



Design of an Intelligent Decision-Making System for University Human Resources Based on Generative AI

Wen Fang

Information & Network Center, Beijing Information Science & Technology University, Beijing, China

Abstract: Driven by both the digital transformation of higher education and the growing demand for refined human resource management, traditional university human resource management models face problems such as data fragmentation, strong subjectivity in decision-making, and low process efficiency. Centered on generative AI technology and combined with core business areas of university human resource management — including position recruitment, performance evaluation, training and development, and staffing optimization — this paper designs an intelligent decision-making system for university human resources. By constructing a multi-source data integration framework and optimizing generative AI models based on the Transformer architecture, the study enables deep mining, intelligent analysis, and decision recommendation generation for human resource data. The system adopts a layered architecture encompassing the data layer, technology layer, application layer, and decision layer, and simultaneously develops core modules such as intelligent recruitment matching, dynamic performance evaluation, and training program generation, along with supporting data processing and decision execution workflows. This study aims to address the challenge of transforming data value in university human resource management and to enhance the scientific rigor and precision of decision-making.

Keywords: generative AI; university human resources; intelligent decision-making system; digital transformation; multi-source data integration

1. Introduction

With the rapid development of higher education, the scale of university human resources continues to expand, and management scenarios are becoming increasingly complex and diverse, placing higher demands on the rational allocation of human resources and the foresight of decision-making. At present, university human resource management largely relies on traditional information systems that are mainly capable of basic data entry and query functions, making it difficult to meet the analytical requirements of massive, multi-dimensional human resource data. Decision-making processes often depend on the personal experience of managers, leading to issues such as insufficient matching between positions and talents, lack of dynamism in performance evaluation, and inefficient allocation of training resources. As a breakthrough technology in the field of artificial intelligence, generative AI possesses core capabilities including natural language generation, data mining, and predictive analysis, enabling in-depth exploration of underlying data patterns and providing precise and effective support for decision-making. Against this backdrop, integrating generative AI technology into university human resource management processes and constructing an intelligent decision-making system has become a key pathway to overcoming existing management challenges.

2. Logical Foundations of Generative AI–Empowered Intelligent Decision-Making for University Human Resources

2.1 Technological Logic: Empowerment Mechanisms of Generative AI in Organizational Management Decision-Making

Generative AI possesses strong capabilities in natural language processing as well as multimodal data understanding and generation, exerting a significant influence on organizational management decision-making paradigms. In the context of university human resource decision-making, generative AI enables deep integration and semantic analysis of structured and unstructured data, and can also simulate multi-factor interactions and dynamic evolution in decision-making processes through sequence generation and pattern prediction [1]. Its core mechanisms are mainly reflected in three aspects. First, semantic data integration and knowledge extraction transform dispersed multi-source information—such as texts, tables, and charts from personnel, academic affairs, and research systems—into structured decision knowledge units. Second, context-aware decision recommendation generation relies on historical data and real-time conditions to produce personalized decision

schemes for specific management scenarios such as recruitment, performance evaluation, and training. Third, continuous learning and feedback adjustment introduce management feedback signals to enable dynamic changes in model parameters and iterative refinement of decision logic, thereby adapting to diverse management needs and improving decision accuracy. The technical characteristics of generative AI correspond to a closed-loop intelligent decision-making system path of "data-driven input, model-based generation, decision execution, and feedback adjustment."

