Chapter 7

Conclusions and future work

7.1 Conclusion

This dissertation presents a comprehensive exploration of sentiment analysis and aspect-based sentiment analysis (ABSA) in the context of the Hindi language, a low-resource yet widely spoken language. The work addresses key challenges in resource scarcity by developing a domain-balanced annotated dataset, which contributes significantly to the field by enabling more reliable experimentation and modeling.

Multiple machine learning and deep learning approaches were investigated for sentiment polarity detection at sentence and document levels. The methods were applied not only to Hindi but also extended to English, demonstrating the multilingual adaptability of the techniques. Among the models evaluated, deep learning architectures showed superior performance in handling nuanced sentiment expressions.

In the domain of fine-grained sentiment analysis, the dissertation proposed effective methods for aspect term extraction. The models demonstrated the ability to accurately extract both single-word and multi-word aspect terms. Further, a deep learning-based approach for predicting aspect categories was introduced. The results confirmed the model's robustness when compared with existing methods

for Hindi.

To address document-level sentiment analysis, an approach based on aspect category-level sentiment aggregation was presented. This strategy enabled a more structured and interpretable way to determine overall sentiment by identifying aspect categories and their associated sentiments across sentences.

A notable strength of the proposed work is the architectural simplicity of the models used. They are designed to be computationally efficient without compromising accuracy, making them well-suited for real-world applications, especially in low-resource scenarios. Although an ablation study was not performed due to the simplicity and integrated design of the model components, the overall system was rigorously evaluated using multiple experimental setups and baselines.

In essence, this dissertation makes significant contributions to advancing sentiment analysis in Hindi and paves the way for further multilingual and resource-robust NLP research. The methodologies and resources developed here can serve as foundational tools for future applications in opinion mining, customer feedback analysis, and social media monitoring in regional languages.

7.2 Future Work

The development of ABSA systems for low-resource languages presents many challenges that need to be addressed. Dataset scarcity is one of the major challenges.

Future research can expand the TU-HSA dataset to include additional domains and diverse sentiment categories. Exploring advanced transformer-based models like IndicBERT and MuRIL can enhance performance in aspect term extraction and sentiment classification.

Additionally, extending the framework to support cross-lingual or multilingual sentiment analysis can make it applicable to a broader range of Indian

languages. The integration of real-time tools for sentiment analysis and visualization dashboards will enhance practical applications in industries like e-commerce, customer feedback analysis, and social media monitoring. Finally, exploring sentiment dynamics in streaming data and domain-specific applications will further solidify the relevance of ABSA in real-world scenarios.

These future directions aim to refine the framework, advance sentiment analysis research, and address linguistic and computational challenges in low-resource languages like Hindi.