappa) between each pair of annotators, then took the average. The items with the best agreement were:

- .53 controversial
- .48 praiseworthy
- .35 individual
- .27 deplorable
- .21 typical

Of the 28 items, on 17 the agreement was better than chance, on 7 the agreement below chance, and for the remaining 4 items, at least one of the annotators applied them to none of the stories, so kappa could not be computed.

In discussion, the annotators noted that the manual needed to be clearer: the meanings of some items needed to be more differentiated from others; it needed to specify that, when the tone and the words suggested different stances, the tone should dominate; it needed to

clarify that annotations should be based on the presenter’s stance, not the annotator’s beliefs or interpretation; and it needed to state two aspects that are opposite, like good or bad, may be both present, or neither present, in any given story.

3.3 Second Trial Annotation

Based on these results I removed three items and abandoned the organization into dichotomies. I also renamed several other stance aspects, organized them into five sets, created phrases or sentences explaining each item, and created a handy summary sheet for the annotators to refer to.

With an annotator from the previous trial, the two of us labeled new data, namely 16 news segments from an 8-minute local news program from radio station CHEV, June 26, downloaded from archive.org. Again we took about an hour.

The agreement was much improved. This was probably because the annotators were now more experienced, because the manual was improved, and because this time they were, it seemed, less rushed.

The items with the highest agreement were:

- 1.00 controversial
- .80 deplorable
- .73 good
- .65 immediate-action
- .50 background
- .45 praiseworthy
- .42 bad
- .42 unusual
- .38 subjective
- .33 complex
- .32 simple
- .27 new information
- .22 under control

In discussion the annotators noted several things: One pass over the data may not be enough, since it’s hard to both understand the content and pay attention to the stance in one pass. Some of the judgments were difficult, since they required inferring the perspectives of the newsreader and her audience in a distant city at a distant time. Some of the items needed to be explained better, notably past and story-part. Labels of 0 can be ambiguous, sometimes meaning that a stance aspect is absent but sometimes meaning that it’s hard to judge, so it could be worth providing separate labeling options for these two cases.

3.4 Third Trial Annotation

Based on these comments, one more aspect was dropped, some explanations were reworded, and some related aspects were reordered in their sets, to bring the easiest decisions earlier.

The same two annotators then annotated actual disaster information: stories on the Guardian.com “Storm Desmond” Blog, some quite short, reflecting new information as it came in, as often as every 10 minutes. They first read all the text and looked at some videos and pictures. (Here there was no audio.) The actual annotation was done in a second pass, based on a printed copy of the blog, to avoid images affecting the labels. The annotations were done in hardcopy, on a printout of a spreadsheet. After each story, the annotators compared notes. Most of the time the disagreement was by one point or less. Sometimes one of the annotators had overlooked a nuance, for example, a mention that “the floodwaters are receding” tucked into a subordinate clause. Stories that were similar to previous stories in content and tone were skipped, in favor of including ones with more variety, but still there were several for which the ratings were similar across most aspects.

(I also considered annotating tweets on the same topic for December 3-7, 2015, but only a small fraction of the relevant tweets seemed useful in any way.)

In debriefing the annotators noted that there seemed to be compassion fatigue, in that something that seemed terrible on first mention seemed less significant after reading about it many times; one annotator noted that his ratings seemed to have drifted lower on average. To address this, I added the rating scale to the Stance Annotation Items handout, to make it always visible.

3.5 Stakeholder Opinions

Table 2 summarizes the results of these first phases. Agreements below 0.20 are not shown. The “common” column indicates how many times this label was used for in the Storm Desmond dataset. The final column indicates outcomes.

I then tidied up the description of the 14 stance items, as seen in Appendix A, and sent them with the above information to stakeholders to get input on which would be most useful. USC, BBN, CMU, and JHU responded. The respondents made comments from various perspectives. Some imagined what the end users would be likely to use, others focused more on what aspects would be non-redundant to other Lorelei efforts. All the comments included nuances and caveats, and there was no consensus, as can be seen in Table 3.

As a result, I decided to proceed without further pruning. While a few stance aspects seemed less viable, due to lack of perceived need and low agreement — notably Factual and Unusual — the marginal cost of having them annotated along with the others was trivial enough that I decided to retain all 14 for the time being.

4 Summary

This process led to the identification of 14 aspects of stance that are common, probably useful, and annotatable. Further, as discussed in [Ward et al., 2016a], most turn out to be automatically detectable from prosody using simple means.