2.2 Managerial Logic: The Dual Drivers of Strategic Human Resource Management and Digital Governance Transformation in Universities

In designing human resource management systems, universities must align with the principles of strategic human resource management and the trend toward digital governance transformation. Strategic human resource management emphasizes the vertical integration of human resource practices with organizational strategy while also focusing on horizontal coordination among various human resource functions. Its core objective is to align the structure of human capital and organizational capabilities with the strategic development of universities. The digital governance transformation of universities requires breaking down departmental data silos and promoting the online and intelligent operation of human resource business processes, thereby forming a data-driven decision-making logic. Intelligent decision-making systems driven by generative AI are well positioned to address these dual demands [2]. At the strategic level, the system deeply mines the intrinsic relationships between human resource data and strategic documents such as disciplinary development plans and research strategies, providing data support for long-term decisions on talent pipeline construction and staffing allocation. At the governance level, the system processes routine human resource affairs in an automated and intelligent manner, driving management processes toward standardization and transparency while balancing operational efficiency and service quality. Anchored in technological support, this system design bridges strategic human resource management and the modernization of governance capabilities in universities, with a focus on translating theoretical frameworks and transformation requirements into practical implementation.

3. Overall System Design Principles and Objectives

3.1 Overall Design Principles

The system design strictly adheres to four core principles. The principle of precise alignment closely corresponds to the public-service orientation and academic characteristics of university human resource management, fully matching the management needs of different position types such as faculty members, administrative staff, and research personnel, while also taking into account the specific features of core business processes including professional title evaluation and position appointment. The principle of technical compliance adopts technical solutions consistent with data security laws and personal information protection regulations, implementing encryption for sensitive human resource data and clearly defining the boundaries of authority for data collection, storage, and use to ensure data security and privacy protection. The principle of intelligent collaboration relies on generative AI technology to enable data interoperability and business coordination across management modules, breaking down interdepartmental data barriers and covering closed-loop management processes from data collection to decision execution. The principle of iterative optimization reserves extensible interfaces in the system architecture design, supporting continuous training of generative AI models and dynamic upgrading of functional modules, thereby aligning with the iterative evolution and development pace of university human resource management models.

3.2 Core Design Objectives

With "Internet Plus" becoming the underlying environment of human resource operations, new theories and methods of human resource management—such as data-driven human resource management (HRM), human resource shared service centers (HRSSC), human resource business partner models (HRBP), as well as flexible organizations, cloud-based knowledge, and cloud-enabled incentives—have emerged. Their common emphasis lies in optimizing human resource management based on business needs, data, and new technology support platforms. The core objectives of the system are developed around three major dimensions, focusing primarily on the construction of a full-process intelligent decision-making framework. First, the system emphasizes the transformation of data value by integrating multi-source human resource data from universities and leveraging generative AI to mine underlying data relationships, thereby converting fragmented data into decision-making evidence and bridging critical links in data circulation and application. Second, it focuses on the intelligent upgrading of management processes by enabling automated processing and intelligent analysis for core functions such as recruitment, performance management, and training, reducing manual intervention and guiding managers away from repetitive tasks toward strategic-level decision-making. Third, it emphasizes precision in human resource allocation by providing accurate

recommendations for talent recruitment, staffing adjustment, and training planning based on intelligent analysis results, achieving precise person–position matching and coordinated operation between individuals and the organization, in line with the practical needs and development direction of university human resource management.

