A Politeness Recognition Tool for Hindi

[With special emphasis on online texts]

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ABSTRACT

This paper gives an overview of a politeness recognition tool (PoRT) for Hindi that is currently under preparation. It describes the the kind of problems that need to be tackled with before developing the tool, the approach and the methodology that will be adopted for the development and testing of the tool, the current progress and the future plan to achieve this goal.

Categories and Subject Descriptors

I.2.3 [**Artificial Intelligence**]: Natural Language Processing—*Discourse, Text analysis, Language parsing and understanding*; I.5.4 [**Pattern Recognition**]: Applications—*Text Processing*

General Terms

Theory, Design

Keywords

Linguistic politeness, CMC, CO3H, PoRT, Hybrid System

1. INTRODUCTION

Polite (or, politic) behaviour has been defined as "socio-culturally determined behaviour directed towards the goal of establishing and/or maintaining in a state of equilibrium the personal relationships between the individuals of a social group" [26]. Despite the differences in the way politeness is expressed across languages, over the last four decades or so, there have been several attempts at formalising, universalising and giving a definite direction to this extremely complex and fascinating aspect of human speech and communication. Of special significance and importance in this regard is the seminal work of Brown and Levinson [4] which tried to give mathematical rigour, precision and straightforwardness to the politeness studies. They proposed a theory based on Goffman's concept of negative and positive face and gave a kind of algorithm for explaining what kind of politeness strategy is being used by speakers in a particular instance. Some of the other well-meaning attempts to formalise and model politeness so that it could be studied cross-linguistically include those by Leech [15] and Lakoff [14]. However these theories could not generate the same kind of response as Brown and Levinson's theory. In spite of all its claims to universality, the model by Brown and Levinson has been hugely attacked by the likes of Eelen [6] and Ide [9] on the grounds of it not being applicable to the non-European languages. Following this criticism there have been several attempts to defend, extend and modify the theory by O'Driscoll [19], Fukada and Asato [7], Meier [16], Pfister [20] and others. Furthermore there have been some attempts by Culpeper [5] and Bousfield [3] to adapt Brown and Levinson's model to study impoliteness in language.

2. PROBLEM DESCRIPTION

Since politeness is a very culture/language-specific phenomenon and what is polite in one language may become impolite in another language which could result in several cross-cultural misunderstandings and conflicts, it is very necessary to have a good understanding of politeness across languages and also let the machine have its understanding. As machines have begun to become more powerful and we are moving more towards semantic-based computing, it has become essential that the machines also begin to understand extra-lexical and extra-structural nuances of the language and work accurately in that direction. Recent works related to emotion analysis, opinion mining, etc are some of the major attempts towards making the machines more equipped, powerful and accurate. However, politeness analysis (which shares some aspects with emotion analysis but it is not exactly its sub-field) has been largely overlooked despite its potential applications in almost every major area of natural language processing ranging from machine transla-

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WWW 2011, March 28–April 1, 2011, Hyderabad, India.
ACM 978-1-4503-0637-9/11/03.

tion (an example would include [12]) to text summarisation and language generation to e-learning systems. The present study seeks to draw attention towards this aspect of NLP and present one of the ways in which a multi-faceted and multi-layered feature like politeness could be formalised and analysed by the machines.

Politeness in Hindi is a little explored aspect of the language. Barring the study of some very rudimentary aspects of Hindi politeness in works like [11], there is no in-depth and detailed study of Hindi till now. So, the first step would be to give a detailed description of the Hindi politeness system, which will be used for developing a politeness recognition tool (PoRT) for Hindi.

Proper analysis and formalisation of the politeness phenomenon is quite a complex an challenging task in itself because of its variability in the language (there are several ways of being 'polite' and all these ways may be hierarchically arranged) and its highly context-based interpretation (what is polite in one context may actually become impolite in the other). Here are two examples to illustrate each instance.

1. Context: Suppose the speaker is a medical councillor and (s)he is trying to tell do's and dont's to a newly wed mother. In such a situation (s)he wants to tell the mother that she should breast-feed the child. It could be said in one of the following ways and this structural difference leads to the difference in politeness 'level' of the utterance.

   (a) बच्चे को माँ का दूध अवश्य पिलायें । (use of subjunctive form and high register) [4]
   Do give mother's milk to the child.

   (b) बच्चे को माँ का दूध ज़रूर पिलायें । (use of subjunctive form but no high register) [3]
   Do give mother's milk to the child.