There is a trade-off here in the number of stance aspects to consider. On the one hand, there are many specific situations that newsreaders talk about and specific attitudes and feelings that they convey, so from that perspective, more stance aspects might be considered. On the other

item	first	second	third	common	outcome
bad implication		.42		30	kept
good implication		.73		7	kept
deplorable action	.27	.80	.61	6	kept
praiseworthy action	.48	.45	.82	11	kept
controversial	.53	1.00	.37	7	kept
new information		.27		28	kept
past				21	dropped
future				17	dropped
large-group			.21	27	kept
individual	.35			9	dropped
simple		.32		7	dropped
complex		.33		16	dropped
unpredictable				20	dropped
under control		.22		18	dropped
factual			.23	28	kept
subjective		.38	.42	10	kept
typical	.21		.63	2	kept
unusual		.42		2	kept
stand-alone				2	dropped
story-related				26	dropped
local			.38	30	kept
distant			.46	4	dropped
immediate-action		.65	.63	15	kept
background		.50	.22	21	kept
current					combined with “new information”
continuation					renamed as “past”
surprising					combined with “unusual”
predictable					combined with “typical”
non-controversial					dropped

Table 2: Winnowing of stance aspects. Agreement values are average weighted kappas. Items below the double line were dropped before the third trial annotation.

hand, for the sake of not overwhelming users, a shorter list would be desirable, even at the cost of losing some information. Thus this list of stance aspects could certainly be adapted to better suit an application or a data source.

5 Data Selection

To support further investigation, I assembled two collections of news broadcasts, in English and in Mandarin. The English data was hand-selected from among the radio news available at archive.org, based on various considerations.

1) Since the primary aim of this is to see whether prosody has value for stance discrimination, not to test robustness against all conditions, the data was selected with only modest concern for diversity, and thus it is more homogeneous than one would expect in an operational situation.

stance aspect	“votes”
1 Bad	bc
2 Good	bc
3 Deplorable	dbc
4 Praiseworthy	dbc
5 Controversial	bc
6 Factual Information	ujc
7 Subjective Information	ujc
8 Unusual or Surprising	c
9 Typical or Unsurprising	c
10 Local	jc
11 Prompting Immediate Action	ubc
12 Background	ub
13 New Information	uc
14 Relevant to a Large Group	c

Table 3: Opinions. Letters indicate the affiliations of people that thought each stance aspect useful: b = BBN, u = USC, d = Darpa, j = JHU, c = CMU.

2) A secondary goal was to include disaster-related samples. I found stories relating to several — shootings, protests, an earthquake, floods, a power outage, a hurricane, various storms, epidemics, and several wildfires. These stories are also very stance-rich. Disaster-relatedness is only a secondary goal at this phase, since the focus for now is on stance, regardless of the topic, and disaster-related broadcasts are not that common.

2) A third goal was to include enough variety to see a good variation in the aspects of stance present. This is naturally true in any set of news stories. However to increase the variety, I also included a few other things, including commercials, sports broadcasts, and commentary.

4) The data was selected to be of good audio quality, with a few exceptions due to the above considerations.

5) The announcers were selected primarily based on availability of adequate data. In particular there is a large subset of the data that is usable for ideal-case testing: the Michael Stone (Space Coast Radio News) subset. In these broadcasts the recording conditions are good, Stone speaks well, each segment is short, and the topics are varied. This plus two other speakers, Jane Markowitz (CHEV) and Ted Leroux (WFDL), comprise the majority of the data. The KBND subset is also well-varied and high quality, although it is multi-speaker and includes also interviews and on-the-spot reporting, and so in those respects is more challenging. The various speakers vary in professionalism, and the data includes, for variety’s sake, a few broadcasts by apparent amateurs. There is somewhat more male than female data. The vast majority of the data is General American English, with only a few speakers clearly using other dialects.

The list of broadcasts chosen is available at <http://www.cs.utep.edu/nigel/stance/> .

For the Mandarin Data I simply adopted the KAZN subset of Broadcast News Hub4 [Huang et al., 1998], taking only the first 250 minutes, as found in first 9 audio files.

	English	Mandarin
audio files	141	9
news segments	997	307
minutes	490	250

Table 4: Data Size

	English				Mandarin
	r-l	r-s	l-s	avg	avg
1 Bad+	0.85	0.67	0.65	0.72	.55
2 Good	0.87	0.25	0.26	0.46	.45
3 Deplorable+	0.75	0.68	0.79	0.74	.37
4 Praiseworthy	0.35	0.28	0.41	0.35	.46
5 Controversial	0.52	0.50	0.58	0.53	.56
6 Factual Information*	0.26	0.33	0.16	0.25	.59
7 Subjective Information	0.53	0.27	0.27	0.36	.55
8 Unusual or Surprising*	0.39	0.12	0.13	0.22	.69
9 Typical or Unsurprising+	0.79	0.81	0.82	0.81	.59
10 Local	0.35	0.53	0.30	0.39	.66
11 Prompting Immediate Action+	0.70	0.66	0.71	0.69	.74
12 Background	0.57	0.38	0.45	0.47	.60
13 New Information	0.28	0.24	0.37	0.30	.92
14 Relevant to a Large Group	0.60	0.45	0.37	0.47	.83