4. Design of the Core Technical Architecture of the System

4.1 Overall Framework of the Technical Architecture

The data layer interfaces with the business systems of various university departments to collect, in real time, multi-source human resource data related to faculty and staff profiles, recruitment and hiring, attendance and performance, and training and development, while simultaneously integrating external talent databases and industry benchmark data resources. A distributed storage scheme is adopted to separately store structured and unstructured data, complemented by automated data cleaning tools to eliminate duplicate and incomplete data [3]. Data are labeled according to human resource business dimensions, and a real-time incremental data update mechanism is established, with full data validation conducted once every 24 hours. The technology layer selects generative AI models tailored to university HR scenarios and embeds multi-dimensional correlation analysis algorithms and semantic parsing modules, training model parameters for scenarios such as résumé screening, performance attribution analysis, and talent profiling. A feedback channel for algorithm iteration is established to dynamically adjust model thresholds based on practical business outcomes, while lightweight NLP tools are integrated to enable intelligent extraction and classification of human resource text data. The application layer focuses on core university HR operations and develops functional modules such as intelligent preliminary recruitment screening, dynamic performance calculation, process-oriented professional title evaluation, and faculty and staff mobility management. These modules are embedded into full business process nodes, supporting customizable approval workflows and data validation rules, and enabling seamless data flow across modules to achieve closed-loop online processing of business scenarios. The decision layer generates multi-dimensional visual charts related to talent pipeline development, compensation optimization, and staffing allocation based on data analyzed at the technology layer, and incorporates a decision recommendation push function to precisely match the practical needs of management scenarios. Unified interface protocols are adopted across all layers to establish data interaction channels, enabling real-time data transmission and bidirectional instruction feedback. Interface connectivity tests are conducted on a regular basis to ensure effective coordination among layers [4]. The system's technical architecture is illustrated in Figure 1, which presents the logical relationships among the four-layer architecture from bottom to top. The data layer is responsible for multi-source data collection, cleaning, and storage; the technology layer, centered on generative AI models, realizes intelligent data analysis and model iteration; the application layer encapsulates AI capabilities into concrete functional modules for business areas such as recruitment and performance management; and the decision layer generates visual charts and decision-related recommendations based on analytical results. This architecture clearly reflects a system design approach in which data flow upward, intelligence is progressively enhanced at each layer, and the ultimate objective is to support management decision-making.

