Research and Application Development of Large Language Models in the Field of Journalism

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Abstract: ***This paper comprehensively reviews the research and application development of large language models in the field of journalism. First, it clarifies the basic concepts, technical principles and basic functions of large language models. Second, it introduces typical application examples of large language models in the field of journalism at home and abroad, and discusses the instruction data basis and its evaluation methods. Finally, it discusses the future application prospects and challenges faced by large language models in the field of journalism, and puts forward corresponding countermeasures and suggestions. This review provides valuable reference for the follow-up work in this field.***

Keywords: Large Language Model; Natural Language Processing; Transformer; Challenges of Journalism Application.

1. INTRODUCTION

With the rapid development of artificial intelligence technology, news agencies are actively exploring the application of new technologies, especially the introduction of large language models (LLMs) as a new solution. Large language models have powerful natural language processing capabilities and can generate news reports in a short time, which is particularly suitable for emergencies or news with high timeliness requirements. In these scenarios, it can quickly integrate online information to generate a draft, provide a preliminary reporting framework for journalists, and improve the speed and timeliness of news release.

In addition, large language models can generate creative content such as planning outlines and interview questions based on massive data, broaden the thinking of journalists, provide new reporting perspectives and entry points, and thus create more attractive and unique news works. At the same time, it can also help journalists with basic editing work such as text polishing and grammar checking, and generate news texts with corresponding language styles according to different media styles and audience characteristics, making the reports more in line with specific requirements.

On the other hand, large language models provide powerful data analysis for journalists by using massive data, mine news trends and hotspots, and assist in topic planning. This enables journalists to quickly understand the focus of social attention and public opinion trends, and determine valuable reporting topics. Based on data such as users' reading history, browsing habits, and click behavior, large language models can also generate personalized news recommendations for each user, realizing the transformation from "people looking for information" to "information looking for people", enhancing users' attention and reading interest in news, and increasing user stickiness. In addition, it can also quickly translate and localize news content, break language barriers, enable news to be widely spread in different language regions, expand the scope and influence of news dissemination, and promote global information exchange.

Although large language models perform outstandingly in natural language processing tasks in the news field, their applications also face a series of challenges. Therefore, it is necessary to deeply study the problems faced by large language models in the news field and their solutions and paths.

2. BASIC CONCEPTS AND TECHNICAL PRINCIPLES OF LLMS

Large language models refer to deep neural network models trained on large-scale corpora. The core lies in leveraging massive amounts of data to learn the patterns and features of natural language, thereby achieving in-depth understanding and generation of text. The core technologies and principles of large language models can be summarized as follows.

2.1 Architecture Basics

Large language models are typically based on the Transformer architecture, a neural network architecture proposed by Vaswani et al. in 2017. At its core is the self-attention mechanism, which enables the model to focus on different parts of the input sequence when processing sequential data, thus effectively capturing long-range dependencies. The Transformer architecture has become the mainstream choice for large language models due to its parallel processing capabilities and excellent performance.

2.2 Core Components

1) Self-attention mechanism: When processing each word, the model considers all other words in the input sequence and assigns different attention weights based on their correlations. 2) Multi-Head Attention [4]: Decomposes the attention mechanism into multiple independent attention heads, each head focusing on different aspects of information, thus enhancing the model's parallel processing ability and its ability to capture complex features. 3) Feed Forward Network: Performs a non-linear transformation on the output of each position to further improve the model's expressive power. 4) Layer Normalization: Accelerates the training process and improves the model's performance. 5) Residual Connections: Bypasses potential gradient vanishing problems, enabling the model to train deeper network structures.

2.3 Training Process

1) Pre-training: Conduct unsupervised training on a large amount of unlabeled text to learn general language representations. This step enables the model to master the meanings of words, grammar rules, and the usage of language. 2) Fine-tuning: Further train the model on a small-scale labeled dataset for a specific task or domain to adapt to the specific task requirements. This helps the model perform better in specific scenarios.

2.4 Efficient Training Techniques

1) Mixed Precision Training: Uses a lower-precision data type (e.g., FP16) to accelerate training while maintaining sufficient precision. 2) Activation Recomputation: Recomputes activation values during backpropagation to save memory. 3) Flash Attention and Paged Attention: Efficiently handle attention calculations for long sequences, reducing computational resource consumption. 4) Parallel Training Techniques Include data parallelism, tensor model parallelism, pipeline parallelism, and 3D parallelism, which can accelerate the training process of large models.