Table 5: Inter-Annotator Agreement Levels for each aspect of stance. + indicates aspects with good or very good agreement; * indicates aspects with poor agreement. The first three columns show agreement between pairs of the three raters, r, l, and s. The fourth shows the average across all three rater pairs. These values are all weighted Kappa, treating the ratings as on a scale, and giving partial credit for close matches, for example, for stance 3 and story 117 a rating of 2 (present) by one rater and a 1 (weakly present) by another. As Kappa values, these scale from 0 (random agreement) to 1 (perfect agreement).

6 Annotation

The annotation was done by a subcontractor following the guidelines in Appendices B and C. For each language first they did an initial segmentation of the broadcasts into news stories, giving the number of segments seen in Table 4. Then, for each language, the annotation was done by three annotators working independently.

The annotations are available at <http://www.cs.utep.edu/nigel/stance/>.

Interestingly no annotators used 3 (strongly present) and most annotations were 0 or 2. Table 5 shows the inter-annotator agreement in terms of Weighted Kappa. For some stance aspects the agreement was very good, for others it is only slightly better than chance, depending on the data set.

Wondering whether some stance aspects were redundant to others, I computed the cross-correlations, as shown in Table 6. Some aspects correlated, as expected, including *deplorable* and *bad*. Some aspects anticorrelated as expected, including *good* and *bad*. However even the

	Bad	Good	Depl	Prai	Cont	Fact	Subj	Unus	Typi	Loca	Imme	Back	New	Larg
1 Bad	1.00	-0.59	0.54	-0.14	0.09	0.03	0.03	0.32	-0.44	-0.08	0.13	0.48	0.17	-0.08
2 Good	-0.59	1.00	-0.31	0.20	-0.11	0.01	0.02	-0.17	0.01	0.04	0.01	-0.07	0.13	0.51
3 Deplorable	0.54	-0.31	1.00	-0.07	0.06	0.06	-0.05	0.01	-0.23	0.08	0.04	0.39	0.02	-0.17
4 Praiseworthy	-0.14	0.20	-0.07	1.00	-0.03	-0.05	0.17	0.00	-0.10	0.07	0.00	0.14	-0.01	0.01
5 Controversial	0.09	-0.11	0.06	-0.03	1.00	-0.08	0.19	0.04	-0.11	-0.03	-0.07	0.15	-0.02	-0.04
6 Factual	0.03	0.01	0.06	-0.05	-0.08	1.00	-0.34	-0.01	0.04	0.19	-0.02	0.09	0.01	0.03
7 Subjective.	0.03	0.02	-0.05	0.17	0.19	-0.34	1.00	-0.01	-0.17	-0.22	-0.03	0.14	-0.04	0.04
8 Unusual	0.32	-0.17	0.01	0.00	0.04	-0.01	-0.01	1.00	-0.20	-0.04	0.23	0.13	0.18	0.07
9 Typical	-0.44	0.01	-0.23	-0.10	-0.11	0.04	-0.17	-0.20	1.00	0.15	-0.19	-0.56	-0.16	-0.08
10 Local	-0.08	0.04	0.08	0.07	-0.03	0.19	-0.22	-0.04	0.15	1.00	-0.01	0.03	0.05	-0.05
11 Immediate Act.	0.13	0.01	0.04	0.00	-0.07	-0.02	-0.03	0.23	-0.19	-0.01	1.00	0.16	0.07	0.21
12 Background	0.48	-0.07	0.39	0.14	0.15	0.09	0.14	0.13	-0.56	0.03	0.16	1.00	-0.02	0.02
13 New Info.	0.17	0.13	0.02	-0.01	-0.02	0.01	-0.04	0.18	-0.16	0.05	0.07	-0.02	1.00	0.27
14 Large Group	-0.08	0.51	-0.17	0.01	-0.04	0.03	0.04	0.07	-0.08	-0.05	0.21	0.02	0.27	1.00

Table 6: Correlations between stance aspects

highest correlation is only 0.59, meaning that no stance item is entirely redundant to any other.

7 Useful Subsets

These corpora are being used in both quantitative and qualitative investigations of stance, including the development of methods to infer stance automatically.

For experimentation, since there is not much data, its probably best to generally evaluate predictors in a leave-one-out fashion, where for each run the training data is all the audio files except the one containing the news segment whose stance is to be inferred.

