Friendly Financial Sentiment Analysis Mini Program

ZHOU Yixin
Email: 224040090@link.cuhk.edu.cn

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1 Introduction

Leveraging cloud computing technology, this project (Figure 1) develops a cloud-based mini-program for individual stock sentiment analysis on the WeChat Cloud Development Platform, utilizing its cloud functions and cloud storage capabilities. Focusing on the core pain points of ordinary investors in public opinion analysis—low efficiency, operational complexity, and high costs—the mini-program provides an end-to-end service covering "public opinion collection, sentiment analysis with visual presentation, and research report downloading," enabling non-professional users to conveniently access high-quality public opinion analysis support.

Currently, the financial public opinion tool market exhibits a significant mismatch between supply and demand, failing to meet the actual needs of ordinary investors. This mismatch is mainly reflected in three aspects. Firstly, the technical threshold is excessively high. Most existing open-source public opinion tools require users to master professional skills such as Python programming, Selenium automated testing, and MongoDB database management (zcyeee [n.d.]). However, ordinary investors generally lack relevant technical backgrounds, making it impossible for them to use these tools effectively. Secondly, functions are severely fragmented. Most tools only possess a single function: some can only crawl public opinion data, while others merely perform simple sentiment analysis. They lack end-to-end coverage of the "data collection - in-depth analysis - result output" process. Users need to use multiple tools simultaneously to complete public opinion analysis, resulting in cumbersome operations. Finally, commercial service costs are prohibitive. Professional financial data platforms targeting institutional users, such as East Money Choice (East Money Information Co. [2025]) and Wind Financial Terminal, typically have annual fees exceeding 10,000 yuan, which is far beyond the affordability of ordinary investors. This situation prevents ordinary investors from accessing high-quality public opinion analysis services. Addressing the aforementioned market pain points, this project will fill the market gap for ordinary investor-friendly financial public opinion analysis tools through technical optimization and model innovation.

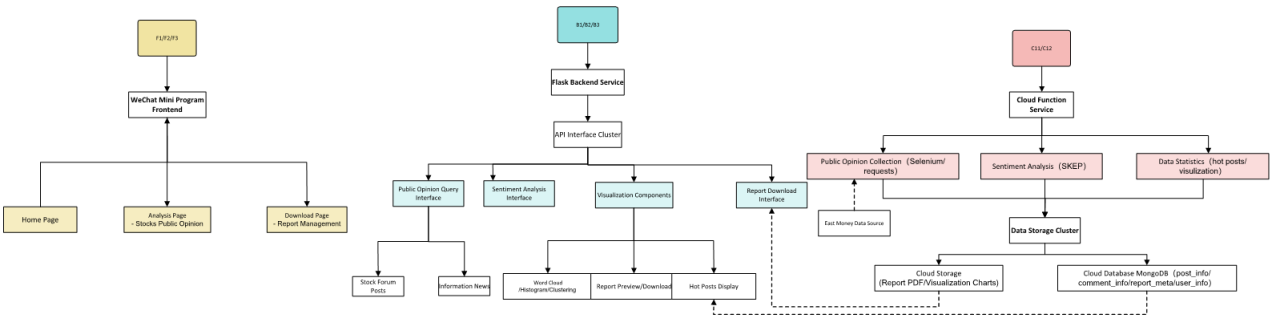

Figure 1: Roadmap of the mini program

2 Background and Motivation

2.1 Analysis of Current Market Pain Points

The current financial public opinion tool market is plagued by numerous pain points, which severely hinder ordinary investors' effective utilization of public opinion information. In terms of technical threshold, open-

source projects impose high requirements on users' technical capabilities. Taking the EastMoney-Crawler project on GitHub (zcyeee [n.d.]) as an example, this project only provides script files for crawling stock bar data. Users are required to master skills such as Python programming and database operations to run the scripts. Additionally, the project lacks a visual interface, meaning data viewing and analysis must be implemented through code, making it inaccessible to ordinary investors.

Regarding functional integrity, most tools only support a single function and lack end-to-end service capabilities. For instance, the stock comment analysis project launched by Lianxianghui can only perform sentiment scoring on stock comment content and cannot realize functions such as research report downloading (Lianxianghui [n.d.]). In contrast, some information crawling scripts shared on Zhihu (Wang [2022]) can only complete the crawling and storage of information and research reports without sentiment analysis capabilities. As a result, users need to switch between multiple tools, leading to low operational efficiency.