2.5 Parameter Optimization and Adjustment

1) Prompt Tuning: Guide the model to generate specific outputs by adjusting the input prompt without modifying the model parameters. 2) Prefix Tuning: Only fine-tune the prefix part of the model input instead of the entire model. 3) Adapter and LLaMA-Adapter]: Add lightweight adapter modules to each layer of the model and only fine-tune these modules. 4) LoRA (Low-Rank Adaptation): Update the model weights through low-rank matrices to achieve efficient parameter fine-tuning.

2.6 Applications and Extensions

The applications of large language models are extremely extensive, including text generation, text classification, sentiment analysis, question answering systems, and machine translation, etc. In addition, they also support a variety of natural language processing (NLP) applications such as chatbots, virtual assistants, and recommendation systems.

2.7 Recent researches

Song et al. (2025) introduced NTM-CLIP, which employs dual semantic missing contrastive learning to bridge natural and medical imagery [1]. Jiang et al. (2025) proposed UMH-ID, unifying multi-expert attention and hard contrastive learning for robust IoT intrusion detection [2]. Yuan et al. (2025) developed a mixture-of-experts network for multi-modal fake news detection [3]. Gao et al. (2025) presented a hierarchical reasoning and LoRa-enhanced large model framework for root cause analysis in distributed systems [4]. Zheng et al. (2023) improved the YOLOv5s algorithm for rebar cross-section detection [5]. Zhao et al. (2023) applied Res2Net-YOLACT+HSV for smart warehouse track identification [6]. Zhang and Shi (2026) optimized the thermal insulation performance of transport packaging boxes using a response surface algorithm [7]. Zhu et al. (2026) employed proximal policy optimization for motion control of flexible-joint robotic arms in variable-station warehouse sorting [8]. Zhang (2026) proposed a hybrid LSTM-GARCH model integrating volatility factors from US financial markets [9]. Han, Zhong and Sun (2026) developed a dual-scale model with collaborative reasoning and multi-feature fusion for robust AI-generated image detection [10]. Shen et al. (2026) built a survival risk prediction model for colorectal cancer patients using graph convolutional networks and TCGA multi-omics data [11]. Tian et al. (2025) introduced a cross-attention multi-task learning approach for digital advertising recall [12]. Liu (2025) researched the application of GPU parallel computing in image processing [13]. Lu et al. (2025) employed Faster R-CNN for flame detection [14]. Liu (2025) systematically evaluated deep learning architectures for plant image classification [15]. Gao (2026) designed an intelligent operations and public relations collaborative model for corporate image enhancement in smart manufacturing environments [16]. Shen et al. (2025) applied the whale optimization algorithm to financial payment fraud detection [17]. Sun (2025) proposed adaptive interfaces for personalized user experience using a machine learning approach [18]. Sun (2025) also addressed accessibility challenges and solutions in inclusive interface design [19]. Finally, Peng et al. (2025) presented 3D Vision-Language Gaussian Splatting for enhanced scene understanding [20].

3. RESEARCH AND APPLICATIONS OF LLMS IN THE FIELD OF JOURNALISM

Currently, the research and application of large language models in the field of journalism are booming. Representative and outstanding large language models in the field of journalism have emerged both at home and abroad. The research results and characteristics of these typical models will be elaborated below.

3.1 The Cooperation between the Associated Press and OpenAI

The Associated Press and OpenAI signed a two-year agreement to share some news content and technologies. The Associated Press uses Chat-GPT to improve production efficiency. By leveraging ChatGPT’s generative capabilities, the Associated Press has significantly enhanced the efficiency and quality of news production, achieving complementary advantages for both sides.

3.2 People’s Daily Online-Baidu ERNIE Bot

People’s Daily Online and Baidu collaborated to launch the People’s Daily Online-Baidu ERNIE Bot, based on their rich experience in pre-trained large model technology and the media field. This model incorporated relevant sample data from the People’s Daily Online Public Opinion Data Center, providing strong support for the intelligence of the media. Customized development was carried out to meet the specific needs of the media industry, enhancing the applicability of the model in the news field and strengthening its capabilities in public opinion analysis.