If, however, a model takes so long to train that it can't be trained more than once, a smaller test set and fixed training set may be desired. For such experiments, a suitable testset is the 19 broadcasts by Michael Stone (Space Coast Radio News) from September, containing 142 segments, totalling about 39 minutes. If the interest is in prediction for a known speaker, a suitable training set is the data the 40 Michael Stone broadcasts from June-August. For unknown-speaker experiments the same test set is appropriate, with the training set being all non-Space Coast broadcasts.

8 Some Stance-Prosody Correlations

Prior to proper model-building and experimentation, as described in [Ward et al., 2016a], I did a first-pass rough study to see whether prosodic features might have information useful for detecting stances.

Table 7 the correlations for 116 prosodic features. Each prosodic feature spans the indicated range, in milliseconds, from the approximate start of the news segment start. The two-letter codes are **dp** for delayed pitch peak, **vo** for volume (intensity), **cr** for creaky voice, **t1** and **th** for pitch low in range and high in range, **np** and **wp** for narrow and wide pitch, and **sr** for a speaking rate proxy. Details are in the documentation at www.github.com/nigelguard/.

			Bad	Good	Depl	Prai	Cont	Fact	Subj	Unus	Typi	Loca	Imme	Back	New	Larg
pd	+0	+50	-0.02	0.08	0.00	-0.03	-0.02	-0.01	-0.04	-0.04	-0.05	-0.00	-0.00	0.03	-0.02	0.05
pd	+50	+100	-0.01	0.09	0.03	-0.03	-0.01	-0.06	-0.03	-0.01	-0.02	-0.01	-0.03	-0.02	-0.04	0.08
pd	+100	+200	0.05	0.02	0.11	-0.02	-0.03	0.04	-0.03	-0.01	-0.02	-0.01	-0.01	0.04	-0.01	0.04
pd	+200	+300	0.00	0.00	0.03	0.00	-0.02	0.05	-0.04	-0.03	0.03	0.03	-0.02	0.01	-0.03	0.01
pd	+300	+400	-0.09	-0.07	-0.02	-0.01	-0.03	0.05	-0.07	-0.04	0.18	0.06	-0.07	-0.10	-0.10	-0.09
pd	+400	+800	-0.00	0.05	0.06	-0.03	0.06	0.10	-0.13	-0.01	0.09	0.08	-0.10	0.03	-0.13	0.00
pd	+800	+1600	0.01	0.07	0.14	-0.04	-0.03	0.14	-0.16	-0.06	0.09	0.09	-0.08	0.02	-0.11	0.08
pd	+1600	+3200	-0.04	0.08	0.08	-0.04	-0.02	0.15	-0.19	-0.06	0.10	0.11	-0.09	0.00	-0.14	0.08
vo	+0	+50	0.06	0.12	0.17	-0.07	0.01	0.16	-0.19	-0.03	-0.01	0.11	-0.10	0.10	-0.11	0.14
vo	+50	+100	-0.02	0.02	0.14	-0.11	-0.02	0.21	-0.26	-0.07	0.17	0.17	-0.17	-0.02	-0.20	0.03
vo	+100	+200	-0.03	0.00	0.14	-0.11	-0.02	0.22	-0.27	-0.08	0.19	0.17	-0.18	-0.03	-0.21	0.01
vo	+200	+300	-0.04	0.00	0.14	-0.11	-0.03	0.22	-0.27	-0.08	0.19	0.17	-0.18	-0.03	-0.21	0.01
vo	+300	+400	-0.03	-0.00	0.14	-0.11	-0.02	0.22	-0.26	-0.08	0.18	0.16	-0.19	-0.02	-0.22	-0.01
vo	+400	+800	-0.05	0.02	0.14	-0.10	-0.00	0.19	-0.25	-0.08	0.17	0.16	-0.20	-0.04	-0.21	-0.00
vo	+800	+1600	-0.03	0.04	0.14	-0.11	-0.01	0.21	-0.26	-0.07	0.15	0.16	-0.18	-0.01	-0.21	0.02
vo	+1600	+3200	-0.05	0.01	0.13	-0.11	-0.02	0.22	-0.26	-0.08	0.20	0.16	-0.19	-0.05	-0.22	0.00
cr	+0	+50	0.01	0.06	0.10	-0.07	-0.03	0.10	-0.13	-0.04	-0.01	0.09	-0.07	0.05	-0.06	0.07
cr	+50	+100	-0.02	0.02	0.07	-0.07	-0.05	0.10	-0.13	-0.02	0.08	0.10	-0.09	-0.02	-0.12	0.02
cr	+100	+200	-0.02	-0.08	0.10	-0.08	-0.01	0.14	-0.17	-0.09	0.16	0.14	-0.13	-0.03	-0.15	-0.10
cr	+200	+300	-0.05	-0.08	0.08	-0.09	-0.02	0.15	-0.18	-0.06	0.17	0.10	-0.16	-0.07	-0.18	-0.10
cr	+300	+400	-0.01	-0.07	0.10	-0.08	0.00	0.17	-0.19	-0.06	0.12	0.09	-0.12	-0.01	-0.17	-0.06
