

LLM-Based Analysis of Media Coverage on Nuclear Power in Czech Republic

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1. Introduction

European Union is determined to maintain its environmental policy, aiming at reduction of greenhouse gas emissions. With ambitious goals ahead, nuclear power turns out to be one of the greatest tool to improve member states' CO₂ footprint [1]. However, in democratic countries, great, nation-wide investments, require social support, or at least acceptance, and there are several factors shaping that public believes, with media coverage, being one of them [2]. This study investigates media portrayals of nuclear power in the Czech Republic using Natural Language Processing techniques. We focus specifically on sentiment expressed in article bodies across three major Czech media outlets, between 2006 and 2024. Using large language models (LLMs), we assessed body sentiment scores for over 8,400 articles. The primary goal is to examine how sentiment toward nuclear energy evolved over time, identify systematic differences in LLM scoring, and evaluate whether media tone correlates with trends in public support.

2. Methodology

In this section are described some of the techniques used to acquire and statistically process data. They include web-scraping, and tools of statistical analysis.

2.1 Data acquisition process

We selected three influential Czech media outlets based on three key criteria: public accessibility (no paywall), compatibility with web scraping tools, and the availability of archived content reaching back to at least 2006. Articles were collected either directly via keyword-based web scraping or indirectly by filtering broader datasets. This ensured relevance to the nuclear energy discourse. After removing duplicates and irrelevant entries, we compiled a final dataset of 8405 unique news articles. For each article, metadata such as the publication date, headline, source, and URL was also preserved for analysis.

2.2 Data Processing

Each article in the dataset was individually assessed using a 1-5 Likert scale on its overall sentiment toward nuclear energy. The rating was conducted automatically

using three state-of-the-art LLMs: Gemini Flash 2.0 (Google DeepMind, 2024), ChatGPT-4o (OpenAI, 2024), and DeepSeek-V3 (DeepSeek AI, 2024). Recognizing their strong performance in multilingual and complex comprehension tasks [3,4], we assume that LLMs are suitable for this type of analysis. This approach was much more efficient in terms of time and cost than manual annotation, particularly due to the large size of the dataset.

2.3 Statistical Analysis

To evaluate consistency and divergence in sentiment assessments, we employed several statistical techniques. Pearson correlation coefficients were calculated to assess the strength and direction of linear relationships between sentiment scores assigned by different LLMs across media outlets and years. This helped identify how similarly the models interpreted the same content. To assess the degree of agreement between models more robustly, we applied the Intraclass Correlation Coefficient (ICC), which measures the reliability of ratings given by multiple evaluators. ICC was particularly useful in determining whether the models could be considered interchangeable. Finally, one-way ANOVA tests were used to evaluate whether the mean sentiment scores differed significantly across the three LLMs. This allowed us to statistically confirm whether any observed differences in sentiment assessments were significant rather than random. Together, these tests provided a comprehensive evaluation of model alignment and interpretative variance.

3. Results

The analysis of body sentiment scores for Czech news articles revealed consistent upward trends in positivity across all three LLMs between 2006 and 2024. Despite minor year-to-year fluctuations, sentiment ratings generally increased over time, suggesting a gradual shift toward more favorable or neutral portrayals of nuclear energy in the Czech media. Notably, major events (ex. 2011-Fukushima disaster, 2022-outbreak of full scale Russian invasion) did influence the ratings rapidly (Fig. 1).

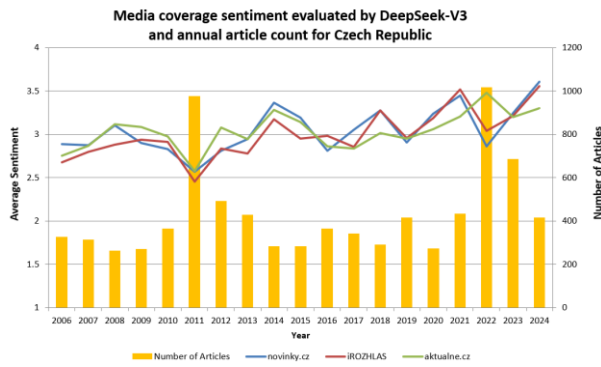


Fig. 1. Media coverage sentiment evaluated by DeepSeek-V3 and annual article count for Czech Republic

The analysis of Article Body Sentiment ratings revealed moderate to good inter-rater reliability, as reflected by the ICC values. This indicates a consistent level of agreement among raters. Pearson correlation coefficients between model outputs varied by media outlet. Notably, Chat GPT and Gemini models frequently showed high agreement, in comparison to DeepSeek-V3 (Tab. 1). Overall, the results demonstrate that sentiment ratings for article bodies are generally consistent both across different models and media outlets, supporting the robustness of the sentiment analysis approach.

ANOVA testing confirmed statistically significant differences between the average sentiment scores assigned by the three models, reinforcing that the LLMs are not interchangeable. The Czech case displayed both increasing sentiment positivity and measurable divergence in model interpretation.

Table I: Pearson Correlation Coefficient among LLMs

Media Outlet	Gemini vs ChatGPT	Gemini vs DeepSeek	ChatGPT vs DeepSeek
aktualne.cz	0.52	0.61	0.64
iROZHLAS	0.89	0.52	0.64
novinky.cz	0.83	0.58	0.59

4. Conclusions

This research highlights a gradual rise in positive media sentiment toward nuclear energy in the Czech Republic over the past two decades. While LLM-based sentiment analysis proved robust and largely consistent, model-specific differences were statistically significant. These findings emphasize the importance of considering model variability in computational media analysis and provide valuable insights into the evolving media landscape surrounding nuclear energy in Central Europe.

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