   (c) बच्चे को माँ का दूध ज़रूर पिलाया जाये। (Use of passive)[2]
   The child should be given mother's milk.

   (d) बच्चे को माँ का दूध ज़रूर पिलाइये । (Use of honorific form of the verb) [1]
   Do give mother's milk to the child.

   (e) बच्चे को माँ का दूध ज़रूर पिलाना चाहिये ।(Use of suggestion and no direct instruction) [5]
   One should give mother's milk to the child.

2. Nisha accidentally meets her supervisor in the lobby of the centre. They have not met for a long time.

   (a) Context a: Nisha asks her supervisor to meet. मैम हम आपसे कल दोपहर में मिल सकते हैं क्या?
   Mam can I please meet you in the afternoon tomorrow?

   (b) Context b: The supervisor asks Nisha to meet her.
   मैम हम आपसे कल दोपहर में मिल सकते हैं क्या?
   Mam can I please meet you in the afternoon tomorrow?

In example 1, we see five different variants of the same utterance (the numeral in bracket shows the ranking of the sentence given by a Hindi speaker; rank 1 is considered the least polite and rank 5 is the most polite in a strictly formal context). It is to be noted that within certain contexts the speaker may not have option to use all of these and also the ranks may differ in other contexts. Thus in politeness analysis it is just not enough to analyse whether a sentence or a text is polite or impolite. We also need to analyse and tell tell 'how' (im)polite is the sentence/text.

Example 2 is an extreme case of the context-sensitiveness of politeness analysis. The same sentence becomes extremely impolite and one of the toughest forms of scolding when uttered by the other person. Thus while giving politeness analysis it is also very necessary to keep in mind the context in which the analysis is being done.

Thus politeness anlysis and development of PoRT presents a two-fold problem - it is not a binary distinction that we are dealing with (and the level to which we want to restrict it also needs to be fixed) and it is not a context-free phenomenon that we are trying to analyse (and the context in which a particular analysis holds also needs to be given).

3. EXISTING RESEARCH IN THE AREA

Unlike the theoretical modelling of politeness (discussed in brief in section 1), there is very little computational modelling of politeness which is of some significance. There have been some scattered attempts to model politeness and some of the strategies used for politeness. However, in the area of language teaching through computers and by computers, there have been a sustained interest towards developing a model of politeness through which these systems could be taught some polite ways of speaking and these systems, in turn, could teach these polite ways to foreign language learners of English.

One of the earliest attempts to teach polite behaviours to the pedagogical agents was as part of a larger attempt to build a socially intelligent agent which would be able to monitor learner performance and provide socially sensitive feedback at appropriate times [10]. Swati et al. [8] developed POLLy (Politeness for Language Learning). It adapted Brown & Levinson's model by combining a spoken language generator with an artificial intelligence planner. This system was applied for collaborative task-oriented dialogue and was designed for providing a fun and stimulating environment for learning English as a second language.

Roman et al. [23, 24] have been working on the role of politeness in automatic dialogue summarization. They have taken dialogues from Net Environment for Embodied Conversational Agents (NECA) and got them summarised. It has been found that politeness in dialogues are carried over in the summaries more often when they are marked. Moreover the point of view of the summarizer influences this information.

Much before these attempts, Ardissono et al. [2], described a framework for the representation and interpretation of indirect speech acts by relating them to the politeness phenomenon. In this system a plan-based representation of speech acts have been adopted. The speech-acts recognition algorithm is embedded in a plan-recognition system for the dialogues that seek information. This system integrates Leech's as well as Brown & Levinson's approach to politeness. Almost ten years later, Porayska-Pomata and Mellish [22] attempted to model politeness for an NLG (Natural Language Generation) system so as to account for the linguistic variation in a systematic way.

Miller et al. [18] developed a model which could produce

culture-specific, politeness-appropriate utterances and perceptions of utterances. It was based on brown & Levinson's model and it could prove to be a promising algorithm for creating proper computer training simulations and games with realistic and culture-specific social interaction models.

Miller et al. [17] describes a computational model of etiquette and politeness perception across different cultures and how it affects compliance to the directives issued to someone. It is called Computational Effects of Cultural Attributes and Etiquette on Directive Adherence (CECAEDA) and consists of four parts.

The works by Alexandrov et al. [1] and Ponomareva & Blanco [21] are the closest to the work being described here. The system being proposed by Alexandrov et al. measures politeness numerically taking into account three parameters – greetings, polite words and polite structures.

