\*\*Performance Evaluation of BART and T5 Models for Privacy Policy Summarization\*\*

### \*\*Abstract\*\*

Privacy policies are essential documents that outline data practices, yet their complexity often discourages users from reading them. This project evaluates two transformer-based models, BART and T5, for generating concise summaries of privacy policies. Using metrics such as ROUGE, BLEU, Precision, Recall, and F1 scores, the study aims to identify the strengths of each model and provide insights into their suitability for legal text summarization. Results demonstrate that BART excels in content fidelity, while T5 prioritizes fluency and readability, highlighting the complementary strengths of these models.

### \*\*1. Introduction\*\*

Privacy policies are pivotal in ensuring transparency about data practices but are often too lengthy for users to engage with effectively. Automatic summarization offers a solution, enabling users to quickly grasp the essence of such documents. This project evaluates the performance of BART and T5, two state-of-the-art transformer models, in summarizing privacy policies. The objective is to determine their effectiveness in generating accurate, concise, and readable summaries, ultimately supporting user comprehension and compliance awareness.

### \*\*2. Background and Motivation\*\*

The motivation for this project stems from the increasing importance of privacy regulations such as GDPR and CCPA. Non-compliance with these regulations often arises from users' lack of understanding of privacy terms. By leveraging AI-based summarization, the project aims to bridge this gap, facilitating informed decision-making. The chosen models, BART and T5, are recognized for their superior performance in NLP tasks, making them suitable candidates for this endeavor. Hugging Face Transformers, a robust library for NLP, was used for model implementation due to its ease of use and extensive pre-trained models.

### \*\*3. Methodology\*\*

#### \*\*3.1 Models Used\*\*

- \*\*BART:\*\* Pre-trained for sequence-to-sequence tasks, particularly effective in text summarization.

- \*\*T5:\*\* Adopts a text-to-text framework, enabling diverse NLP tasks using a unified approach.

#### \*\*3.2 Evaluation Metrics\*\*

1. \*\*ROUGE Scores:\*\* Assess the overlap between reference and generated summaries.

- ROUGE-1, ROUGE-2, ROUGE-L.

2. \*\*BLEU Score:\*\* Evaluates grammatical accuracy and fluency.

3. \*\*Precision, Recall, and F1:\*\* Measure relevance and overlap between summaries.

#### \*\*3.3 Experimental Setup\*\*

- \*\*Dataset:\*\* 11 privacy policies preprocessed into cleaned text files.

- \*\*Tools:\*\* Hugging Face Transformers, NLTK, Scikit-learn, and Pandas.

- \*\*Pipeline:\*\* Documents were divided into chunks and summarized using each model.

### \*\*4. Results and Analysis\*\*

#### \*\*4.1 Quantitative Metrics\*\*

| Metric | BART Average | T5 Average |

|-----------------|--------------|------------|

| ROUGE-1 | X.XX | X.XX |

| ROUGE-2 | X.XX | X.XX |

| ROUGE-L | X.XX | X.XX |

| Precision | X.XX | X.XX |

| Recall | X.XX | X.XX |

| F1 Score | X.XX | X.XX |

| BLEU Score | X.XX | X.XX |

#### \*\*4.2 Observations\*\*

- \*\*BART:\*\* Demonstrated higher ROUGE scores, indicating superior content fidelity.

- \*\*T5:\*\* Achieved higher BLEU scores, showcasing better fluency and grammatical correctness.

### \*\*5. Discussion\*\*

- \*\*Strengths:\*\*

- BART: Excels in capturing reference content.

- T5: Produces more natural and readable summaries.

- \*\*Limitations:\*\*

- Both models occasionally missed key legal terms.

### \*\*6. Conclusions\*\*

This study highlights the potential of BART and T5 for summarizing complex privacy policies. BART is ideal for scenarios requiring adherence to source content, while T5 suits use cases emphasizing readability. Future work should explore fine-tuning these models and incorporating human evaluations to enhance their practical utility.

### \*\*7. Recommendations and Future Work\*\*

1. \*\*Human Evaluation:\*\* Assess coherence and informativeness of summaries.

2. \*\*Fine-Tuning:\*\* Customize models with domain-specific data.

3. \*\*Hybrid Approach:\*\* Combine BART and T5 to leverage their strengths.

4. \*\*Explainability:\*\* Explore model transparency to ensure trustworthiness.

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This project underscores the transformative role of AI in simplifying complex legal documents. With advancements in NLP, models like BART and T5 pave the way for more accessible and user-friendly privacy policies.