In terms of service costs, commercial platforms primarily target institutional users, with pricing far exceeding the affordability of ordinary investors. The annual fee for East Money Choice exceeds 10,000 yuan, while the annual fee for Wind Financial Terminal is as high as over 30,000 yuan (iFinD [2025], East Money Information Co. [2025]). Unable to bear such high costs, ordinary investors have to rely on free public opinion channels with scattered information and unguaranteed accuracy.

2.2 Project Vision

The core vision of this project is to provide convenient, efficient, and low-cost financial public opinion analysis services for retail investors, advancing the inclusiveness of financial information services.

In terms of lowering the usage threshold, the project will adopt the form of a cloud-based WeChat Mini Program to realize "zero coding operation." Users do not need to master any professional technologies; instead, they can fulfill their public opinion analysis needs through simple operations on the Mini Program interface. This design effectively covers the investor group without technical backgrounds.

Regarding functional integration, the platform will integrate end-to-end services including "public opinion collection, sentiment analysis, research report downloading, and visual reporting." Users do not need to switch between multiple tools; instead, they can complete all operations from public opinion acquisition to analytical application within a single platform, significantly improving usage efficiency.

In terms of cost optimization, the project will leverage open-source technologies and cloud computing architecture to reduce system development and operation costs. Meanwhile, it will adopt a flexible pricing strategy and launch cost-effective service plans, enabling retail investors to access high-quality public opinion analysis services at a low cost and breaking the monopoly of commercial platforms on professional financial information services.

3 WeChat Cloud Development Platform

WeChat Cloud Development (Team [n.d.c]) is a professional mini-program development service jointly launched by the WeChat team and Tencent Cloud. Its core value lies in eliminating the need for developers to set up servers; developers can directly use the APIs provided by the platform for business development without authentication. Moreover, it natively integrates WeChat's open capabilities, providing end-to-end backend support for WeChat ecosystem applications such as mini-programs, mini-games, and official account webpages.

Its core functions focus on four major modules: cloud testing services, cloud function deployment, cloud database, and cloud storage. These modules form a complete development closed loop covering development and debugging, business logic implementation, data management, and file storage, significantly reducing the development and operation costs of applications within the WeChat ecosystem.

3.1 Cloud Testing Services

Cloud Testing Service (Figure 2) is a multi-mode online testing solution tailored for applications such as mini-games. Its core objective is to assist developers in rapidly completing functional, performance, compatibility, and stability testing. This service supports various testing modes, including intelligent exploration, recording and playback, and testing frameworks, allowing developers to flexibly choose based on cost and testing accuracy requirements. Relying on a real-device cluster covering mainstream manufacturers and key users, it enables multi-terminal adaptation verification without relying on physical devices. After the completion of testing, a comprehensive and professional visual quality assessment report will be generated, which includes detailed problem analysis. This helps developers quickly locate and fix issues related to adaptation and performance.

3.2 Cloud Function

Cloud Functions (Team [n.d.b], see Figure 3) are server-side functions running on cloud servers. Developers do not need to purchase or set up servers; they only need to write JavaScript code, deploy it to the cloud, and then call it from the mini-program side, with mutual invocations supported between cloud functions.

Its core advantage lies in seamless integration with WeChat login authentication. When a mini-program calls a cloud function, the incoming parameters will be automatically injected with the user's 'openid'. Developers do not need to verify the validity of the 'openid' and can directly implement user-associated business logic based on this identifier. The code runs in a cloud-based 'Node.js' environment, supporting regular backend operations such as network requests. It can also directly call the APIs of services like cloud databases and cloud storage through the cloud function backend SDK.

The platform automatically handles resource allocation and operation and maintenance management for cloud functions. Developers do not need to focus on the underlying infrastructure and can concentrate solely on business logic implementation.

3.3 Cloud Database

The official platform provides a stable and reliable document-oriented database (Team [n.d.a], see Figure 4 and 5), whose core feature is that it requires no deployment or maintenance. It supports direct invocation from both mini-programs and cloud functions, and enables visual management through the cloud development console.