cr	+400	+800	-0.06	-0.01	0.11	-0.08	-0.03	0.19	-0.23	-0.06	0.17	0.13	-0.18	-0.05	-0.19	-0.03
cr	+800	+1600	0.01	-0.01	0.16	-0.10	-0.00	0.20	-0.23	-0.06	0.11	0.15	-0.15	0.01	-0.20	-0.02
cr	+1600	+3200	-0.02	0.02	0.15	-0.11	0.01	0.21	-0.26	-0.08	0.15	0.17	-0.19	-0.01	-0.20	0.00
tl	+0	+50	0.01	0.07	0.12	-0.07	-0.02	0.13	-0.16	0.00	0.06	0.12	-0.11	0.02	-0.11	0.04
tl	+50	+100	-0.03	0.04	0.07	-0.06	-0.03	0.14	-0.18	-0.02	0.11	0.14	-0.11	-0.01	-0.15	0.02
tl	+100	+200	-0.03	0.00	0.08	-0.07	-0.01	0.16	-0.20	-0.04	0.13	0.13	-0.14	-0.00	-0.17	-0.02
tl	+200	+300	-0.03	-0.01	0.08	-0.07	-0.00	0.16	-0.19	-0.03	0.13	0.11	-0.13	-0.00	-0.14	-0.03
tl	+300	+400	0.04	-0.03	0.18	-0.10	-0.00	0.16	-0.19	-0.04	0.08	0.10	-0.09	0.03	-0.10	-0.00
tl	+400	+800	-0.02	-0.00	0.10	-0.09	-0.03	0.16	-0.17	-0.04	0.12	0.10	-0.14	-0.05	-0.12	0.02
tl	+800	+1600	-0.00	-0.08	0.10	-0.10	0.05	0.15	-0.18	-0.05	0.12	0.14	-0.12	0.01	-0.16	-0.05
tl	+1600	+3200	-0.07	-0.07	0.09	-0.10	-0.01	0.18	-0.22	-0.08	0.23	0.16	-0.18	-0.08	-0.20	-0.10
th	+0	+50	0.02	0.08	0.09	-0.05	-0.03	0.05	-0.09	-0.06	-0.05	0.02	-0.02	0.03	-0.06	0.08
th	+50	+100	-0.00	0.04	0.09	-0.05	-0.02	0.07	-0.10	-0.06	0.02	0.06	-0.08	-0.00	-0.08	0.02
th	+100	+200	-0.02	-0.05	0.07	-0.05	-0.06	0.11	-0.10	-0.05	0.11	0.06	-0.08	-0.05	-0.09	-0.03
th	+200	+300	0.01	-0.04	0.08	-0.04	-0.01	0.11	-0.11	-0.04	0.07	0.07	-0.06	0.00	-0.08	-0.00
th	+300	+400	-0.05	-0.03	0.01	-0.02	-0.04	0.11	-0.14	-0.06	0.15	0.09	-0.12	-0.05	-0.14	-0.03
th	+400	+800	-0.00	0.07	0.09	-0.05	0.03	0.12	-0.18	-0.04	0.07	0.12	-0.12	0.05	-0.13	0.03
th	+800	+1600	0.01	0.11	0.18	-0.09	-0.03	0.18	-0.22	-0.07	0.07	0.11	-0.12	0.02	-0.15	0.11
th	+1600	+3200	-0.02	0.10	0.11	-0.09	-0.03	0.19	-0.22	-0.06	0.12	0.10	-0.13	-0.02	-0.18	0.10
np	+0	+200	-0.00	0.06	0.11	-0.09	-0.02	0.16	-0.19	-0.04	0.06	0.12	-0.14	0.03	-0.15	0.04
np	+200	+300	-0.00	0.00	0.15	-0.09	0.00	0.16	-0.19	-0.05	0.09	0.13	-0.15	0.00	-0.13	-0.00
np	+300	+400	0.03	-0.00	0.18	-0.09	-0.00	0.17	-0.19	-0.04	0.06	0.10	-0.16	0.01	-0.11	-0.01
np	+400	+800	-0.01	0.06	0.12	-0.10	0.03	0.16	-0.21	-0.05	0.07	0.13	-0.15	0.01	-0.16	0.04
np	+800	+1600	-0.05	0.07	0.09	-0.10	0.01	0.19	-0.23	-0.08	0.14	0.13	-0.17	-0.04	-0.18	0.06
np	+1600	+3200	-0.04	0.02	0.11	-0.10	-0.02	0.20	-0.25	-0.08	0.19	0.14	-0.18	-0.04	-0.20	0.01
wp	+0	+200	-0.01	0.06	0.14	-0.09	-0.04	0.19	-0.21	-0.04	0.08	0.12	-0.15	0.02	-0.14	0.07
wp	+200	+300	-0.02	0.01	0.14	-0.10	-0.04	0.19	-0.21	-0.05	0.11	0.13	-0.13	-0.01	-0.14	0.03
wp	+300	+400	-0.00	0.00	0.12	-0.09	-0.04	0.19	-0.22	-0.06	0.10	0.12	-0.17	-0.01	-0.15	0.02
wp	+400	+800	-0.05	0.04	0.10	-0.09	-0.00	0.17	-0.23	-0.05	0.12	0.14	-0.19	-0.02	-0.18	0.03
wp	+800	+1600	-0.02	0.04	0.15	-0.10	-0.01	0.20	-0.25	-0.07	0.10	0.17	-0.17	0.01	-0.18	0.04
wp	+1600	+3200	-0.02	0.04	0.14	-0.10	-0.01	0.22	-0.26	-0.07	0.13	0.16	-0.18	-0.00	-0.18	0.03
sr	+0	+100	-0.05	-0.08	-0.09	0.02	-0.02	-0.05	0.06	-0.01	0.06	-0.04	0.02	-0.08	-0.00	-0.12
sr	+100	+200	0.00	-0.01	-0.06	0.03	-0.01	-0.07	0.09	0.02	-0.04	-0.08	0.05	-0.01	0.05	-0.04
sr	+200	+400	-0.01	0.00	-0.05	0.01	0.01	-0.01	0.01	0.01	0.02	-0.02	-0.00	-0.02	-0.04	-0.04
sr	+400	+800	-0.06	-0.01	0.08	-0.05	-0.06	0.16	-0.19	-0.06	0.21	0.12	-0.15	-0.07	-0.15	-0.04
sr	+800	+1600	-0.03	-0.04	0.11	-0.08	0.00	0.19	-0.23	-0.06	0.20	0.16	-0.17	-0.04	-0.18	-0.04
sr	+1600	+3200	-0.04	0.02	0.11	-0.08	0.00	0.17	-0.22	-0.06	0.14	0.15	-0.15	-0.02	-0.16	0.02

