

Contents

1	Introduction	1
1.1	Levels of Sentiment Analysis	3
1.2	Approaches to ABSA	5
1.3	Evaluation Metrics	12
1.4	Applications of ABSA in Hindi	14
1.5	Challenges in ABSA of Hindi language	15
1.6	Problem Statement	17
1.7	Thesis outline	18
2	Background Study	20
2.1	Sentiment Analysis	21
2.2	Aspect Term Extraction	22
2.3	Aspect Category Detection	23
2.4	Aspect Sentiment Classification	24
2.5	Aspect Category-Sentiment Polarity Pair Prediction	26
2.6	ABSA datasets	28

Contents

2.7	Classifications in Machine Learning	36
2.8	Summary	37
3	A Preliminary investigation on Sentiment Analysis	39
3.1	Methodology	40
3.2	Setup for Experimentation	40
3.2.1	Data pre-processing	41
3.2.2	Feature Extraction	42
3.2.3	Model Training	43
3.3	Results and Analysis	50
3.4	Summary	54
4	Aspect Term Extraction for Hindi	56
4.1	Framework	56
4.1.1	Data pre-processing	58
4.2	Experimental Design	58
4.3	Evaluation Results and Analysis	64
4.4	Summary	67
5	Aspect Category Detection for Hindi	69
5.1	Methodology	70
5.2	Experimental Setup	70

Contents

5.2.1	Data pre-processing	70
5.2.2	Fully connected layer	74
5.3	Evaluation Results and Analysis	75
5.3.1	Experimental Setup	75
5.3.2	Model Evaluation	76
5.3.3	Result Analysis	76
5.3.4	Accuracy Analysis	77
5.3.5	Influence of batch size and learning rate	80
5.3.6	Comparison of aspect Category Detection Results	81
5.4	Summary	82
6	Aspect term category-wise sentiment aggregation framework for Hindi document	84
6.1	Methodology	85
6.2	Results and Analysis	89
6.2.1	Performance Analysis	93
6.2.1.1	MLC	93
6.2.1.2	MCC	95
6.3	Summary	96
7	Conclusions and future work	97
7.1	Conclusion	97

Contents

7.2 Future Work	98
A	115
Publications based on the Thesis Works	116