This database is equipped with comprehensive data manipulation capabilities, covering basic functions such as data reading/writing, conditional filtering, and sorting. It also supports advanced features including database transactions and automatic backup and rollback, which ensure data security and consistency. Leveraging the authentication-free advantage of the WeChat ecosystem, the database can directly identify user information from mini-programs. Developers can implement fine-grained access control either by configuring security rules or writing custom code, making it adaptable to diverse scenarios such as user data isolation and public data access.

3.4 Cloud Storage

Cloud Storage (Team [n.d.d]. see Figure 6) is a cloud-based file storage service tailored for WeChat ecosystem applications, supporting the full-lifecycle management of various file types such as images, audio, video, and documents.

Its core advantage lies in its built-in CDN acceleration capability, which can significantly enhance the access speed of file uploads and downloads. Moreover, it allows direct initiation of upload and download requests from the frontend, eliminating the need for additional file server deployment. Developers can conduct visualized file management through the cloud development console, including operations such as file classification, previewing, deletion, and renaming. Meanwhile, it supports flexible permission configuration, enabling developers to set file access permissions according to business requirements to ensure file security. Each generated file is assigned a unique 'fileID', facilitating precise referencing and manipulation in mini-programs or cloud functions.

4 Mini-Program Functions

4.1 Frontend Homepage

The frontend homepage (Figure 7) presents core function entrances with a concise and intuitive layout. At the top of the page, the main title "How Much Do You Know About Sentiment" and the subtitle "Intelligent Analysis of Public Opinion and Research Reports" are displayed. The core area features three functional buttons: "Data Collection", "Public Opinion Analysis", and "Report Download", with each button linked to a corresponding icon and page path.

In terms of interaction, the buttons support pressed-state display. When a button is clicked, the system first verifies the global environment configuration. If the configuration is incomplete, a pop-up prompt guides the user to fill in the cloud development environment ID at the designated location; if the configuration is valid, the system redirects to the corresponding functional page with the environment ID parameter carried over.

Overall, the page focuses on core functions with clear interactions. Through minimalist visual design and comprehensive pre-validation, it serves as an entry point for the full process of public opinion analysis for users, balancing ease of use with configuration guidance.

4.2 Data Collection Function

The ‘crawlStockdata‘ cloud function (Figure 8) offers flexible and efficient crawling capabilities for stock-related data. It supports customizing the number of pages to crawl (applicable to both stock bar posts and news information) for specified stock codes and names. The maximum number of crawl pages is restricted via global configuration items, while legality verification and automatic correction are performed on page number parameters to ensure the compliance and controllability of the crawling logic.

This function unifies the pagination crawling logic for stock bars and news content, encapsulating general rules such as pagination delays and request retries into configurable global parameters. It also records the number of successfully crawled pages, facilitating monitoring of the crawling process and troubleshooting of issues.

In terms of functional implementation, the function can fully crawl posts from East Money Stock Bar and news information, adapt to the DOM structure of corresponding pages, and accurately parse core fields—including post titles, read counts, comment counts, authors, and release times for stock bar content; and news titles, sources, release times, and links for news content. Additionally, it standardizes data formats and performs type conversion on the parsed data.

From a performance perspective, the function supports batch database write operations, which significantly reduce the frequency of database interactions. It also incorporates a title-based deduplication mechanism to avoid duplicate data, and allows flexible control over the volume of data crawled per request by configuring the number of entries per page, thereby improving data processing efficiency.

Furthermore, the function features high robustness: it adopts a multi-level error capture mechanism, ensuring that a single page crawling failure does not interrupt the entire process; automatically completes relative path links; adds a crawl time field to enable data traceability; and equips the request process with a retry mechanism and compliant request headers. These design features effectively guarantee the stability and success rate of the crawling process, enabling the efficient completion of the full lifecycle of stock bar and news data for the specified number of pages, including crawling, parsing, and storage.

4.3 Public Opinion Analysis Function

The core public opinion analysis cloud function ‘advancedAnalysis‘ (Figure 9) conducts multi-dimensional analysis on stock comment and news data using frontend-passed stock codes and optional time ranges, returning structured results: it standardizes and validates input parameters (e.g., date formatting), queries and filters relevant data, processes text for word cloud visualization, calculates sentiment distribution and average sentiment value, and incorporates comprehensive logging and exception handling to support frontend visualization and trend analysis functions.