Most of these computational models that are developed taking politeness into account are developed for language teaching and text summarisation and that too only for English. However there has been no attempt as such to develop a tool for politeness analysis and recognition, which could be used for other NLP purposes.

4. RESEARCH METHODOLOGY

The tool will be developed using the hybrid approach. It implies that it will be developed using both the machine learning (in a semi-supervised manner) as well as the rules that will complement the learning. Moreover, it must be noted at the very outset that the system will take written text as input for the politeness analysis and so it will be built using the analysis where the prosodic features like intonation, pitch and tone do not play any role.

The best data for the analysis of politeness and training of the machine of this kind would be from the internet and the computer-mediated communication (CMC) in written form. CMC, on the one hand, gives the data of a natural conversation in real time and, on the other hand, prosodic features are absent from this data (or, they are represented in some written form).

Since there is no corpus of computer-mediated communication for Hindi available (corpus is absolutely necessary for the study of politeness in Hindi as well for machine learning), we have started to build one such corpus (named CO3H). The data of different kinds of CMC (both asynchronous and synchronous CMC) for the corpus is taken from the following sources:

1. Data for the blogs is collected using
   `http://chitthajagat.in` [a Hindi blog aggregator]
2. Data for web portals is collected using eight different web portals in Hindi
3. Data for e-forums is collected using Google and Yahoo groups in Hindi.
4. Data for e-mails is taken from 8 different people.
5. Data for public chats is taken from the log files of IRC chat on the channel 'India' of 'Dalnet' network. For private chats the data from Gmail chat transcripts is provided by the same people who gave it for the e-mails.
6. Data from social networking will be collected from Facebook and Orkut.

It is to be noted that the only those entries in blogs and web portals are taken which have received at least 3 replies/comments. For e-forums, only those threads are included in the corpus which have received at least one response/reply.

The data is then pre-processed (to clean up all the noise), arranged and annotated at different levels. Annotation at the POS level will be don using the BIS tagset which is now the Indian standard for POS tagging approved by the Bureau of Indian Standards (BIS; it is the nodal Government body to set up and decide the standards in the country across different fields). After POS tagging, sense tagging of the data will also be required (since politeness also depends on the sense in which the word is being used in a particular context). Some basic tagging at the syntactic level (related to the kind of sentence and the verb form) will also be required for the proper machine learning. At the discourse level, dialog act annotation will be done. Finally the data will also be annotated with politeness 'value' at all of these levels of annotation. The annotation will be done using the machine learning techniques. Moreover, since no tagset for semantic and syntactic tagging in Hindi is available, we will need to develop those also. Finally the machine will be trained using this annotated data.

At the same time an extensive linguistic analysis of politeness strategies used in Hindi online texts and communication will be carried out. Also the politeness value of the words/senses/structures will be decided and incorporated. Assignment of this politeness 'value' will generally be done on the basis of surveys carried out among the speakers of Hindi. This will ensure a more balanced and sociolinguistically aware grading of the structures.

The system will not only have access to these rules but also the whole annotated corpus. The system will also be trained on this corpus. This will ensure out-of-dictionary search in cases where rules are not clearly marked.

Some of the machine learning algorithms that we have zeroed in to apply for this purpose include Multinomial Naive Bayes (NBM), Support Vector Machines (SVM) and Maximum Entropy. The machine will be trained by each of these algorithms using a small set of annotated data and the performance will be evaluated using the standard measures of Precision, Recall, F-score, given by the following formulae (taken from [25]).

$$Precision : P = \frac{TP}{TP + FP}$$

$$Recall : R = \frac{TP}{TP + FN}$$

In the above two equations, TP stands for correctly classified positive examples, FP stands for incorrectly classified positive examples and FN stands for incorrectly classified negative examples.

F-score is the weighted average of the 'precison' and 'recall' values given by above equations and it is given by the following equation.

$$F - Score : F = \frac{(\beta^2 + 1)P}{(\beta^2 + 1)P + R}$$

Machine will be trained completely using one of these algorithms, depending on the accuracy achieved on being trained by that particular algorithm.

Finally rules will be devised for the places where the machine is making errors in the testing phase and these rules will be incorporated with the trained system, which is expected to make the system more accurate and consistent.

5. PROGRESS TILL NOW

At present the collection and arrangement of the corpus is underway. We have collected a substantial amount of corpus till now, which include the following.