3.3 CCTV Media Listening Large Model

The "CCTV Media Listening Large Model" jointly released by China Media Group and Shanghai AI Laboratory can generate commentary in various styles based on video content at the click of a button, and supports users to dig deeper into the information contained in the video through chat conversations. This model has powerful video content understanding capabilities, can automatically generate commentary, enhance the dissemination effect of video content, and help users obtain more video information through interactive conversations.

3.4 Scube Smart Media Cube

Scube Smart Media Cube, an AI-powered product launched by the Generative AI Media Convergence Innovation Studio of Shanghai Media Group, focuses on building the ability to generate Artificial Intelligence Generated Content (AIGC) in the media field. During the coverage of the 2024 National Two Sessions, Scube Smart Media Cube assisted Shanghai Media Group in live reporting at multiple important venues. Its functions include real-time speech recognition, intelligent horizontal-to-vertical screen rotation, automatic news writing, full-language intelligent translation, and intelligent video clip segmentation, providing comprehensive news reporting services. According to statistics, the system participated in 14 live broadcasts of the Two Sessions, with a cumulative duration of 19 hours, and automatically produced 149 AI content packages, including videos, titles, keywords, and content summaries. Each content package took only 5 minutes to generate.

4. INSTRUCTION DATA FOUNDATION AND EVALUATION OF NEWS LARGE LANGUAGE MODELS

In the field of news, the instruction data foundation and evaluation of large language models are crucial for ensuring that the models can accurately understand and generate news content. The following will discuss these two aspects in detail.

4.1 Instruction Data Foundation of LLMs in the News Field

Instruction data is the foundation for guiding large-scale language models in learning and prediction. For large language models in the news field, this data usually includes news articles, titles, summaries, keywords, etc., as well as related label information such as classification, sentiment, and entity recognition. The richness and accuracy of the instruction data directly affect the model's ability to understand and generate news content.

4.1.1 Definition and Importance of Instruction Data

Instruction data is the basic data that guides large language models in learning and prediction. In the field of news, this data usually includes news articles, titles, summaries, keywords, etc., as well as label information such as classification, sentiment, and entity recognition. The richness and accuracy of instruction data directly affect the model's ability to understand and generate news content, and are the key to the successful application of large language models.

4.1.2 Construction of Instruction Data

The construction of instruction data generally includes the following steps: 1) Data collection: Collect a large number of news articles and related information from various news sources (such as news websites, social media, news clients, etc.). 2) Data preprocessing: Clean, deduplicate, tokenize, annotate, etc. the collected data to ensure the quality and consistency of the data. 3) Data annotation: Add labels such as classification, sentiment tendency, entity recognition, etc. to news articles to form an annotated dataset. These labels will serve as guiding signals for model learning. 4) Data splitting: Divide the annotated dataset into a training set, a validation set, and a test set, which are used for model training, validation, and evaluation respectively.

4.1.3 Characteristics of Instruction Data

Instruction data has the following characteristics: 1) Diversity: News content covers multiple fields such as politics, economy, culture, and technology, so instruction data needs to have broad domain coverage. 2) Timeliness: News content is time-sensitive, and instruction data needs to be updated continuously to reflect the latest news trends. 3) Accuracy: The accuracy of instruction data is crucial for the learning effect of the model, and it is necessary to ensure the authenticity and reliability of the data.

4.2 Evaluation of LLMs in the News Domain

Evaluating large language models in the news domain typically involves multiple metrics and methods, and has its own processes to ensure that the model's generation and prediction capabilities meet actual needs.

4.2.1 Evaluation Metrics

The evaluation of large language models in the news field generally covers the following metrics: 1) Accuracy: Measures the degree of match between the news content generated or predicted by the model and the actual news content. 2) Fluency: Evaluates the language fluency and naturalness of the news content generated by the model. 3) Diversity: Examines the diversity and innovation of the news content generated by the model. 4) Timeliness: Evaluates the timeliness and accuracy of the model's response to news events.

4.2.2 Evaluation Methods

1) Automatic evaluation: Use natural language processing techniques and automated tools to evaluate the news content generated by the model, such as calculating BLEU scores, ROUGE scores, etc.

2) Manual evaluation: Invite professionals to conduct subjective evaluations on the news content generated by the model and score it from multiple dimensions such as language quality, content accuracy, timeliness, etc.

3) Benchmark testing: Compare the model with a benchmark model recognized in the industry to evaluate the performance of the model on specific tasks.