4.3.1 Sentiment Scoring Function

The sentiment scoring function leverages the sentiment analysis capability of the ‘SKEP‘ model (Hao et al. [2020]) based on the ‘PaddleHub‘ deep learning framework. It generates a corresponding sentiment score for the title of each data entry and writes it to the ‘sentiment-score‘ field of each record in the database. Scoring results are presented as numerical values in the range of 0 to 1: 0.5 represents strict neutrality, values closer to 1 indicate more positive sentiment, and values closer to 0 indicate more negative sentiment.

Technically, a batch update strategy of 10 entries per batch is adopted to balance writing efficiency and database rate-limiting rules. Additionally, fault-tolerant mechanisms are designed for abnormal scenarios such as model loading failures, empty text, and abnormal prediction formats.

4.3.2 Visualization of Word Cloud and Sentiment Histogram

The plotting of word clouds and sentiment histograms is completed on the frontend, integrating the full process of parameter verification, cloud function invocation, data processing, and visual plotting. The page implements real-time input and update of stock codes and dates through input event monitoring.

When executing the analysis, the script first completes multi-dimensional input validation: verifying that the stock code is a 6-digit number, the start date is required (with the end date defaulting to the current day if not filled), the date format is ‘YYYY-MM-DD‘, the start date is not later than the end date, and the date interval is limited to no more than 30 days. If validation fails, corresponding error prompts are displayed.

Upon successful validation, the script calls the ‘advancedAnalysis‘ cloud function, parses the returned public opinion analysis results, extracts core information (including word cloud data, sentiment distribution data, the number of stock comments/news, and positive proportion), and updates the page data. In the visualization phase, the script uses Canvas to draw word clouds and sentiment histograms respectively:

For word cloud drawing: The canvas is cleared first; word frequency data is filtered and standardized in format. Random colors are assigned to different words, font sizes are adjusted according to word frequencies, and the visual layout of words is completed by combining rotation angle and position parameters.

For sentiment histogram drawing: Based on the sentiment distribution data of positive, neutral, and negative (with values below 0.4 defined as negative and above 0.6 as positive), the height of the histogram is calculated, corresponding colors are assigned to different categories, and the bar chart is drawn with category names and values labeled.

The entire script ensures the integrity of input validity verification, abnormal data processing, and visual display. Meanwhile, it improves user experience and development debugging efficiency through details such as loading status, error prompts, and debugging logs.

4.4 Research Report Download Function

The research report download function (Figure 10) is built on the cloud function 'getReport's, whose core capability is to accurately query and return the corresponding list of research reports from WeChat Cloud Storage based on the stock code or name passed from the frontend, while providing temporary links for direct download.

First, the function filters special characters from the stock code/name passed by the frontend to avoid errors in the Cloud Storage path, ensuring effective matching of research reports stored in Cloud Storage regardless of naming variations. In the query phase, the function retrieves the Cloud Storage file management collection through the database, filters out all PDF-format research report files under the specified directory, and generates a temporary download link with a refresh mechanism for each file. It also extracts information such as file names and upload times, standardizes all time formats to the 'YYYY-MM-DD HH:MM:SS' style, and finally assembles details (including research report titles, download links, upload times, and Cloud Storage file IDs) into a list, which is returned in descending order of upload time.

The function is also equipped with comprehensive parameter verification and exception handling mechanisms: if the frontend fails to pass a valid stock code/name, a clear error prompt is returned; if an exception occurs during execution, the specific error information is captured and fed back; if no research reports are found in the query, an empty list with a corresponding prompt is returned. Overall, the function is not restricted to specific stocks and can adapt to research report query requirements for any stock, while ensuring the stability and compatibility of research report querying and download link generation. It directly supports the frontend in implementing list display and download functions for research reports of any stock.

5 Discussion

The core competitiveness of this project is mainly reflected in four aspects: user-friendliness, functional comprehensiveness, cost-effectiveness, and scalability, which enables it to provide differentiated financial public opinion analysis services for retail investors. In terms of user-friendliness, the project adopts a WeChat Mini Program as the frontend carrier. Users do not need to download or install any additional software and can access the service directly via WeChat. The operation process is designed to be concise and intuitive, supporting one-click analysis triggering and result pushing. Without mastering any programming skills or professional knowledge, users can easily fulfill their public opinion analysis needs. This completely addresses the pain point of retail investors being "unable to use professional public opinion tools" and effectively expands the user coverage.