Table 7: Correlations between prosodic features and stances

1 Bad	0.09
2 Good	0.21
3 Deplorable	0.07
4 Praiseworthy	0.03
5 Controversial	0.00
6 Factual Information	0.00
7 Subjective Information	-0.05
8 Unusual or Surprising	0.04
9 Typical or Unsurprising	0.43
10 Local	0.12
11 Prompting Immediate Action	0.05
12 Background	0.33
13 New Information	0.17
14 Relevant to a Large Group	0.32

Table 8: Correlation between predicted and actual values

Having found that there were many correlations, as a logical next step I did a quick prediction experiment, trying to predict values for all 14 stance aspects using prosodic information.

For this the training data was the 40 Space Coast Radio News broadcasts found at archive.org for July–August 2013, totalling about 40 minutes, and the test data was all available broadcasts for September 2013, 19, containing about 100 news segments.

The predictive features were the 116 features listed in Table 7. These were computed only over the first 3 seconds of each news segment. The model was simple linear regression.

Table 8 shows the results. Prosody clearly has useful information for predicting at least whether a story is “Typical/Unsurprising,” “Background Information,” and “Relevant to a Large Group.” Referring to Table 7, some of the features that enabled these predictions were the fact that news stories relevant to a large group of people tend to be high in pitch and have a slower speaking rate; that stories giving typical or unsurprising information tend to have a delayed pitch peak near the start and overall be louder, creakier, and faster; and that stories with good implications tend to be somewhat high in pitch after the first second. Some of these align with tendencies in the literature; others are novel.

9 Prosodic Features

The prosodic features used in the experiments reported in [Ward et al., 2016a] are listed in Appendix D. The codes are explained in the toolkit documentation [Ward, 2015].

Appendices

- A) List of Stance Aspects (Annotation-Item List), Version 6
- B) Stance Annotators Manual, Version 3
- C) Stance Annotation Procedure
- D) Prosodic Features Used in [Ward et al., 2016a].