1. Data for blogs is collected from around 100 blog sites, totaling more than 2500 blog entries.
2. Data for portals is collected from two web portals, totaling around 200 entries.
3. Data for e-forums is taken from five Google groups in Hindi, totaling around 500 discussions.
4. Access to more than 10,000 e-mails have been acquired but only few hundreds among them are expected to be in Hindi
5. More than 1000 private chat transcripts in Hindi is acquired (average length of transcripts is around 80-100 lines, with transcripts being as small as two lines and as big as 500 or more lines.
6. Public chats of around 150 days have been logged but again, as in e-mails, chats in Hindi will need to be sieved out of them.

Along with the corpus collection, the linguistic analysis has also started and the some of the results are shown in the examples given in section 2 above (a more detailed analyses is found in [12] and [13]). Furthermore preparation of the dialog act tagset have also been initiated. The initial annotation scheme of the dialog act (reinterpreted as communicative units for CMC, particularly asynchronous CMC) annotation has been prepared and soon the tagset will also be finalised. The scheme is based on the classification of registers and sub-registers, as described below.

1. Blogs
   (a) Blog Posts
      i. Opinions
         A. Socio-political Issues
         B. Movie Reviews
         C. Other Issues
      ii. Informations
         A. Technical Help/ information
         B. Other General information
      iii. Creative Writing
         A. Poetry
         B. Stories
   (b) Comments
      i. Related reaction
         A. Attack
         B. Appreciate
      ii. Related non-reaction
         A. Direction
         B. Elaboration
      iii. Non-related reaction
2. Web Portals
   (a) Main Posts
      i. Same as blog posts
   (b) Comments
      i. Same as blog comments
3. E-forums
   (a) First Post
      i. Questions
         A. Help seeking
         B. Information seeking
      ii. Discussion initiation
         A. Socio-political issues
         B. Other issues
      iii. Opinion seeking
         A. Socio-political opinion
         B. Other opinions
   (b) Follow-up posts
      i. Same as blog comments
4. E-mails
   (a) First Mail
      i. Same as e-forums first post
   (b) Replies to the mails
      i. Same as blog comments
5. Social Networking
   (a) First Post
      i. Same as e-forums first post
   (b) Follow-up posts
      i. Same as blog comments
6. Chats (Not yet fully worked out but they are expected to follow a very similar pattern as dialog act annotation scheme, since they are very close to spoken communication in certain aspects)
   (a) Public Chats
   (b) Private Chats

6. THE WAY AHEAD

The work related to most of the aspects of the research have already started. The tentative future goals in front of us are as follows

1. The immediate goal is to get the cleaned up raw corpus ready within a few months time (our target is July, 2011).
2. Once the corpus is ready, the manual annotation of the corpus will begin. It will start with POS annotation and then annotation with the communicative units.

3. After this work on semantic and syntactic annotation scheme and tagset will begin. After the preparation of this tagset, manual annotation of the corpus will begin with this tagset (it is expected to start around January, 2012).

4. Along with it, the linguistic analysis of the data is also expected to reach a more mature and nuanced level.

5. Once the linguistic analysis is done (or reaches a substantially advanced stage) then the rules regarding the 'levels' of politeness each kind of structure encodes and other clearly visible patterns will be formulated.

6. After all this background work is complete then the training and testing of the system will begin.

7. REFERENCES

[1] M. Alexandrov, B. X., P. N., and R. P. Constructing empirical models for automatic dialog parameterization. In *Proceedings of the 10th International Conference on Text, Speech and Dialogue*, number 4629 in LNAI, pages 455–463. Springer-Verlag, 2007.

[2] L. Ardissono, G. Boella, and L. Lesmo. Indirect speech acts and politeness: A computational approach. In J. D. Moore and J. F. Lehman, editors, *Proceedings of the 17th Cognitive Science Conference, Pittsburgh*, number 316-333, New Jersey Hove, UK, 1995. Lawrence Erlbaum Associates, Publishers.

[3] D. Bousfield. *Impoliteness in Interaction.* John Benjamins Publishing Company, Amsterdam, 2008.

[4] P. Brown and S. Levinson. *Politeness: Some Universals in Language Usage*. Cambridge University Press, Cambridge, 1987.

[5] J. Culpeper. Towards an anatomy of impoliteness. *Journal of Pragmatics*, 25:349–367, 1996.

[6] G. Eelen. *A Critique of Politeness Theories*. St Jerome, Manchester, 2001.