In terms of functional comprehensiveness, the project integrates end-to-end services covering public opinion collection, sentiment analysis, visual presentation, and research report downloading. In contrast to competing products with fragmented functions in the market, users do not need to switch between multiple tools and can complete all operations from public opinion acquisition to analytical application within a single platform. Meanwhile, the sentiment analysis module adopts dual-model collaboration, which not only enables accurate scoring of individual stock comments but also generates comprehensive overall sentiment analysis reports. The diverse visual presentation methods meet users' analytical needs at different levels.

Compared with local implementation, this project develops the mini-program by leveraging the cloud function and cloud storage capabilities of the WeChat Cloud Development Platform, resulting in significant differences in both technical and functional implementation approaches. First, in terms of data storage, a cloud database is adopted, where all data is stored in the cloud development database of Tencent Cloud. This eliminates the need for local installation or operation of MongoDB, with data automatically synchronized to the cloud. In terms of programming languages, the project mainly uses 'WXML', 'WXSS', 'JavaScript', and 'JSON' formats, while native support for Python is not available. For numerous Python libraries, it is necessary to find their approximate JavaScript alternatives and program cloud functions in accordance with the system requirements of the WeChat Cloud Development Platform to implement functions such as data collection, data analysis, and data visualization.

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6 Appendix

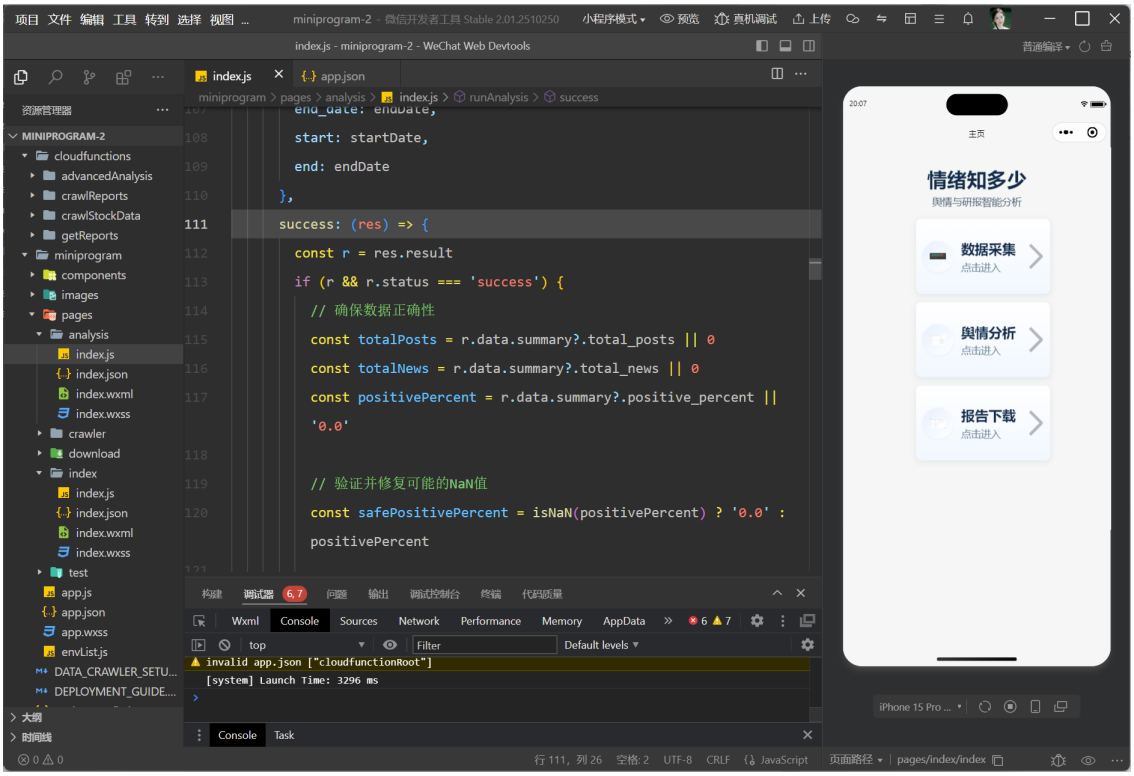

Figure 2: Cloud tesing main page.

