

Financial Sentiment Analysis Using Various NLP Techniques

– Executive Summary –

This study evaluates Recurrent Neural Networks (RNNs), Long Short-Term Memory Networks (LSTMs), and Transformers for financial sentiment analysis using the Financial Phrase Bank dataset.

Key Findings

- **Transformers** achieved the highest accuracy (64%) and excelled across sentiment classes, particularly in positive and neutral sentiments.
- **LSTMs** showed balanced performance with 63% accuracy, benefiting from improved long-term dependency handling.
- **RNNs** struggled with complex dependencies, achieving 61% accuracy and poor performance on negative sentiment.

Observations

- **Strengths:** Transformers excelled in handling complex contextual relationships and large-scale computations, demonstrating robustness across sentiment classes. LSTMs effectively modeled sequential dependencies with balanced results.
- **Weaknesses:** All models struggled with the negative sentiment class due to its underrepresentation in the dataset, highlighting the challenges of imbalanced data.

Recommendations

Focus on data augmentation and hybrid approaches to address class imbalances and improve performance for underrepresented sentiments. Transformers demonstrated the most potential for capturing financial text nuances effectively.

Conclusion

The study underscores the effectiveness of modern architectures like Transformers in financial sentiment analysis, demonstrating their ability to handle complex and nuanced financial language. While LSTMs offer balanced performance and RNNs provide baseline insights, Transformers stand out as the most reliable and versatile option for this domain. Future research should focus on addressing class imbalances and integrating hybrid solutions for improved classification accuracy.