

gradually established, and operation and maintenance management systems such as data leakage prevention, security audit, security event traceability and evidence collection, and big data security situation analysis should be formed [1].

### **Conclusions**

Data openness and sharing is the core link in China's establishment of a data element market, and it is an important foundation for the development of the digital economy. Generally speaking, China's data opening and sharing work is gradually advancing, but it is still facing problems such as the low practicability of the open data and the lack of willingness to open the unopened data. Drawing on the experience of developed countries, China can continue to improve the data opening mechanism, promoting government-enterprise data sharing, improve data opening capabilities, and strengthening data security protection, the value of data can be truly released.

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## **TEXT SENTIMENT RECOGNITION FOR ECONOMIC AND FINANCIAL APPLICATION**

*The article is devoted to the use of text sentiment recognition technology in economic and financial texts, extraction and study of the influence of*

*consumer emotions on the market using deep learning methods, which can contribute to rational policy formulation by national regulatory authorities, which can maintain market stability and contribute to its effective growth. Special attention is paid to the problem of identification of emotions arising in various social contexts (China, Russia, Belarus).*

**Key words:** *artificial intelligence, economic and financial text.*

*Статья посвящена использованию технологии распознавания текстовых настроений в экономических и финансовых текстах, извлечению и изучению влияния эмоций потребителей на рынок с помощью методов глубокого обучения, что может поспособствовать рациональному формированию политики национальными регулирующими органами, поддержать стабильность рынка и поспособствовать его эффективному росту. Особое внимание уделяется проблеме идентификации эмоций, возникающих в различных социальных контекстах (Китай, Россия, Беларусь).*

**Ключевые слова:** *искусственный интеллект, экономико-финансовый текст.*

## **1. Introduction**

In the era of artificial intelligence, text sentiment recognition is an emerging research area, and the main goal of the research is to apply computer technology to the field of linguistic sentiment recognition. Since 1997, when Google released the world's first text emotion recognition system, text emotion recognition has been one of the most important technologies in the field of text classification.

With the development of deep learning frameworks as well as speech models, neural networks can analyze and process speech signals, which can be transformed into images or digital signals and expressed. And in the fields of computer vision, speech recognition and natural language understanding, neural networks can analyze and convert image or digital signals into corresponding image or digital information and express them. Based on this, text emotion recognition technology can be further applied to research on text, graphics or music.

The text sentiment recognition technology based on machine learning and artificial intelligence will bring significant changes to the economic and financial fields: extending from traditional economic and financial fields to other industries; changing from focusing on individual entities to complex systems; and transforming from pursuing precision to improving quality.

With the development of the Internet, people's lives have undergone radical changes. People are no longer satisfied with simply receiving information, but need to get information in a richer and higher quality way.

The most important thing in the information age is user experience, which determines people's purchasing behavior, and this is one of the reasons why e-commerce and mobile Internet have developed so rapidly in recent years.

One of the most popular information services in the Chinese market is called "Enterprise News", which provides customers with the latest and most comprehensive news information from the media or social networks to help companies make informed decisions.

## **2. Sentiment Analysis Use Cases**

Businesses use sentiment analysis to obtain information and develop actionable plans in different areas, listed below.

### **2.1. Improve customer service**

Customer service teams that use sentiment analysis tools can personalize responses based on the sentiment of the conversation. Artificial intelligence-based chatbots with sentiment analysis identify urgent incidents and report them to support staff.

### **2.2. Brand Monitoring**

Organizations constantly monitor mentions and chats about their brands in social media, forums, blogs, news articles and other digital spaces. Sentiment analysis technology enables public relationship teams to be aware of ongoing and relevant situations. Teams can assess underlying sentiment to resolve complaints or take advantage of positive trends.

### **2.3. Market research**

Sentiment analysis systems help companies improve their products by understanding the products that are effective and ineffective. Marketers may analyze comments on online review sites, survey responses and social media posts to gain insight into specific product features. Their results can be communicated to product engineers for corresponding innovation.

### **2.4. Track campaign performance**

Marketers may use sentiment analysis tools to ensure that their campaigns have the desired response. Instead, they can track conversations on social media platforms to ensure that the overall sentiment is positive. If online sentiment drops below expectations, marketers could adjust campaigns based on real-time data analysis.

## **3. Current status of applications in the economic and financial fields**

### **3.1. Economic field**

It is economically beneficial to use AI technology to identify emotions, through sentiment recognition analysis of financial texts to obtain data information related to investor psychology and investment behavior and related sentiment trends, to provide investors with valuable investment advice.

For example, text sentiment analysis is used to help identify potential market risks or uncertainties of investors in the financial field from economic news or government policy. This is because investment preferences vary subjectively among individuals and can be influenced by market information, changes in sentiment and other factors. By extracting these features, investors' judgments on key market factors such as future returns and uncertainty can be obtained.

There are differences in the benefits of identifying positive and negative emotions among different cultures, which are related to the existence of different mental expectations of the technology, and there are economic losses caused by the negative reactions people show to the technology, which are also related to the existence of different mental expectations of the technology.

### **3.2. Application on insurance company**

It mainly involves text sentiment recognition analysis of various insurance contracts (such as life insurance or health insurance) by insurance companies to help them customize and price insurance contracts and make risk control decisions according to their own needs.

Insurance companies can customize contracts on a one-to-one basis with customers, which requires specialized interviews with customers and access to sufficient keywords for sentiment analysis.

For example, at present, many companies will take the lead in launching many preferential activities, free medical examinations and other welfare activities in order to attract more customers to join their customer base. However, they often lack scientifically critical research data or relevant user label information, resulting in poor quality products or services, or even being over-marketed.