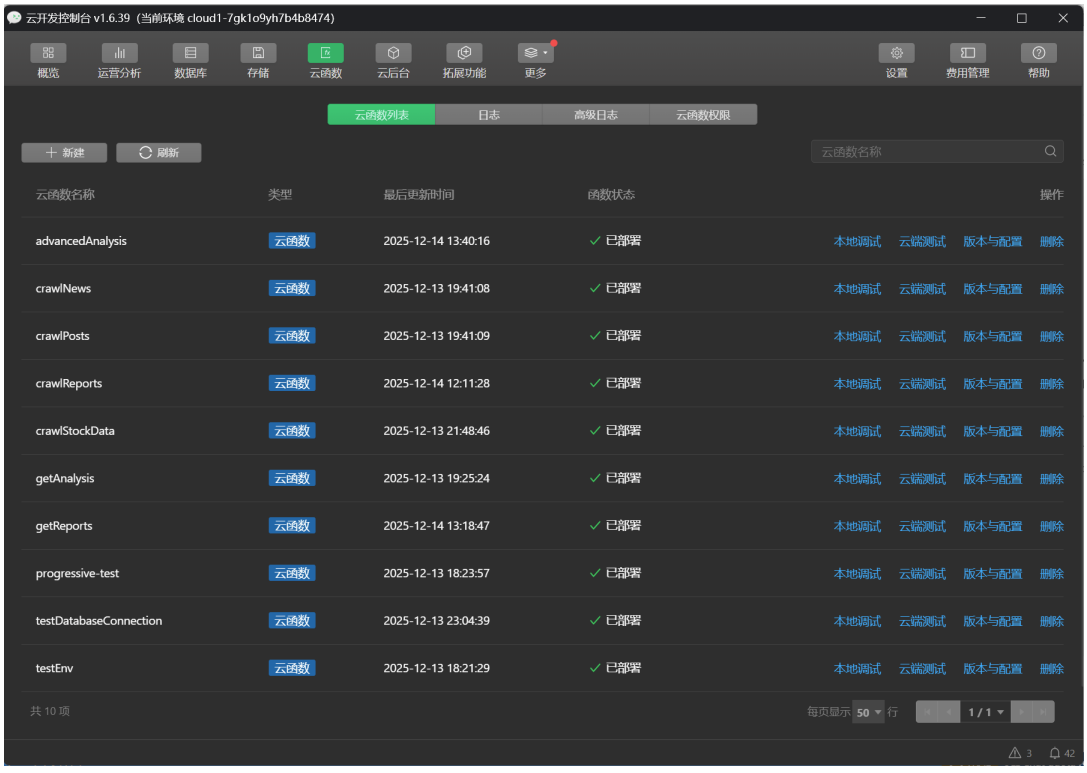

Figure 3: Cloud function developed in this program.

