Review

A Review of the State-of-the-Art Techniques and Analysis of Transformers for Bengali Text Summarization

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Abstract: Text summarization is a complex and essential task in natural language processing (NLP) research, focused on extracting the most important information from a document. This study focuses on the Extractive and Abstractive approaches of Bengali Text Summarization (BTS). With the breakthrough advancements in deep learning, summarization is no longer a major challenge for English, given the availability of extensive resources dedicated to this global language. However, the Bengali language remains underexplored. Hence, in this work, a comprehensive review has been conducted on BTS research from 2007 to 2023, analyzing trends, datasets, preprocessing techniques, methodologies, evaluations, and challenges. Leveraging 106 journal and conference papers, this review offers insights into emerging topics and trends in Bengali Abstractive summarization. The review has been augmented with experiments using transformer models from Hugging Face and publicly available datasets to assess the Rouge score accuracy for Abstractive summarization. The extensive literature review conducted in this study reveals that before the advent of transformers, LSTM (Long Short-Term Memory) models were the dominant deep learning approach for text summarization across various languages. For transformers, one of the key datasets utilized was XL-SUM with the MT5 model emerging as the best performer among various contemporary multilingual models. These findings contribute to understanding the contemporary techniques and challenges in BTS. Furthermore, recommendations are made to guide future research endeavors, aiming to provide valuable insights and directions for researchers in this field.

Keywords: abstractive; Bengali language; extractive; natural language processing; text summarization; transformer models

1. Introduction

The purpose of text summarization [1–3] is to highlight crucial details for better contextual understanding of a relatively longer text [4]. Achieving accurate summarization involves employing a variety of methodologies, with machine learning (ML), deep learning (DL), and statistical approaches currently dominating the field [5]. Text summarization primarily employs two approaches: Extractive and Abstractive (See Figure 1) [6,7].

- **Extractive**: Extractive: This approach generates sentences or phrases directly from the source material without introducing new sentences.