CHAPTER 9

CONCLUSION

9.1 CONCLUSION

In the present research work, the application of MD as a document level sentiment detection measure has been demonstrated. Customer reviews on three different products have been classified as positive or negative using the MD. A new method for representing the text review as a feature vector consisting of representative terms has been proposed. The laborious procedure involved in the dimensional reduction using SVD has been eliminated as the text has been represented using eight or less features using the representative terms.

The collection of these feature vectors of all the reviews has been named as RTDM (Representative term-document matrix). Two different formats of RTDM have been used for calculating the MD. In the first format, the entries in the RTDM represent the frequency of the corresponding RT in the document, whereas in the second format, the frequency of the RT has been converted as a fuzzy score using an intuitive method.

Thus, three different classifiers have been developed in this research work namely MDC, MFSC and FLC. MDC uses the first format (RTDM) for the sentiment analysis, whereas the MFSC and FLC use the second format (RTDM-FS) for the sentiment analysis.
The proposed system in this thesis handles the explicit opinions only. The implicit opinions can not be handled by the proposed system. The explicit opinions are found in subjective sentences and hence the opinion words/phrases can be captured and then the RT can be assigned for calculating the MD and thus the sentiment can be determined. Since the implicit opinions are found in objective sentences, in which no opinion words/phrases can be captured and hence the proposed system can not handle the implicit opinions. In a document level sentiment analysis, the feature level sentiment analysis is not performed and hence the proposed system can not handle the implicit/explicit features.

For camera reviews, the MFSC achieved 87.36% of classification accuracy followed by MDC with 85.5% of accuracy and FLC with 79% of accuracy.

For cell phone reviews, the MDC achieved 78.8% of accuracy followed by MFSC with 78% and FLC with 76.2% of accuracy.

For movie reviews consisting of 25000 reviews, the MDC achieved 70.8% of classification accuracy followed by MFSC with 69.4% and FLC with 65.8%. It was observed that, the reviews containing more terms with negative connotations but ending with a positive note have been wrongly classified. This emphasizes the need for sentence level analysis compared to the document level analysis in the present work. The hybrid of MDC and MLP achieved 98.8% of accuracy, the hybrid of MFSC and CART achieved 99.78% of accuracy and the hybrid of FLC and CART achieved 98.9% of classification accuracy.

From the experiments carried out in this research work, the usefulness of MD as a measure for detecting the sentiment at document level
has been established. Also in this research work, the advantage of representing the text documents in the form of RTDM has been demonstrated.

9.2 SCOPE FOR FUTURE RESEARCH

The current study can be extended to

- detect the sentiment at feature level.
- carry out the sentence level sentiment analysis to capture the \textit{representative term (RT)} to overcome the problem of ambivalence i.e. a review sentence containing more terms with negative connotations and ending with a positive note.
- enhance the performance of FLC proposed in this thesis, as the present design has a poor \textit{recall}.
- find a general method to identify the Mahalanobis space (MS) from the RTDM.
- find the reasons for the very high accuracy of the ML classifiers like MLP and CART as a hybrid with MDC/MFSC/FLC.

Though the proposed system does not have any measures for handling the fake/untruthful/biased/paid reviews, the following enhancements can be made to handle them.

- Separate the reviews with very high frequency of RT towards a particular polarity i.e. very high positive RT frequency or very high negative RT frequency. Usually the fake reviews are extremely lengthy; hence based on this criteria the fake reviews can be detected. Also by incorporating a system to monitor the IP Address of the computer system from which the reviews are uploaded, the genuineness of the reviews can be verified.