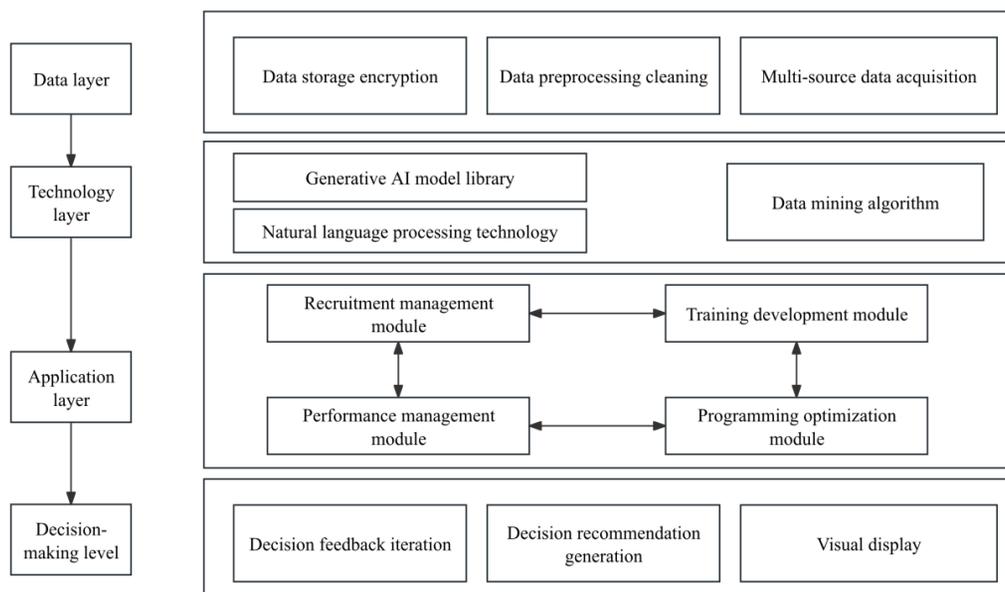


Figure 1. Overall Technical Architecture of the System

4.2 Selection and Optimization of Generative AI Models

A generative AI model based on the Transformer architecture is selected as the core, with the open-source LLaMA-2 model adopted for related work. Data dimensions are decomposed according to university human resource business modules such as recruitment, performance management, and training, followed by scenario-based fine-tuning. After historical data are collected, duplicate and incomplete information is removed, and unstructured résumé texts, structured performance indicators, and time-series training records are classified and annotated to form a dedicated dataset. Training is conducted in batches with an incremental ratio of 10% to align the model with business terminology and logic. A 4-bit quantization compression technique is employed to reduce model parameters, combined with a dynamic attention mechanism to focus on the extraction and analysis of key fields such as professional titles, assessment results, and training duration [5]. A lightweight model inference framework is constructed to accommodate the requirements of large-scale parallel data processing. On a monthly basis, newly added human resource data and HR decision feedback are incorporated, and deviations between model outputs and actual decisions are compared. Misclassified cases are labeled and used to reversely adjust model parameters, thereby forming a closed-loop process of data input, training, output, and feedback.

4.3 Multi-Source Data Integration and Processing Technologies

The data layer applies multi-source data integration technologies to interface with university personnel, academic affairs, and research management systems. Through RESTful APIs, fields such as faculty basic information, teaching performance, research outputs, and compensation and benefits are aligned on a one-by-one basis. At the same time, direct connections are established with higher education public information platforms, human resources and social security department talent market databases, and professional title evaluation policy repositories to collect external data including human resource allocation standards, supply–demand dynamics, and policy details. Data acquisition is conducted using a dual-mode approach: newly generated data are pushed in real time via interfaces, while batch synchronization of historical data is completed through direct database connections during off-peak hours each day. During data preprocessing, deduplication is performed by comparing field hash values, while a rule engine is used for validation, error correction, and unified data formatting. NLP-based tokenization and entity annotation are employed to convert unstructured text into standardized fields. Sensitive data such as compensation and identification numbers are encrypted and stored using the AES-256 algorithm, and data access scopes are restricted by defining read–write permissions for roles including HR personnel, departmental administrators, and auditors. The data middle platform organizes datasets according to business scenarios such as recruitment and performance management, retains data flow traces to support on-demand retrieval, and synchronously updates data quality verification logs. The human resource data processing workflow is illustrated in Figure 2, which highlights the specific interfacing methods between external data sources and internal systems, as well as key steps such as data cleaning and annotation, sensitive information security encryption, and access control. This figure visually demonstrates how the system transforms raw and heterogeneous data into high-quality and usable decision-making resources, serving as a key reference for understanding the system's data foundation and governance capabilities.