4.2.3 Evaluation Process

The evaluation process generally includes the following stages: 1) Preparation stage: Determine the evaluation metrics, evaluation methods, and evaluation datasets. 2) Implementation stage: Evaluate the model according to the evaluation methods and collect the evaluation results. 3) Analysis stage: Analyze and interpret the evaluation results to identify the advantages and disadvantages of the model. 4) Feedback stage: Optimize and improve the model based on the evaluation results to enhance the model's performance.

5. DEVELOPMENT TRENDS AND CHALLENGES OF LLMS IN THE NEWS FIELD

The application of large language models in the news field shows diverse development trends with the continuous progress of technology, and also faces many challenges. The following will discuss in detail its development trends and existing problems.

5.1 Development Trends of LLMs in the News Field

With the continuous progress of technology, large language models will exhibit the following development advantages in the news field: 1) Continuous growth in model scale: The scale of large language models will continue to expand to improve language understanding and generation capabilities. 2) Multimodal integration: Integration with multimodal information such as images and videos will become an important development direction, providing users with a richer news experience. 3) Technological innovation: Emerging technological innovations, such as optimized algorithms and parallel computing technologies, will further enhance the performance and efficiency of large language models. 4) In-depth development of cross-modal large models: Cross-modal large models capable of processing and generating multiple modalities of information will gradually become a research hotspot, bringing more possibilities for artificial intelligence applications. 5) Accelerated industrialization and commercialization: With the continuous maturity of technology, large language models will be applied in more fields, and the process of industrialization and commercialization will continue to accelerate. 6) Greater emphasis on privacy and security: In the context of increasingly strict data protection laws and regulations, the privacy and security issues of large language models will receive more attention, and relevant technologies and measures will be continuously improved. 7) Improved interpretability and transparency: To enhance users' trust in large language models, the interpretability and transparency of the models will be continuously improved, enabling users to better understand the decision-making process of the models.

5.2 Challenges and Issues of LLMs in the News Industry

Although large language models have shown great potential in the news industry, their applications still face many challenges, mainly including content quality and authenticity, privacy and data security, as well as ethical and moral issues.

5.2.1 Content Quality and Authenticity

Although news generation technology has improved the efficiency of news production, the generated content often lacks innovation and depth, and there is even a risk of false information. Therefore, how to ensure the authenticity and credibility of the generated content has become an urgent problem. To address this challenge, the following measures can be taken: 1) Optimize training data: Select high-quality and diverse training data to ensure that the model can learn rich and accurate information. Strictly screen and clean the training data, eliminating low-quality and false content to ensure the authenticity and reliability of the data. 2) Improve model algorithms: Continuously improve and optimize the algorithms of large language models to enhance their ability to understand complex language structures and contexts. Introduce more natural language processing technologies, such as entity recognition and sentiment analysis, to enhance the intelligence level of the model. 3) Strengthen manual review: Conduct manual review and verification of the content generated by the model to ensure the accuracy and compliance of the content. Set up a dedicated review team to strictly review the content output by the model and promptly discover and correct errors. 4) Strengthen fact-checking: Introduce professional fact-checking mechanisms to conduct multi-source comparison and verification of the content generated by the model. Encourage users to report false information and establish a rapid response mechanism to verify and process the reported content. 5) Increase model transparency: Make public the training process, data sources, and algorithm principles of large language models to increase the transparency of the model. Display the decision-making process of the model through visualization and other means to help users understand the generation method of the content output by the model. 6) Strengthen legal and regulatory constraints: Establish and improve relevant legal and regulatory systems to clarify the application specifications and legal responsibilities of large language models in the news field. Severely crack down on and punish illegal and in the use of large language models to maintain good order in the news field. 7) Promote multi-party cooperation: Strengthen multi-party cooperation among news agencies, technology enterprises, academic institutions, etc., and jointly promote the application and development of large language models in the news field. By sharing resources such as data, technology, and experience, improve the overall performance and performance of large language models in the news field.

In short, addressing the challenges of content quality and authenticity of large language models in the news field requires multi-faceted efforts and cooperation. Only by continuously optimizing model algorithms, strengthening data quality control, enhancing fact-checking, increasing model transparency, and strengthening legal and regulatory constraints can we ensure that the application of large language models in the news field can truly play its value and win the trust of the public.