The appendices are also available at <http://www.cs.utep.edu/nigel/stance/>

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Lorelei Stance Annotation Items

version 6, March 3, 2016

EVALUATION-RELATED

1. **Bad Implications** - information with undesirable consequences, such as a raise in taxes, an approaching storm, or a flood. Events with more severe implications will rate higher on this scale
2. **Good Implications** - the opposite, such as a peace agreement, a good harvest, or nice weather
3. **Deplorable Action** - something bad done by someone or some organization
4. **Praiseworthy Action** - the opposite: something good done by someone or something
5. **Controversial** – something people do or could disagree about, such as a bold action by some person or group, or new government policy

PRESENTATION-RELATED

6. **Factual Information** – information presented as facts
7. **Subjective Information** - the opposite, such as opinions, either the presenter's or someone else's, or information reported skeptically or speculatively
8. **Unusual or Surprising** - something quirky, odd, or unexpected

9. **Typical or Unsurprising** – conversely, something expected, such as an opposition politician criticizing the government or the stock market fluctuating

IMMEDIACY-RELATED

10. **Local** - personally relevant to the listening audience, like local weather or close-by rioting
11. **Something Prompting Immediate Action** - something that may motivate the listening audience to do something, like take shelter from a storm or vote in today's election
12. **Background** - conversely, information useful just as background, such as an explanation of the causes of a situation
13. **New Information** - new information or description of a recent development (rather than a repetition or rehash of something previously reported)
14. **Relevant to a Large Group** - something affecting many people

Rating Scale

- 0 or blank: not present or unsure
1: barely present
2: present
3: strongly present

Large Stance Annotation Manual, version 3, March 2, 2016

Overview

In order to develop stance detectors for multiple languages, we need annotated data, namely a set of news stories, each annotated with all the elements of stance present.

Your job is to create these annotations, that is for each segment, to identify all the elements of stance present.

Background

In news reports, blogs, tweets etc., in addition to the content conveyed, there is typically some element of stance, such as how the newsreader or blogger feels about the information he or she is presenting. Such information is potentially very useful for planning disaster relief, for example as addressed by the Darpa Lorelei program, as discussed at <http://www.darpa.mil/news-events/2015-10-08> . Below are four examples illustrating how stance information can helpfully supplement the information content of a news report or tweet.

1. After an earthquake, the Lorelei heatmap shows two dense clusters of talk about the topic, one in Province A and one in Suburb B. The analyst applies the “locally relevant” filter to cull out talk that has a second-hand/non-local stance, and discovers that Province A is the important location. Later he finds out that the suburb was populated by an ethnic group originally from Province A, and the talk there was mostly about concern for relatives in the province.

2. After a storm hits power lines around cities E and F, there is lots of messaging from both relating to electricity. Attempting to determine where the situation is most severe, the analyst finds that E almost disappears from the heat map after applying the “typical rather than unusual” filter, and also after applying the “large-group versus individual” filters. He gives priority to translating messages from F. Later he finds that most of the messaging from city E was about a bizarre event involving a little girl, a downed power line, and the family pet, with a heartwarming outcome.

3. Trying to assess the scale of a marketplace bombing in City G, the analyst also finds a lot of messaging on the topic of violence in nearby City H. Applying the “immediate-action-needed versus background” filter and the “factual-information versus opinion” filters, he decides that the talk in H is less relevant and decides to focus on G. Later he finds that the messaging in H was about a bombing they had experienced years ago, and opinions about the way the authorities, including some politicians now up for re-election, had handled it.

Procedure

For each annotation, first familiarize yourself with the content: read the transcript if available, otherwise listen to the broadcast once. Then listen to each segment individually again and decide which stance aspects are present.

You will have a spreadsheet listing the segments and with spaces for each of the 14 stance aspects. Depending on whether that stance is absent, barely present, present, or strongly present, the appropriate cell will contain 0, 1, 2, or 3. Please use labels 0 and 2 most of the time, using 1 and 3 when clearly appropriate. Do not agonize about whether to use a 1 or a 2, for example: such small differences matter little.

Before you start on the main data, please listen to segments 1–4 and see how they were labeled in the spreadsheet. Note down any of these labels that seem strange or difficult, and discuss them with your supervisor.

Then listen to segments 5–8 and label them yourself. Show your supervisor; he or she will then compare your labels to ours, and discuss any differences. Then you're ready to start work.

For some of the segments and some stances there may not be a clear correct answer, so please use your best judgment. On the other hand, some elements of stance are clearly present in some segments. For example, if the segment is “snowstorm coming in, roads will be affected, drive carefully,” then this clearly needs to be marked as “bad implications” and “locally relevant to the listening audience.” Other aspects clearly not present would be “controversial” or “praiseworthy.” When we check the quality of your work, we will focus on such clear cases. There are other aspects, however, which are more subjective. For example, you may be able to tell from the newsreader's tone of voice that the snowstorm a “typical situation” or an “unusual one.” Although some of these will be subtle, they are still important, so please listen carefully and note down whatever you think is present.

Please focus on the presenter's view, not an objective view or your own. When judging whether something is “local” or “immediately relevant” please take the perspective of the listening audience on the day when they heard the broadcast. If the presenter's tone seems to convey a different feeling than the words, rely more on the tone.

