Agent-based Business Service Capability and Platform Construction in the Social Sciences Field (Postprint)

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Abstract

[Purpose/Significance] To provide technical services for researchers in the field of social sciences and meet their personalized research needs, this paper proposes a business service capability system based on the concept of agents and constructs a business service platform to implement this system.

[Method/Process] By constructing supporting systems such as a business model management system and a resource management system, the business service platform has formed a full-process service capability ranging from data resource acquisition and processing to result output, enabling the structural parsing of business resources and model construction. The platform adopts a model combining SaaS and PaaS, supporting researchers in flexibly configuring functional modules and resources according to specific research needs: they can either directly invoke existing functions to complete research analysis or add personalized functions through custom plug-ins, thereby achieving highly adaptable and extensible business services.

[Result/Conclusion] The business service platform can provide personalized services for researchers in the field of social sciences, supporting them in conducting automated business analysis and academic research.

Full Text

Preamble

Agent-Based Business Service Capabilities and Platform Construction in the Social Sciences

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Abstract

With the rapid development of artificial intelligence, particularly the breakthrough of Large Language Models (LLMs), the social sciences are undergoing a profound paradigm shift. This paper proposes a framework for constructing business service capabilities and platforms in the social sciences based on the "Agent" concept. By integrating multi-agent systems with domain-specific knowledge bases, the proposed platform aims to automate complex research workflows, enhance data-driven decision-making, and provide specialized intelligence services. We discuss the architectural design, key technologies—including task planning, memory management, and tool-use—and the practical application scenarios of such a platform in social science research and policy consultation.

1. Introduction

The integration of information technology and social science research has evolved from simple data processing to the current stage of intelligent transformation. Traditional social science research often faces challenges such as fragmented data sources, high barriers to cross-disciplinary analysis, and the difficulty of simulating complex social systems. The emergence of autonomous agents provides a new methodology to address these issues. Unlike traditional software, an Agent based on large models possesses reasoning, planning, and execution capabilities, allowing it to act as a "digital researcher" that can autonomously complete literature reviews, data analysis, and report generation.

2. Theoretical Framework of Social Science Agents

In the context of social sciences, an Agent is not merely an algorithm but a functional entity with specific role-playing capabilities and domain expertise. The construction of these agents is guided by three core dimensions:

2.1 Perception and Memory

Social science agents must perceive multi-modal data, including structured statistical data, unstructured text, and social media dynamics. Through a combination of long-term memory (based on vector databases) and short-term memory (contextual awareness), agents can maintain consistency in long-term research projects and continuously accumulate domain-specific knowledge.

2.2 Planning and Reasoning

Complex social science problems require multi-step decomposition. Using techniques such as Chain of Thought (CoT) and Tree of Thoughts (ToT), agents can break down a macro-research question into manageable sub-tasks, such as data collection, hypothesis testing, and result validation, ensuring the rigor of the scientific process.

2.3 Tool Use and Action

Agents are empowered to call external APIs

摘要

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[Purpose/Significance] To provide technical services to researchers in the social sciences and meet their personalized research needs, this paper proposes a business service capability system based on the concept of agents and constructs a business service platform to implement this system. [Method/Process] By developing supporting systems such as a business model management system and a resource management system, the business service platform has established full-process service capabilities—ranging from data resource acquisition and processing to result output—enabling the structured parsing of business resources and model construction. The platform adopts an integrated operational mode that allows researchers to flexibly configure functional modules and resources according to specific research requirements. Users can either directly invoke existing functions to complete research analysis or add personalized functionality through custom plugins, thereby achieving highly adaptive and extensible business services. [Results/Conclusion] The business service platform is capable of providing personalized services for researchers in the social sciences, supporting them in conducting automated business analysis and academic research.

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关键词

Business Services, Platform as a Service (PaaS), and Software as a Service (SaaS): Platform Research and Intelligent Agents

Abstract

The rapid evolution of cloud computing architecture has fundamentally transformed the delivery of digital capabilities through Business Services, Platform as a Service (PaaS), and Software as a Service (SaaS). This research explores the integration of these layers within modern enterprise ecosystems, focusing specifically on the emergence of intelligent agents as a core component of next-generation platforms. By analyzing the interplay between service-oriented archi-

tectures and autonomous decision-making entities, this paper outlines a framework for more resilient and adaptive business environments.