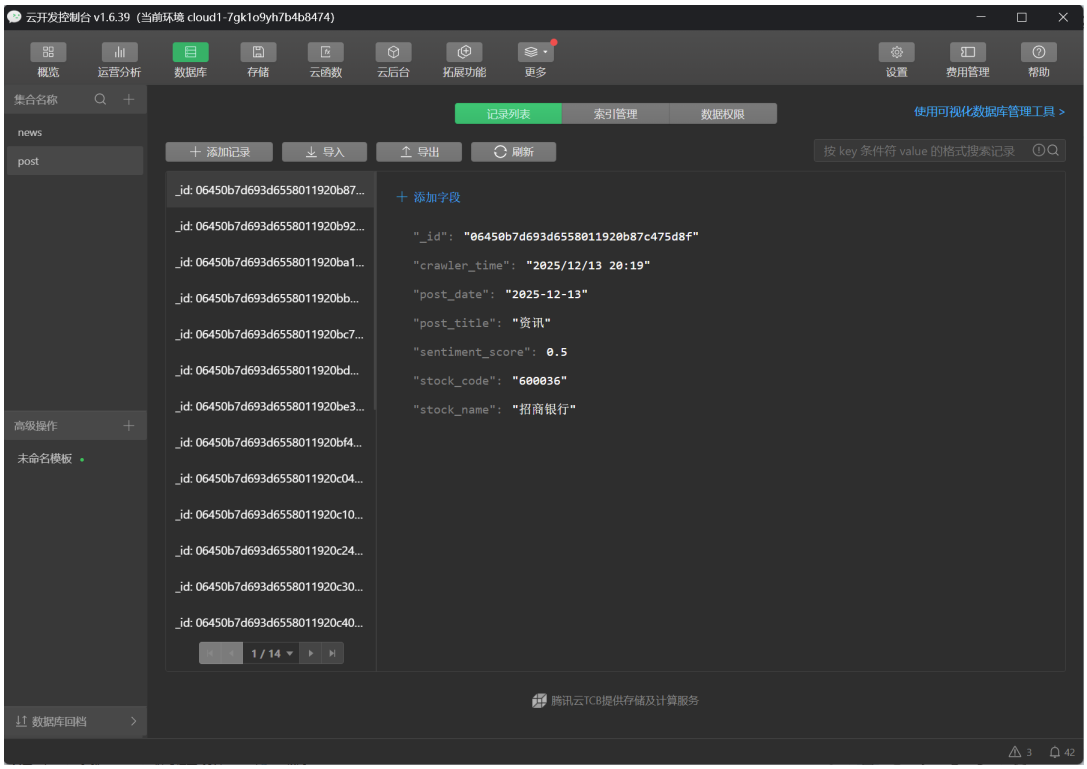

Figure 4: Cloud database example: post collection.

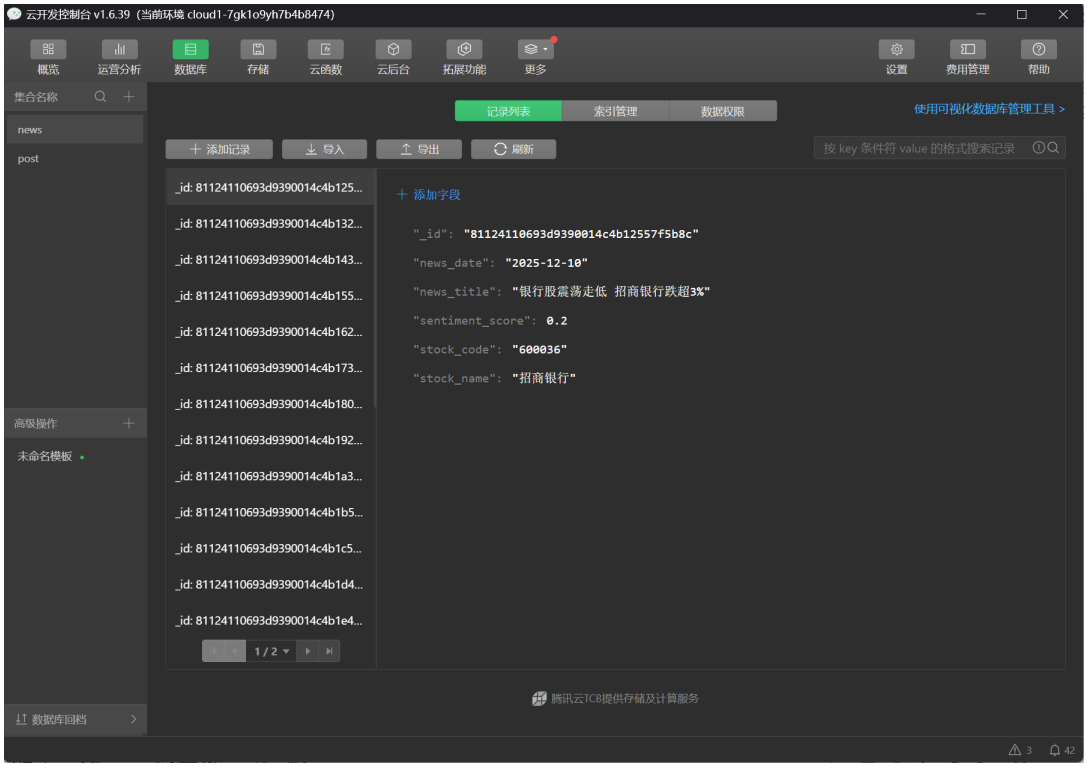

Figure 5: Cloud database example: news collection.