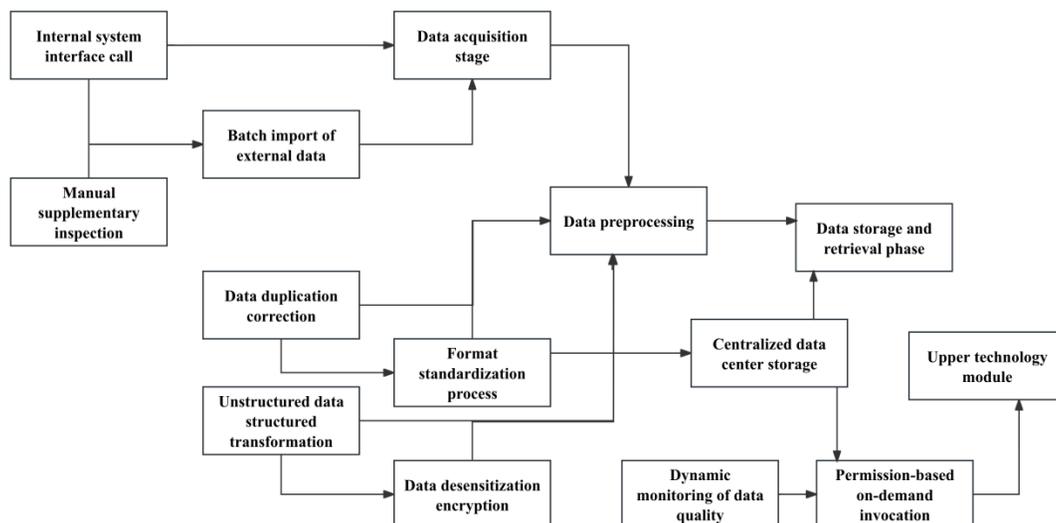


Figure 2. Human Resource Data Processing Workflow

5. Design of Core System Functional Modules

5.1 Intelligent Recruitment Management Module

The recruitment management module covers the entire process from position demand analysis to candidate hiring. Leveraging generative AI to integrate university disciplinary planning documents with position vacancy lists, the system retrieves recruitment data for the same positions over the past three years, along with information on existing faculty professional titles, research directions, and staffing gaps. It decomposes job responsibilities, qualification requirements, and core competency items to generate detailed position requirement descriptions. By referencing salary percentile values for comparable positions at peer institutions and industry talent supply–demand heat maps, the system determines appropriate salary ranges and recommends targeted recruitment channels based on disciplinary categories, prioritizing academic conferences and research platforms for science and engineering disciplines, and core journal columns and professional associations for humanities and social sciences. During résumé screening, the system employs OCR recognition and NLP parsing to extract quantitative indicators such as candidates' academic backgrounds, years of experience, journal quartile rankings, and project levels. A weighted algorithm is used to generate matching scores, highlighting key strengths and weaknesses, and only the top 20% of highly matched résumés are forwarded to HR personnel. In the interview stage, tiered question banks are generated according to position characteristics: professional competency questions closely align with core teaching and research tasks, comprehensive quality questions incorporate scenario-based simulations, and research potential questions focus on the feasibility of research plans. Interview audio is transcribed in real time, with key statements extracted and compared against position requirements to form interview evaluation reports that detail specific performance and supporting examples. At the hiring stage, screening scores, interview conclusions, and background check highlights are integrated to calculate weighted composite rankings. Negotiable salary ranges and hiring priority levels for each candidate are identified, and a checklist of hiring process milestones is simultaneously generated.

5.2 Dynamic Performance Management Module

Generative AI is used to organize core task items for various university positions and, by referencing development plans from the past three years and industry benchmark data, to generate an initial indicator repository. For faculty positions, indicators include quantifiable items such as teaching workload completion rates, the number of papers published in core journals, and award levels achieved through student competition guidance. For administrative positions, indicators specify metrics such as task completion timeliness, service recipient satisfaction scores, and process execution compliance rates. Manual adjustment interfaces are reserved to support fine-tuning of individual indicator weights and the addition of customized assessment items, with all adjustment trajectories retained for traceability. System interfaces with academic affairs, research, and personnel management platforms are established, with synchronization frequencies set according to work milestones. Teaching data are automatically captured upon completion of teaching hours and grading of assignments; research data are updated in real time through connections with journal databases and project platforms; and administrative data are extracted from office systems. Manual data entry is eliminated, with only manual review permissions retained for data anomalies, and review outcomes are annotated with reasons and archived. The model retrieves historical data from the past three years and average values for comparable positions at peer institutions, conducting indicator-by-indicator deviation analysis. For faculty research performance, causes are decomposed in terms of resource utilization rates and alignment between research directions and key disciplinary areas. For administrative positions, bottlenecks in task circulation nodes and cross-departmental collaboration efficiency are examined. Analytical reports include specific deviation values and corresponding work stages. For identified weaknesses, personalized improvement plans are pushed. Faculty members with insufficient research output are matched with high-quality internal resources and comparable cases, while administrative staff with lower efficiency are provided with optimized work pathways. Visual dashboards present data categorized by usage scenarios and are directly connected to approval systems for professional title evaluation and compensation adjustment, eliminating the need for secondary data entry.