1. Introduction

In the current digital economy, the distinction between infrastructure and application has blurred, giving rise to a sophisticated hierarchy of cloud-based delivery models. Business services are no longer static offerings but are increasingly dynamic, driven by the underlying capabilities of Platform as a Service (PaaS) and Software as a Service (SaaS). As organizations seek greater agility, the research focus has shifted toward how these platforms can support "Intelligent Agents" —autonomous or semi-autonomous software entities capable of performing complex tasks with minimal human intervention.

2. The Evolution of Service Platforms

2.1 Platform as a Service (PaaS) and Software as a Service (SaaS) PaaS provides the foundational runtime environment, development tools, and database management systems necessary for building and deploying applications without the complexity of maintaining the underlying hardware. SaaS sits atop this layer, delivering end-user applications via the web. The synergy between these two models allows for rapid scaling and continuous integration/continuous deployment (CI/CD) cycles, which are essential for modern business services.

2.2 Business Service Integration Business services represent the functional manifestation of these technologies. They encapsulate specific organizational processes—such as supply chain management, customer relationship management, or financial processing—into modular, consumable units. The integration of these services requires a robust platform architecture that can handle high concurrency, data consistency, and cross-platform interoperability.

3. Intelligent Agents in Platform Research

A significant trend in platform research is the transition from passive tools to active participants. Intelligent agents, powered by machine learning and deep learning, are being integrated into PaaS and SaaS layers to optimize resource allocation, automate routine decision-making, and enhance user experience.

As shown in , the role of intelligent agents varies across different service layers. In the

关键词

Business Services, Platform as a Service (PaaS), and Software as a Service (SaaS) Platform Research: An Agent-Based Approach

Abstract

This research explores the integration of intelligent agents within the architectural frameworks of Business Services, Platform as a Service (PaaS), and Software as a Service (SaaS). As cloud computing environments become increasingly complex, the demand for autonomous, adaptive, and intelligent management systems has grown. This paper investigates the role of machine learning and deep learning agents in optimizing service delivery, resource allocation, and automated decision-making across these service layers. By analyzing the interplay between platform research and agent-based modeling, we propose a framework for enhancing the intelligence and efficiency of modern cloud-based business ecosystems.

1. Introduction

The evolution of cloud computing has fundamentally transformed how enterprises deploy and manage software. The traditional hierarchy of Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) provides a structured approach to resource abstraction. However, the increasing scale of business services necessitates a shift from static management to dynamic, intelligent orchestration.

Intelligent agents, powered by advancements in machine learning and deep learning, offer a promising solution for managing these complex environments. These agents can perceive their environment, reason about optimal actions, and execute tasks autonomously to meet specific business objectives. This study focuses on the application of agent technology within the TP182 classification framework, emphasizing the synergy between platform research and intelligent automation.

2. Architectural Framework for Intelligent Business Services

The integration of intelligent agents into business service platforms requires a multi-layered architectural approach. Each layer of the cloud stack presents unique opportunities for agent-based optimization.

2.1 Software as a Service (SaaS) Layer At the SaaS level, agents focus on user experience and functional automation. By leveraging deep learning models, these agents can predict user behavior, personalize service delivery, and automate routine business processes. This reduces the cognitive load on end-users and increases the overall value of the software offering.

2.2 Platform as a Service (PaaS) Layer The PaaS layer serves as the critical intermediary where development and deployment occur. Intelligent agents in this domain are responsible for: - **Dynamic Resource Scaling:** Utilizing predictive analytics to adjust computational resources before demand spikes occur. - **Automated Debugging and Maintenance:** Identifying anomalies in application performance and suggesting or implementing fixes in real-time. - **Middleware Optimization

0 引言

The social sciences primarily investigate the complex phenomena of human society to reveal the underlying laws governing its development. As social interactions increasingly generate vast amounts of unstructured data, these massive data resources have become rich repositories of information essential for research. Scholars in the social sciences have already begun applying various text analysis methods to their work. For instance, word embedding techniques are used to study social biases and organizational relationships, while topic modeling methods are employed to analyze the characteristics and evolutionary trends of policy documents.

