# ABSTRACT

Natural Language Processing (NLP) has evolved from rule-based methods to sophisticated neural models, transforming how machines understand and generate human language. Traditional NLP excels in structured linguistic tasks, offering interpretability and reliability, whereas Generative AI, driven by transformer-based models like GPT and BERT, provides contextual fluency and creative text generation. This paper explores a hybrid approach that integrates the precision of traditional NLP techniques with the adaptability of Generative AI to enhance robustness in text processing.

We outline the historical evolution of NLP, discuss core techniques for combining rule-based systems with deep learning architectures, and present a case study showcasing hybrid text generation for factual accuracy. The applications of such systems span multiple domains, including healthcare, education, and customer support, demonstrating improved efficiency and contextual accuracy. However, challenges such as data dependency, computational costs, and ethical risks must be addressed.

Future directions include optimizing hybrid NLP models for low-resource languages, ensuring fairness and bias mitigation, and expanding multimodal capabilities. This research highlights the potential of hybrid NLP systems to balance structure and creativity, paving the way for more reliable and scalable AI-driven text generation and analysis.

# CONTENTS

**Sl. No. Chapter Name Page No.**

1. **Abstract i**
2. **Contents ii**
3. **List of figures iii**
4. **List of tables iv**
5. **Introduction 01-02**
6. **Literature Survey 03-06**
7. **Technology/Methodology followed 07-11**

**3.1. Traditional NLP Techniques 07**

**3.2. Generative AI Models 08**

**3.3. Hybrid Model Design 08**

**3.4. System Architecture 09**

**3.5. Training and Dataset Considerations 10**

**3.6. Challenges and Future Improvements 11**

**References 12**

**LIST OF FIGURES**

**Figure. No Figure Name Page. No**

|  |  |  |
| --- | --- | --- |
| Figure 1.0  Figure 1.1  Figure 1.2  Figure 1.3 | Dataflow Diagram  Hybrid Model Design  System Architecture  Training and Dataset Considerations | 07  08  09  10 |

**LIST OF TABLES**

**Table. No Table Name Page. No**

Table 1.0. Literature Survey 03-06