[7] A. Fukada and N. Asato. Universal politeness theory: application to the use of japanese honorifics. *Journal of Pragmatics*, 36:1991–2002, 2004.

[8] S. Gupta, M. Walker, and D. M. Romano. How rude are you?: Evaluating politeness and affect in interaction. In A. C. Paiva, R. Prada, and R. W. Picard, editors, *ACII '07 Proceedings of the 2nd international conference on Affective Computing and Intelligent Interaction*, pages 203 – 217. Springer Berlin / Heidelberg, 2007.

[9] S. Ide. Preface: The search for integrated universals of linguistic politeness. *Multilingua*, 12(1):7–12, 1993.

[10] W. L. Johnson and P. Rizzo. Politeness in tutoring dialogs: "run the factory, that's what i'd do". In J. C. Lester, R. M. Vicari, and F. Paraguaçu, editors, *Intelligent Tutoring Systems*, volume 3220 of *Lecture Notes in Computer Science*, pages 206–243. Springer Berlin / Heidelberg, 2004.

[11] Y. Kachru. *Hindi*. John Benjamins Publising Company, Amsterdam, 2006.

[12] R. Kumar. An overview of politeness strategies. In *4th International Students' Conference of Linguistics in India, SCONLI-4, Mumbai*, 2010.

[13] R. Kumar. Comments in blogs and web portals: a study in politeness. To be presented at 29th South Asian Language Analysis Roundtable (SALA29), 8-10 January, 2011, January 2011.

[14] R. Lakoff. The logic of politeness; or minding your p's and q's. *Chicago Linguistics Society*, 8:292–305, 1973.

[15] G. Leech. *Principles of Pragmatics*. Longman, 1983.

[16] A. Meier. Passages of politeness. *Journal of Pragmatics*, 24:381–392, 1995.

[17] C. A. Miller, T. O. Peggy Wu, Vanessa Vakili, and K. Smith. Culture, politeness and directive compliance. In C. Stephanidis, editor, *Proceedings of the 5th International Conference onUniversal Access in Human-Computer Interaction. Addressing Diversity. Part I: Held as Part of HCI International 2009*, volume 5614 of *Lecture Notes in Computer Science*, pages 568–577. Springer Berlin / Heidelberg, 2009.

[18] C. A. Miller, P. Wu, and H. B. Funk. A computational approach to etiquette: Operationalizing brown and levinson's politeness model. *IEEE Intelligent Systems*, 23(4):28–35, July/Aug 2008.

[19] J. O'Driscoll. About face: A defence and elaboration of universal dualism. *Journal of Pragmatics*, 25:1–32, 1996.

[20] J. Pfister. Is there a need for a maxim of politeness? *Journal of Pragmatics*, 42:1266–1282, 2010.

[21] N. Ponomareva and X. Blanco. Example-based empirical formula for politeness estimation in dialog processing. In *Proceedings of 10th International Workshop on NooJ applications*, 2007.

[22] K. Porayska-Pomata and C. Mellish. Modelling politeness on natural language generation. In A. Belz, R. Evans, and P. Piwek, editors, *Natural Language Generation*, volume 3123 of *Lecture Notes in Computer Science*, pages 141–150. Springer Berlin / Heidelberg, 2004.

[23] N. T. Roman, P. Piwek, and A. M. B. R. Carvalho. Politeness and summarization: an exploratory study. In *Proceedings of AAAI Spring Symposium on Exploring Attitude and Affect in Text: Theories and Applications (AAAI-EAAT 2004)*. AAAI Technical Report SS-04-07, 2004a.

[24] N. T. Roman, P. Piwek, and A. M. B. R. Carvalho. Politeness and bias in dialogue summarization: two exploratory studies. In W. B. Croft, J. Shanahan, Y. Qu, and J. Wiebe, editors, *Computing Attitude and Affect in Text: Theory and Applications*, volume 20 of *The Information Retrieval Series*, pages 171–185. Springer Netherlands, 2006.

[25] M. Sokolova and S. Szpakowicz. Machine learning applications in mega-text processing. In E. S. Olivas, J. D. M. Guerrero, M. M. Sober, J. R. M. Benedito, and A. J. S. López, editors, *Handbook of research on machine learning applications and trends: algorithms, methods and techniques*, volume 2, pages 325–347. Information Science Reference, New York, 2010.

[26] R. J. Watts. *Politeness*. Cambridge University Press, Cambridge, 2003.