In the process of utilizing various natural language processing (NLP) technologies to complete research tasks, researchers must typically invest significant time and effort into acquiring technical knowledge and programming skills. Furthermore, these analyses are often conducted within isolated personal computing environments. Despite the substantial effort invested in completing such research, a persistent challenge remains: the code generated is often difficult to reuse or reproduce across different contexts.

Large Language Models (LLMs) possess robust natural language understanding capabilities and the ability to solve complex tasks. They are capable of analyzing and processing massive datasets and exhibit cross-disciplinary potential.

The broad applicability of these methods allows for the development of tailored solutions across various problems, leading to extensive research and application within the social sciences. These approaches can be directly leveraged to create personalized business services, thereby facilitating the successful completion of complex research tasks.

An agent is defined as an entity capable of perceiving its environment, making decisions, and taking actions. Based on the concept of intelligent agents, this paper investigates business service capability systems by integrating Software as a Service (SaaS) and Platform as a Service (PaaS) models. We have developed a preliminary business service platform characterized by task responsiveness and autonomous process configuration capabilities.

The platform integrates various tools and plugins, including natural language processing algorithms and Large Language Models (LLMs). It can generate corresponding services based on domain-specific data and research protocols pro-

vided by researchers, enabling the automated analysis and processing of corpora to meet personalized research requirements. By implementing a unified resource organization and service mechanism, the platform allows researchers to share data, models, and tools. This provides a convenient pathway for knowledge dissemination and experience transfer, facilitating research collaboration and methodological reuse. Ultimately, the platform promotes knowledge exchange and resource interoperability across different disciplines, driving the integration and application of cross-domain methodologies.

1 相关研究进展

To address business challenges in the social sciences, researchers have designed various specialized service platforms. For instance, Ma Yumeng et al. [**?**] developed a science and technology policy analysis service platform to meet user demands for policy text analysis. By utilizing tools for policy derivation analysis, conceptual entity indexing, and classification, the platform provides services such as policy issuance characterization, hotspot evolution tracking, and policy derivation analysis, thereby streamlining and automating the policy analysis process. Yao Zhanlei et al. [**?**] proposed diversified data collection strategies and established metadata description standards to construct a research data management platform for the humanities and social sciences. This platform features basic text analysis functions, such as general database structure analysis and keyword clouds, to facilitate data sharing. Additionally, Liu Jia et al. [**?**] developed a Tibetan medical ancient books service platform tailored to specific research needs, providing services such as knowledge retrieval and knowledge reasoning.

Many existing platforms are limited by specific business designs and offer only predefined services to users. This lack of flexibility makes it difficult to generate different services based on diverse user requirements, hindering researchers from efficiently obtaining service support adapted to their specific goals when tackling complex research topics. To address these issues, this paper introduces the concept of "agents" and proposes a social science business service capability system based on agent-oriented thinking, along with a corresponding business service platform. The platform allows researchers to independently define business processes according to their research objectives and provides flexible business services through SaaS and PaaS models to meet personalized research needs. At the platform level, by constructing support systems such as algorithm and resource management systems and integrating the capabilities of Large Language Models (LLMs), the platform achieves full-process business services ranging from data acquisition and analysis to result presentation. Through a plugin upload mechanism, researchers can upload or invoke relevant algorithm models in the social science field based on their research needs. Leveraging its functional assembly capabilities, the platform can rapidly form diverse business services, automatically complete the analysis and processing of research resources, and output the corresponding analytical results.

2.1 业务服务能力体系设计

To address the challenges of complex workflows, diverse research requirements, and high technical barriers in social science research, this paper introduces the concept of agents and proposes a business service capability framework for the social sciences based on agent-oriented thinking, as shown in Figure 1 [Figure 1: see original paper]. Driven by research needs, this framework decomposes complex research processes and abstracts the business service capabilities involved in social science research—such as data acquisition and model construction. By encapsulating these capabilities, the framework achieves intelligent organization and invocation, providing researchers with diversified services through SaaS (Software as a Service) and PaaS (Platform as a Service) models.