Therefore, keywords in text sentiment analysis technology can be used to identify product or service information and user tags to help companies achieve personalization and accurate marketing.

### **3.3. Other areas**

For example, as social media, big data, cloud computing, artificial intelligence technology and other technologies are combined with the financial sector, a new round of technological revolution will be generated; along with the continuous development and maturity of machine learning and deep learning, machines can complete many assignments that humans cannot complete independently; as artificial intelligence technology continues to mature and develop, robots can be involved in more and more difficult jobs; as machine translation technology is widely used in the world, it will promote more facilitation and globalization of economic and trade activities, etc.

### **4. Use different algorithms according to financial scenarios**

In some specific application scenarios, text sentiment recognition technology also has some different forms of algorithms.

#### **4.1. Financial product text emotion recognition**

Using natural language processing techniques such as text splitting, text summarization and document annotation, the

sentiment elements in products are split into words and encoded and decoded. For example, using sentiment analysis algorithms, the keyword “interest rate” is extracted from financial product reviews and the corresponding sentiment value is calculated using semantic analysis algorithms. Then, based on these text sentiment values and sentiment classification, we can determine whether the financial product is worth buying.

#### **4.2. Customer service robot**

The keywords (emotions) or words (sentences) in the call records are extracted by natural language processing technology for keyword emotion classification and recognition, and the user’s emotion score is extracted by NLP model to classify the customer’s voice conversation content.

#### **4.3. Robot response**

Natural language processing technology combined with neural network is used to classify the conversation content with emotion and display the result on the screen. Then the user’s attitude, emotion and tone are judged based on the text content of the user’s reply. For example, customer service robots are used as one of the product functions, and automatic voice response is realized by combining manual and natural language processing technology.

#### **4.4. Online customer service system**

The dialogue content is based on text comments as input, and machine translation algorithms are used to recognize and translate it into Chinese. For example, OCR image recognition technology is used to extract information from text in speech data, etc.

#### **4.5. Online Q&A**

Using natural language processing, text classification and semantic analysis technologies combined with Q&A system to achieve automatic retrieval and matching of customer sentiment rating results and user opinion information in the Q&A system. For example, automatic text classification algorithms are used in the online Q&A system to automatically classify, emotionally label and extract keywords from users’ answers, and finally form an emotion

label related to the user's Q&A intention as a basis for decision making. At the same time, based on this tag data, we can realize the operation of filtering and generating automatic response contents.

### **5. Sources of financial text data**

For the sources of text data in the financial field, they mainly include the following aspects.

- Various types of news information made public by Internet news platforms.

- Official announcements on the official websites of banks and financial articles published on the websites of major commercial banks.

- Media reports or comments contain non-standard language information such as jargon, concepts and events.

- Various announcements published on the official websites of commercial banks or news media, including loan prospectus, loan details, asset management plan, etc.

- Third-party financial data platforms collect comments and inquiries from banks or financial institutions to users, such as voice texts of customer service calls and records of online customer service inquiries.

- Third-party financial technology companies collect data, such as log records of payment interfaces, codes generated in business systems, and other content.

- Third-party industry media, such as Internet media platforms and financial media to collect and analyze texts in the financial field.

### **6. Challenges for sentiment analysis**

Despite the advances in natural language processing technology, comprehension of human language remains a significant challenge for machines. Machines potentially misunderstand the subtleties of human communication.

#### **6.1. Sarcasm**

Computers find it challenging to analyze the emotions in sentences that involve sarcasm. Until the computer understood the scenario thoroughly when analyzing the sentence, a positive assessment would be marked as a positive experience based on the word very good.

## **6.2. Negation**

Negation is the usage of a negative word to express the negative meaning in a sentence. As an example, “I would not say that this item is expensive”. Sentiment analysis algorithms may have difficulty interpreting such sentences accurately, particularly if the negation occurs between two sentences. “I like this product, but I will not buy it again”.

## **6.3. Multipolarity**

Multipolarity occurs when a sentence contains more than one emotion. For example, a product review reads, “I am happy with the style of the product, but not the color”. It is difficult for software to interpret the underlying sentiment. You need to use aspect-based sentiment analysis to extract each entity and its corresponding sentiment.

## **7. Emotions recognition in different cultures**

From the perspective of big data, there is a need to further enrich the database of emotional features. In terms of feature databases in the economic and financial fields, in addition to sufficient data resources, a series of technical issues such as data cleaning, feature engineering and machine learning need to be considered.

Due to the different levels of economic development and the different social and cultural backgrounds of each country, people may have different results in identifying emotions arising from different social contexts. For example, in the Russia, positive and negative emotions are considered to be two different indicators of emotion due to their own straightforward nature; in China, they are considered to be independent of each other and to influence each other without interference, people tend to think negative will transform into positive after several progress; and in the Belarus, the focus is more on the expression of personal emotions and the distinction between people’s own internally held views and opinions.



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## **CREDIT TRANSFORMATION OF COMMERCIAL BANKS IN THE CONTEXT OF DIGITIZATION**

*The article considers the current state of development of lending to commercial banks in China. The trends of credit transformation against the backdrop of digitalization are analyzed in detail, in particular, much attention is paid to the role of Big Data in optimizing banking products, data and processes associated with digital technologies. The factors that have the greatest impact on the digital transformation of banking strategies, as well as business models that implement new growth drivers, are identified.*

**Key words:** *digitization, commercial bank, credit, digital transformation.*

*В статье рассмотрено текущее состояние развития кредитования коммерческих банков Китая. Детально проанализированы тенденции кредитной трансформации в процессе цифровизации, в частности*