5.3 Training and Development Planning Module

The module interfaces with the performance management system, position promotion application materials, and employee career development records to aggregate multi-source data. Through generative AI, competency gaps are decomposed on a position-by-position basis and categorized by groups such as early-career faculty and middle-level managers, with key improvement areas labeled, including teaching methodologies, research capabilities, and management skills. By linking internal and external faculty pools and course repositories, training resources are automatically matched according to identified gaps, specifying the delivery format, duration, and instructor sources for each course. Training

schedules are arranged in alignment with job workload rhythms, with core teaching and research periods clearly marked and avoided. During the training process, attendance data and course viewing progress are captured, while participants' classroom interaction frequency, assignment completion quality, and feedback during Q&A sessions are recorded in parallel. After training completion, anonymous questionnaires are distributed and practical competency assessments are organized. Performance data from three months after training are retrieved for comparison, and evaluation reports are generated that identify courses failing to meet expectations and underlying issues. Targeted adjustment recommendations are simultaneously pushed to inform the next stage of training planning, and faculty and course matching lists are updated accordingly.

5.4 Staffing Optimization and Allocation Module

This module interfaces with departmental and functional HR systems as well as business ledgers to collect data on employee qualifications, position vacancy details, monthly workload, and disciplinary development task lists, establishing a dynamic database with quarterly updates to data dimensions and granularity. Generative AI models are applied, incorporating discipline development milestone objectives, annual task decomposition tables, and labor market supply–demand fluctuation data, to accurately identify specific departments, positions, and numbers where staffing redundancies or shortages exist. For positions with shortages, phased recruitment plans are developed based on labor market salary ranges and university budget constraints, specifying timelines for filling core and reserve positions, with priority given to multi-skilled candidates capable of cross-position functions. For redundant positions, a full-scale skills and position fit assessment is conducted, targeted retraining is organized, and internal vacancy positions are matched. Personnel who cannot be immediately reassigned are managed within an internal talent pool, with temporary and special assignments allocated strategically. Based on personnel skill maps and position requirement lists, a bidirectional allocation intention list across departments and faculties is generated, complemented by processes for transferring personnel relationships and linking performance accounting. Core metrics such as work efficiency and resource utilization are tracked semi-annually; pre- and post-allocation data differences are compared, model prediction deviations are reviewed, parameter settings and allocation plan details are adjusted, and talent pool training content is updated accordingly.

6. Conclusion

With the rapid advancement of technology and the evolution of human thought, the rise of artificial intelligence and the transformation of organizational relationships have profoundly impacted all industries, introducing new technologies and ideologies that are set to significantly alter human organizational models. This study, based on generative AI technology and aligned with the core requirements of university human resource management, completed the overall design, technical architecture construction, and functional module development and testing of an intelligent human resource decision-making system for universities. Through a layered architecture design and multi-source data integration, and leveraging an optimized generative AI model, the system enables intelligent handling of core HR functions including recruitment management, performance management, training and development, and staffing optimization. It effectively addresses pain points and challenges inherent in traditional management models, enhancing management efficiency and decision quality. The research outcomes demonstrate the application value of generative AI in university human resource management and provide both technical support and practical pathways for the digital transformation of university HR practices.

References

- [1] Zhao Yixuan, Wei Danxia. Research on AI-Driven HR Management Mechanisms Based on Human Capital Elasticity and HR Value Calibration [J]. *Journal of Management*, 2025, 22(10):1826-1838.
- [2] Xu Qin, Huang Hao, Zhao Shuming. Research on the Influence Mechanism of HR Management Intensity on Employee Innovative Behavior from an AI Perspective [J]. *Journal of Management*, 2025, 22(05):848-857.
- [3] Li Jianbo. Application and Challenges of AI Technology in Human Resource Decision Support Systems [J]. *Sichuan Labor and Social Security*, 2025, (16):195-196.
- [4] Chen Ying. Design of a Generative AI-Based Intelligent HR Decision System for Universities and Its Adaptability to Educational Management [J]. *Pinwei Classics*, 2025, (10):94-97.
- [5] Wang Linyi. Applications and Reflections of Artificial Intelligence in HR Decision-Making [J]. *China Market*, 2024, (14):107-110.