Agents typically possess four characteristics: autonomy, perception, decision-making, and action. Autonomy refers to the agent' s ability to perceive its environment, make decisions, and take actions without relying on external instructions. Perception enables the agent to collect information about its surroundings through sensors. Decision-making allows the agent to process perceived information and take appropriate actions to achieve its goals. Action refers to the agent' s ability to execute movements that change the state of its environment. By decomposing and organizing business service capabilities based on agent-oriented thinking, the various services required in social science research are abstracted into business agent units capable of autonomous execution and collaborative work. This allows complex research tasks to be completed automatically in a modular and composable manner.

The business service capability framework constructed in this paper provides full-process, integrated business service support for social science research. By decomposing complex research tasks and flexibly configuring platform functions and business resources, the system generates diversified services delivered to researchers via a SaaS model. This reduces the technical threshold for research, supports the construction of personalized business services, and enables the automatic execution of complex workflows. Based on the PaaS model, new business service capabilities can be expanded through plugin configurations. These new capabilities collaborate with the platform' s existing functions to respond to evolving research needs and iterative technological updates, thereby enhancing the platform' s adaptability.

The business service capability framework primarily consists of three parts: the support system layer, the service capability layer, and the business agent construction mechanism. The support system layer serves as the foundation for the entire framework; through modular design, it provides the underlying technical support for the task decomposition and execution of business agents. It offers a unified entry point and user interface for business services under the SaaS model and provides the fundamental environment for plugin expansion under the PaaS model. The construction of the support system ensures that the business service platform possesses both general service capabilities and

the ability to implement personalized business services. The service capability layer abstracts the functions required for business services, forming a complete and reusable set of capabilities—ranging from data acquisition and processing to analysis and result visualization—based on the support system. This provides methodological and tool support for the construction of business agents. Finally, the business agent construction mechanism, based on both SaaS and PaaS models, supports researchers in building personalized services on demand by combining and scheduling platform service capabilities, thereby flexibly adapting to diverse research requirements.

2.2 业务服务平台实现

Based on the established business service capability framework, this study developed a business service platform for the social sciences. The platform aims to provide social science researchers with configurable and extensible business modeling and analysis services, supporting the definition of structured business models for specific research objects. Based on these models, the platform performs multi-level parsing and processing of relevant textual resources through methods such as conceptual annotation, relationship extraction, and semantic indexing. This enables the analysis of multi-dimensional characteristics of research objects and supports business modeling for diverse research objectives. The platform features integrated capabilities for model configuration, tool invocation, data processing, and result output. By supporting customized services for specific research tasks, it achieves a "demand-driven—model construction—service generation" business closed-loop, providing flexible, low-barrier intelligent technical support for social science research.

The platform is composed of five subsystems, including a platform management system and an algorithm management system. It offers two service modes, SaaS (Software as a Service) and PaaS (Platform as a Service), tailored to the specific needs and technical backgrounds of researchers. Through the collaborative operation of these supporting systems, the platform facilitates resource

uploading, processing, and parsing, providing full-lifecycle business service capabilities ranging from business data acquisition to result presentation. Specifically, the platform

management system is primarily responsible for managing projects, personnel, and permissions; the algorithm management system handles the management and configuration of platform plugins and functions; the business model management system focuses on the construction and management of business models; the resource acquisition system provides web crawling functions to facilitate the collection of online resources; and the resource management system manages the data generated during the business analysis process.

Researchers can select or upload research tools and business resources on the platform according to their research requirements and workflows, allowing the platform to generate personalized services. In the SaaS mode, the platform

provides applications directly as services, allowing researchers to utilize existing platform functions and business resources. This enables researchers to complete their analysis through the platform' s interface without needing to consider tool development. Conversely, the PaaS mode provides a mechanism that supports on-demand development, allowing researchers to develop corresponding functions on the platform according to their research needs. This extends the platform' s service capabilities and satisfies diverse research and analysis requirements.