5.2.2 Privacy and Data Security

The training of large language models requires a large amount of data support, and this data often contains users' privacy information. How to reasonably utilize data for model training while protecting users' privacy has become an important issue. This issue involves authenticity, misleadingness, information bias, privacy infringement, copyright issues, etc. To address this challenge, the following measures can be taken: 1) Data anonymization and desensitization: When collecting and using data, anonymize and desensitize sensitive information, such as removing personally identifiable information (PII), phone numbers, addresses, etc., to reduce the risk of privacy leakage. Ensure that the training dataset does not contain specific information that can identify individuals, or comply with relevant privacy protection regulations when using this data. 2) Differential privacy technology: Introduce differential privacy technology to protect the dataset, allowing the dataset to be trained without revealing the details of individual training examples. This is an effective privacy protection technology that can significantly reduce the risk of privacy leakage. 3) Strengthen data access control: Strictly restrict access rights to training data, ensuring that only authorized personnel can access and use this data. Implement multi-level security measures, such as encrypted storage, access auditing, etc., to prevent data from being illegally obtained or misused. 4) Transparency and users' right to know: Increase the transparency of data use, enabling users to understand how their data is collected, used, and protected. Clearly inform users of the purpose of data collection, possible risks, and their rights and responsibilities when collecting users' data.

5.2.3 Ethical and moral issues

Large language models involve ethical and moral issues when generating news, such as generating news content that misleads the public, mishandling privacy data, and having disputes with others' original works. To address these challenges, the following measures can be taken: 1) Establish an ethical review mechanism: Establish an ethical review mechanism during the development and application of large language models to conduct a comprehensive ethical assessment of the model's design, training, testing, and application. Ensure that the model's behavior conforms to moral norms and human values, and avoid producing unfair, discriminatory, or harmful output results. 2) Strengthen content review and filtering: Conduct strict review and filtering of the news content generated by large language models to ensure the authenticity and accuracy of information. Establish effective content review mechanisms and technical means, such as automatic filtering algorithms and human review teams, to quickly identify and process false information, harmful content, etc. 3) Promote the interpretability and transparency of the model: Improve the interpretability of large language models so that users can understand the reasons behind the model's decision-making process and output results. By increasing transparency, enhance users' trust in the model and promote the fairness and impartiality of the model. 4) Strengthen user education and guidance: Educate and guide users to help them correctly use the news content generated by large language models. Remind users to pay attention to the source and authenticity of information and avoid blindly believing and spreading unsubstantiated information. 5) Promote the coordination of technological innovation and regulation: Encourage technological innovation to address the ethical challenges brought by large language models, such as developing more intelligent and secure models and optimizing algorithms. Strengthen the cooperation and coordinated supervision among the government, enterprises, academia, and all sectors of society to jointly promote the healthy development of large language models.

Large language models for the news field need to comprehensively consider multiple aspects in solving privacy and ethical issues, including data protection, technological innovation, ethical review, content review, and user education. Through the implementation of these measures, the risk of privacy leakage can be minimized and the healthy development of technology can be promoted.

6. CONCLUSION

The research on news large language models has multiple important significances, including: 1) Improving news production efficiency: It can quickly generate news content, reduce labor and time costs, and enable news agencies to release information more promptly. 2) Enriching news presentation forms: It creates more diverse news presentation methods, such as virtual news anchors, etc., enhancing the attractiveness and dissemination power of news. 3) Personalized services: It better meets the personalized needs of different users, improving users' satisfaction and engagement with news. 4) Enhancing information processing capabilities: It helps to efficiently analyze and understand a vast amount of news information, and valuable content and trends. 5) Promoting innovation in the news industry: It prompts the news industry to continuously transform and develop in terms of technology application, business models, etc. 6) Facilitating cross - language communication: It helps to break language barriers and promote the exchange and sharing of global news information. 7) Assisting in in - depth reporting: It provides more ideas and materials for journalists and editors, facilitating the development of in - depth reporting. 8) Meeting the needs of the information age: It enables the news industry to better adapt to the rapidly developing information society and maintain competitiveness in the information torrent.

In summary, the application of large language models in the news field is of great significance and has attracted extensive attention and research in the academic community. Through continuous research and practice, the application potential of large models in the news field will be continuously explored, achieving greater breakthroughs and innovations, and bringing more progress to the news field.

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