Most segments will have multiple stance labels. There is no need to be completely exhaustive, rather please focus on the stance aspects most strongly present in a segment. For example, if a segment presents a lot of bad news but one piece of good news, focus on on the dominant theme. However in such a case it would also be appropriate to mark a 1 in the good news column, to indicate something there. In general, each segment should probably be tagged with 3–8 stance items.

Stance Annotation Procedure, version 2, March 3, 2016

Segmentation Procedure

Divide each news broadcast into segments. A segment is a topic or story, like a specific crime report or a report on some political issue.

Segments will typically be 30 seconds to 3 minutes in length. A segment may include multiple closely-related short items: for example several road closures, or several days of weather forecasts, or a financial report that covers stocks and exchange rates. However a story should be split into different segments if the parts involve very different stances; for example mention of nice weather tomorrow should be a separate segment from a discussion for how to prepare for a big storm coming on the weekend. A segment may contain multiple speakers, such as an announcer, a reporter, and some interviewees. If in doubt, err on the side of smaller segments.

Broadcasts contain things other than news, such as radio station call letters, program names, and commercials. The first time these occur they should be identified as segments and then labeled for any relevant aspects of stance. Repeated occurrences should be skipped and not annotated. Lists of headlines should be ignored; they should not be part of any segment.

For each segment, record in a spreadsheet

- an item number, starting with 1
- audio source information (the audio file name, source URL, or station name and broadcast date, etc.)
- speaker information, such as the name of the main speaker (when available, typically the newsreader or a reporter), or “multiple” if there are many
- segment start time
- segment end time
- simple short title or description, e.g. “protests” or “weather”

Annotator Training

First have the annotators read the Stance Annotation Manual and the Lorelei Stance Annotation Items document.

Then give them the annotation procedure document, and have them annotate the first 4 stories. Then discuss with them, comparing to the gold standard. If they're way off, ask what they were thinking, and review the stance aspects document to discuss what they are supposed to mean.

Then have them label 4 more stories, and repeat. Finally have them label the rest in the training data, and as long as their agreement is 80% or better, then that's fine.

mono.fss
Nigel Ward, UTEP
October 2015
just one half of april.fss

volume
vo -3200 to -1600 self
vo -1600 to -800 self
vo -800 to -400 self
vo -400 to -300 self
vo -300 to -200 self
vo -200 to -100 self
vo -100 to -50 self
vo -50 to 0 self

vo 0 to 50 self
vo 50 to 100 self
vo 100 to 200 self
vo 200 to 300 self
vo 300 to 400 self
vo 400 to 800 self
vo 800 to 1600 self
vo 1600 to 3200 self

creaky
cr -1600 to -800 self
cr -800 to -400 self
cr -400 to -300 self
cr -300 to -200 self
cr -200 to -100 self
cr -100 to -50 self
cr -50 to 0 self

cr 0 to 50 self
cr 50 to 100 self
cr 100 to 200 self
cr 200 to 300 self
cr 300 to 400 self
cr 400 to 800 self
cr 800 to 1600 self

pitch lowness
tl -1600 to -800 self
tl -800 to -400 self
tl -400 to -300 self
tl -300 to -200 self
tl -200 to -100 self

tl -100 to -50 self
tl -50 to 0 self

tl 0 to 50 self
tl 50 to 100 self
tl 100 to 200 self
tl 200 to 300 self
tl 300 to 400 self
tl 400 to 800 self
tl 800 to 1600 self

pitch highness
th -1600 to -800 self
th -800 to -400 self
th -400 to -300 self
th -300 to -200 self
th -200 to -100 self
th -100 to -50 self
th -50 to 0 self

th 0 to 50 self
th 50 to 100 self
th 100 to 200 self
th 200 to 300 self
th 300 to 400 self
th 400 to 800 self
th 800 to 1600 self

narrow pitch
np -1600 to -800 self
np -800 to -400 self
np -400 to -300 self
np -300 to -200 self
np -200 to -0 self

np 0 to 200 self
np 200 to 300 self
np 300 to 400 self
np 400 to 800 self
np 800 to 1600 self

wide pitch
wp -1600 to -800 self
wp -800 to -400 self
wp -400 to -300 self
wp -300 to -200 self
wp -200 to -0 self

wp 0 to 200 self
wp 200 to 300 self
wp 300 to 400 self
wp 400 to 800 self
wp 800 to 1600 self

speaking rate
sr -1600 to -800 self
sr -800 to -400 self
sr -400 to -200 self
sr -200 to -100 self
sr -100 to -0 self

sr 0 to 100 self
sr 100 to 200 self
sr 200 to 400 self
sr 400 to 800 self
sr 800 to 1600 self