The platform supports the storage and management of business models and analysis results. Through a sharing mechanism, it enables the exchange of data, research tools, and research findings, allowing researchers with similar needs to reuse existing services. These functions improve resource utilization, reduce the investment of researchers in repetitive tasks, and enhance scientific research efficiency and engagement in social science research. Furthermore, they promote scientific collaboration and cross-disciplinary innovation. As research demands continue to expand, the platform will gradually build large-scale research resources and business services by integrating multi-domain research tools and analysis methods, continuously enhancing its intelligence and automation capabilities.

3 平台业务服务模式

Based on the business service capability framework, this study designed and implemented the relevant functions of the platform. The platform supports researchers in completing the entire business workflow—from data acquisition to result visualization—to achieve their specific research objectives.

The platform provides services through both SaaS (Software as a Service) and PaaS (Platform as a Service) models. This dual-mode approach enables researchers to construct personalized business services tailored to their research goals, thereby satisfying a wide range of diverse research requirements and application scenarios.

3.1 业务服务流程

Based on the operational requirements of researchers, the platform provides comprehensive business service support centered around the core data processing workflows of social science research. The platform enables researchers to flexibly reorganize existing functions or develop necessary service plugins according to their specific research needs and workflows. This allows for the completion of a full business chain—encompassing data acquisition, processing and storage, business analysis, and visualization applications—to achieve personalized research objectives, as shown in [Figure 2: see original paper].

Upon entering the platform, researchers first select an existing project or create a new research project. Subsequently, they can construct business models based

on their specific research requirements by selecting built-in platform functions or uploading necessary plugins and fine-tuned large language models (LLMs) to define their custom workflows. By uploading local resources or utilizing the platform to crawl required business data, researchers can implement personalized studies using the selected functions or uploaded plugins. This service supports the structured parsing and storage of raw resources in various formats (such as .docx and .txt), enabling business services such as public opinion monitoring and report generation to meet diverse operational needs.

3.2 基于 PaaS 的业务服务

The research objects, methods, and data involved in the social sciences are complex and diverse, making it difficult for existing functional modules of platforms to meet the varied needs of different researchers. To enhance the platform' s capacity for handling complex business logic and to provide researchers with greater freedom to address personalized research problems, this paper proposes a personalized business service model based on Platform as a Service (PaaS). This model allows researchers to independently develop research tools within a unified platform framework or to invoke, improve, and reorganize existing tools to obtain customized research instruments and implement personalized business workflows.

Building upon the platform' s fundamental business service capabilities, this paper designs a business service configuration process tailored to personalized research requirements. By defining business model schemas and developing plugins, the platform' s functions can be developed and reorganized according to the specific business analysis needs of researchers. This approach enables the personalized parsing and processing of business texts, thereby improving the platform' s adaptability to new requirements and its functional extensibility.

To further enhance the platform' s intelligent business service capabilities, this paper conducts a preliminary exploration of an automatic plugin generation mechanism. By researching resource-on-demand parsing methods that bridge the gap from requirements to code, the system can generate corresponding parsing plugins by invoking existing algorithmic models after analyzing research requirements. This mechanism effectively improves the platform' s ability to respond to diversified research demands.

3.2.1 PaaS 模式

The PaaS (Platform as a Service) model addresses the requirements of personalized business processes and business modeling. By building upon foundational service capabilities, it provides functional extension mechanisms to researchers with technical development skills, supporting them in performing adaptive modifications to the platform. This model can flexibly

respond to new business analysis requirements and support the construction

and deployment of diverse business services, thereby enhancing the platform' s scalability. Platform as a Service is the product of integrating cloud computing with business delivery platforms. As a cloud computing service model, a PaaS platform provides the development, execution environment, and operations capabilities for applications, characterized by high availability and high scalability. This allows users to develop, deploy, and manage applications without concerning themselves with the underlying infrastructure. PaaS platforms can simplify the workload for developers and possess dynamic resource scheduling capabilities, enabling Web applications to automatically adapt to changes in business volume. Providing services to researchers through the PaaS model simplifies the development process, allowing them to focus on the implementation of core business logic. It permits them to leverage existing platform capabilities to develop required functions, achieving a complete closed loop from data acquisition and processing to the generation of entirely new business services. The PaaS model provides technical support for the efficient development of business service platforms and can flexibly deploy the services required by researchers. This not only improves the platform' s responsiveness to diverse research needs and complex business scenarios but also enhances its adaptability to iterative technological updates.