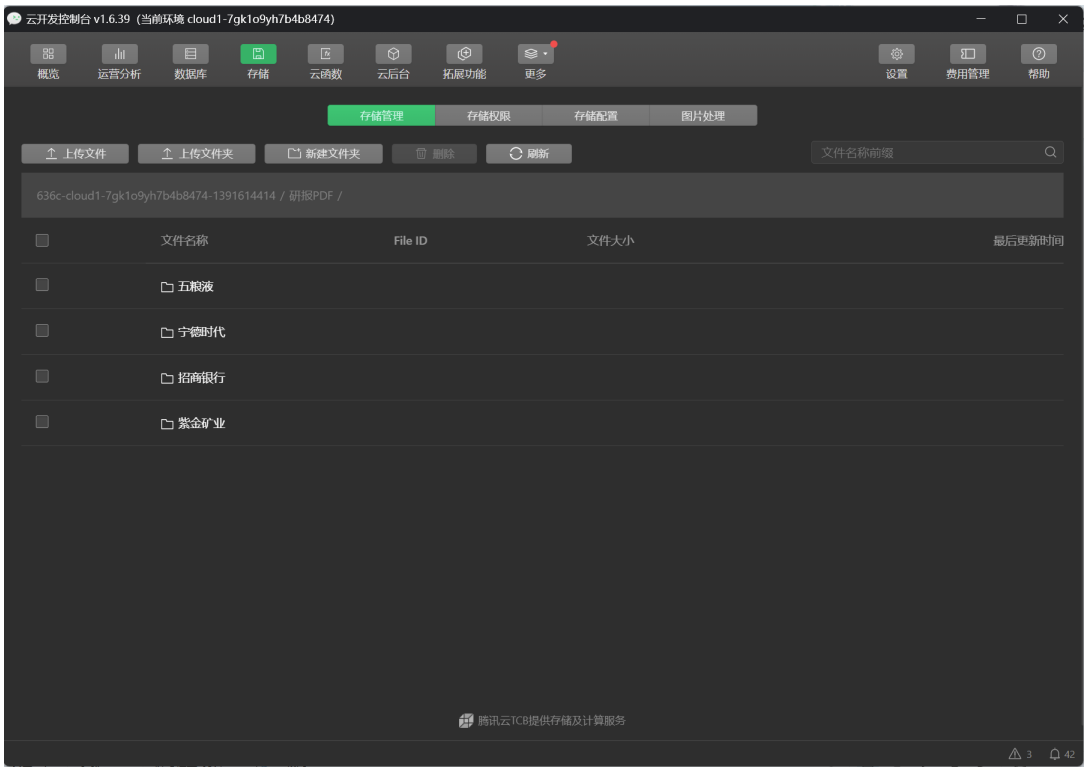

Figure 6: Cloud storage example: research reports pdf.

Figure 7: Frontend Homepage

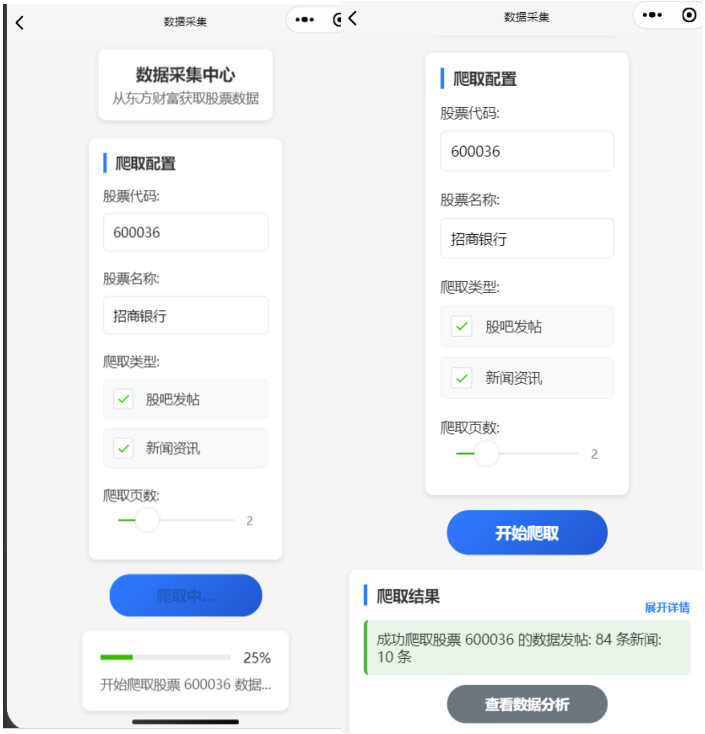

Figure 8: Data Collection Function

Figure 9: Stock Public Opinion Analysis and Visualization Interfaces

Figure 10: Research Report Download Function Interfaces