3.2.2 业务服务配置流程

Data sources in the social sciences are extensive and diverse, characterized by a vast amount of unstructured and semi-structured text that is difficult to utilize directly for research and analysis. By constructing business models and defining corresponding schema structures, specialized parsing plugins can be developed using various natural language processing (NLP) algorithms. These plugins facilitate the parsing, extraction, and transformation of raw resources from different formats (such as .docx and .txt) into structured corpora defined by the schema. This approach enables the automated processing of data, thereby providing reliable data support for social science research.

To meet the personalized processing requirements of researchers, this paper proposes a service configuration workflow based on Platform as a Service (PaaS), as illustrated in [Figure 3: see original paper]. This framework allows researchers to construct business models tailored to their specific research needs. Within the platform' s unified architecture, users can upload their own algorithmic models or invoke existing ones, as well as call, rewrite, or add platform plugins to obtain customized functionality.

The specific workflow is organized as follows: First, researchers design a corresponding business model schema based on their research requirements, defining the data structure of the XML file to provide a target for resource parsing. Second, to achieve structured parsing of unstructured and semi-structured resources according to the defined schema, researchers must develop corresponding parsing plugins based on the characteristics of the resources; these plugins then undergo testing, packaging, and deployment. Finally, by configuring schema

templates on the platform, building Solr indices, registering parsing plugins, and configuring front-end display information, the entire process—from design and development to testing and deployment—is completed. This comprehensive workflow enables the construction of personalized business services.

The platform provides researchers with a flexible approach to business modeling, enabling them to design business models tailored to their specific research requirements and conduct domain-specific business analysis. The business models designed in this study are composed of business elements that reveal the core essence and attributes of the business; these models can ultimately be presented through structured text, images, and other formats. Domain-specific texts contain a wealth of business information. Based on research···

Based on the business models and processes defined by researchers, this approach utilizes business model construction techniques to mine business knowledge and the implicit relationships between business elements within text. This process enables the discovery of the inherent logical structure of a business, ultimately assisting researchers in completing business analyses and generating outputs.

The design of the business model in this study is primarily implemented through XML Schema. XML is utilized for the transmission and storage of data, as its hierarchical structure supports complex data modeling and diverse business requirements. Specifically, XML Schema is used to describe and regulate the structure of XML documents by defining elements, attributes, and data types, thereby achieving a structured description of the business. By leveraging XML Schema, business resources in various formats can be parsed into standardized XML data, facilitating efficient data transmission, storage, and invocation, which in turn enables the parsing and application of business resources.

Researchers can analyze business components according to specific requirements and identify core fields and key attributes. By defining different field types and data types, they can construct corresponding XML Schemas that clarify the basic structure and objectives of the business, achieving a structured representation. Once the XML Schema is established, the platform invokes various model algorithms and tools to complete text analysis and business model construction. For example, Large Language Models (LLMs) are employed for information extraction to populate business model fields, while text classification algorithms are used to categorize the text under analysis. Through this process, the platform gains the capability to construct business models tailored to diverse research scenarios.

Researchers can upload and manage XML schema templates corresponding to business models within the business model management system, enabling the construction and editing of these models. The specific process is as follows: after defining the business model structure based on research requirements, researchers write the corresponding XML schema template and upload it via the XML schema upload page in the business model management system, as shown in [Figure 4: see original paper]. Once the XML schema is uploaded, the back-

end parses it to extract the schema structure, constraint information, and other relevant metadata. For the list of XML schemas already uploaded by researchers, the platform provides operations such as export and deletion, facilitating maintenance and updates and providing efficient support for business modeling.

By developing parsing plugins, the platform can dynamically integrate various types of parsing tools, thereby enhancing its overall flexibility and scalability. These parsing plugins are primarily written in Java, and the platform provides the necessary foundational code and standardized development workflows to facilitate their creation. Once a plugin has been developed and successfully tested in a local environment, researchers can package and upload it to the server. By implementing a unified and standardized process for plugin development and deployment, the platform ensures seamless integration and efficient management of diverse analytical tools.

Simplifying the management and maintenance of the platform reduces potential errors during plugin deployment. To enable the use of personalized parsing plugins on the platform, researchers must configure the parsing plugin within the system. This process involves sequentially completing configuration fields such as the tool name, tool category, target file format, and processing resource category, as illustrated in [Figure 5: see original paper].

By configuring schemas and registering parsing plugins, the platform can incorporate new functionalities and establish corresponding business service capabilities. This architecture enables customized data processing, thereby meeting the diverse processing requirements of various data types. Furthermore, by configuring Solr index fields, platform data can be efficiently retrieved and utilized, providing robust support for a wide range of data analysis and application scenarios. Additionally, the platform features front-end page design capabilities, allowing researchers to dynamically add or modify display content according to practical needs, achieving the personalized presentation of business results.

The platform supports the configuration of display modes for business fields, including options for visibility on detail pages and search result pages, as well as settings for visual representation. These features are designed to meet the requirements for multi-level business result presentation and user interaction.

3.3 基于 SaaS 的业务知识体系构建服务

The SaaS (Software as a Service) model provides developed software applications as services to researchers. This allows researchers to access software services via the network, enabling them to focus exclusively on their specific business objectives without needing to concern themselves with the underlying functional implementation details.

To address common challenges in the social sciences—such as resource collection, storage, and parsing—this paper constructs a platform featuring fundamental functional modules for resource acquisition, structural parsing, storage, and

visualization, thereby forming encapsulated knowledge services. Depending on their specific research needs and themes, researchers can utilize the platform' s existing functions to select or define required business services, then upload or crawl corresponding business resources for structured processing. The platform generates the necessary services based on the functions and resources selected by the researcher, achieving automated corpus analysis and assisting researchers in completing their analytical tasks. Grounded in agent-based design principles, the platform achieves the decomposition and automated execution of complex business processes through modular functional design. This effectively lowers the technical barrier to entry, enabling researchers who lack programming skills to utilize the platform for business analysis.

To achieve the analysis and understanding of business texts, this paper constructs business models by fine-tuning Large Language Models (LLMs). Based on the business concept category system defined by the researcher, the platform fine-tunes the LLM to implement functions such as text annotation according to set category labels. This process captures the knowledge structure within the text and completes the structural parsing of business documents. The specific workflow is as follows: first, researchers analyze the corpus in relation to their specific research questions, identifying key concept categories and the attribute relationships between them; second, they design the business structure.

The business structure design involves defining business concept categories, concept attributes, and inter-conceptual relationships to build a knowledge framework and complete basic business settings. Third, researchers can utilize existing dictionaries or construct specific business concept category dictionaries, attribute dictionaries, and synonym dictionaries as domain-specific prior knowledge to assist in resource structuring. The platform provides a dictionary import function, allowing researchers to upload locally constructed dictionaries or retrieve and invoke existing ones based on their needs. Additionally, it offers dictionary processing and management functions, enabling researchers to edit and modify dictionaries to meet their specific research requirements. Researchers can perform operations on dictionary resources within the dictionary management module of the resource management system, as shown in [Figure 6: see original paper].

To meet the business data acquisition needs of researchers, the platform has developed various web crawling functions, supporting three types: simple crawlers, topic-based crawlers, and customized crawlers. Researchers can select the desired crawling function within the resource acquisition system and achieve automated corpus collection by adding crawling tasks, as shown in [Figure 7: see original paper].

The platform has developed various plugins to support researchers in the structural processing of corpora, providing technical support and improving research efficiency. Researchers can upload local corpora through the corpus import interface and select matching parsing tools based on the text type to achieve structural parsing, as shown in [Figure 8: see original paper]. The platform

also features a corpus task assignment function, allowing researchers to grant editing and auditing permissions for the current corpus to collaborators. This enables multi-person collaborative processing of corpus content and structure, enhancing the quality and efficiency of corpus processing.

The platform supports corpus retrieval functions, providing methods such as fuzzy matching and exact word matching, as shown in [Figure 9: see original paper]. Researchers can search the platform' s resources to obtain target resources from the repository that meet their specific requirements.

For business resources acquired via crawlers or local business resources uploaded by users for analysis, researchers can select appropriate text parsing tools and algorithmic models to perform preliminary processing based on their research needs. Leveraging prior knowledge such as dictionaries, the platform can process the corpus through methods like distant supervision labeling to generate fine-tuning datasets for LLMs. Furthermore, the resource management system provides functions for retrieving and exporting fine-tuning corpora. Once model fine-tuning is complete, researchers can utilize the fine-tuned model to perform structural parsing, such as text annotation and the extraction of conceptual relationships, thereby forming a business knowledge system.

To support collaborative sharing among researchers in completing scientific tasks, the platform incorporates a sharing mechanism and defines different user types. User types are categorized into system administrators, data administrators, and regular users, each with corresponding permissions. System administrators are responsible for the overall operation and maintenance of the platform; they possess the highest level of authority and can manage projects, users, and plugins. Data administrators have permissions for business resource management, such as managing user-uploaded texts and constructed dictionaries. Regular users are the primary operators of the platform, with access permissions assigned by system administrators according to project requirements. Through this sharing mechanism, the platform enables multiple researchers to work simultaneously on the same project and share datasets, research tools, and analytical results across different projects.

4 业务服务平台应用与展望

By leveraging the constructed business service capability system, the business service platform can flexibly build customized professional research platforms for different research fields, thereby achieving automation of business services within the social sciences. Focusing on the field of policy research, this paper performs domain adaptation and functional expansion based on the existing platform to construct an automated policy research platform. This platform provides services to researchers through a Software-as-a-Service (SaaS) model.

The automated policy research platform is designed around the text analysis and research requirements of the policy domain, integrating functions such as data crawling and acquisition, resource parsing and processing, resource retrieval,

briefing recommendation, and resource visualization analysis. The platform acquires policy-related text resources from various countries through multiple channels and utilizes policy-specific corpora to fine-tune large language models (LLMs). These fine-tuned models are then used to perform structured processing of resources, providing researchers with flexible and customizable policy research solutions while lowering the technical barriers to entry for policy research. For example, the automatic briefing generation and recommendation function analyzes keywords input by researchers and autonomously organizes relevant corpora into a briefing chapter template structure, endowing the platform with targeted automated briefing generation capabilities.

The platform presented in this paper is based on a dual SaaS and PaaS (Platform-as-a-Service) model, enabling multi-level service support. The SaaS model encapsulates complex model algorithms into configurable functional modules, delivering the platform to researchers as an application. Researchers can directly utilize the platform' s existing functions and resources for business analysis to achieve personalized research goals, thereby reducing technical requirements. To flexibly address the diverse research needs of scholars, this paper investigates functional expansion mechanisms and processes based on the PaaS model, building upon the platform' s basic service capabilities. This allows for the development and reorganization of platform functions, providing the platform with personalized functional expansion capabilities. This approach offers technical support for implementing customized services using large language models and establishes a foundation for agent invocation and the assembly of plugins to form services. In the future, the code generation capabilities of large models will be further utilized to achieve automatic plugin generation based on researcher requirements, creating new services and expanding the platform' s application domains and scenarios.

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[End of translation]

Construction of Service Capabilities and Platform in the Social Sciences Based on the Concept of Agents Liu Yao Zhou Jiahui Zhang Xiaodan Qiu Wuwen (1. Institute of Scientifi c and Technical Information of China, Beijing 100038, China;

Abstract

Purpose/Significance To provide technical service support for researchers in the social sciences and meet their personalized research needs, this paper proposed a business services capability framework and developed a corresponding service platform based on the concept of agents.

Method/ Process By constructing supporting systems such as the business model management system and the resource management system, the platform has the ability to provide full-process services from data resource acquisition and processing to result output, and can realize structured analysis and model construction of resources. Based on SaaS and PaaS modes, the platform allows

researchers to flexibly configure functional modules and resources for specific research requirements, by using built-in functions or by extending personalized functions through user-defined plugins, thereby achieving adaptable and scalable service.

Result/Conclusion The platform is capable of providing personalized services, supporting researchers in conducting automated analysis and research.

Keywords

Service; Platform as a Service (PaaS); Software as a Service (SaaS); Platform Research; Agents (Editor: Kong Qingqing)

Note: Figure translations are in progress. See original paper for figures.