

Research on Financial Capability Analysis System of Petroleum Enterprises based on Knowledge Mapping

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Abstract

With the arrival of the big data era, the financial capability analysis of oil enterprises faces new opportunities and challenges. However, at present, the financial analysis work of most oil enterprises still exists problems such as uneven data quality, backward analysis methods, poor logic and wholeness of financial data across businesses, etc., which makes it difficult to provide timely and efficient financial data support and decision-making support for the company's resource allocation and optimization. Financial capability knowledge mapping can not only improve the efficiency of enterprise financial data management and analysis, but also enhance the decision-making support capability and promote the digital transformation of enterprise finance. Therefore, this paper focuses on the current situation and problems of financial analysis of petroleum enterprises, proposes a framework for analyzing the financial capability of petroleum enterprises based on knowledge graph, and constructs a new type of financial knowledge graph using Neo4j graph database. Finally, it puts forward targeted suggestions from the aspects of improving data quality, deepening the integration of industry and finance, and strengthening data asset management.

Keywords

Big Data; Knowledge Mapping; Financial Capability Analysis; Digitalization.

1. Introduction

With the rapid development of information technology, the era of big data has arrived. Although the era of big data has brought new opportunities to the operation and management of enterprises, it has also raised new challenges. If enterprises can accelerate the pace of digital transformation, they can improve the efficiency of operation and management through data mining, and help them achieve self-diagnosis, optimize resource allocation and enhance sustainable competitiveness. As the core basis for enterprise strategic management and investment decision-making, the essence of financial capability analysis lies in the multi-dimensional financial data deconstruction and systematic correlation, revealing enterprise resource allocation efficiency and value creation logic. Currently, academics generally adopt the "four-dimensional ability model" financial evaluation system with solvency, operating ability, profitability and development ability as the pillars, which maps the rationality of enterprise capital structure, asset turnover efficiency, quality of profit and sustainable growth potential through quantitative indicators to provide stakeholders with financial support for strategic decision-making. It provides stakeholders with financial support for strategic decision-making (Yan Yuyong,2006) [1]. However, the unique capital-intensity, price fluctuation sensitivity and complexity of the industrial chain of the petroleum industry make the traditional financial analysis paradigm face significant limitations: first, the discrete index calculation system is prone to forming data islands, which makes it difficult to penetrate to reveal the financial

transmission mechanism among business units such as exploration and development, refining and sales; second, the static ratio analysis lacks a dynamic response mechanism to external shocks such as international oil price fluctuations and carbon tax policy adjustments; third, the static ratio analysis lacks a dynamic response mechanism to external shocks such as international oil price fluctuations and carbon tax policy adjustments; and third, it lacks a dynamic response mechanism to international oil price fluctuations and carbon tax policy adjustments. Secondly, static ratio analysis lacks a dynamic response mechanism to external shocks such as international oil price fluctuations and carbon tax policy adjustments; thirdly, the manually-driven anomalous data traceability model has information barriers, which leads to inefficiency in analyzing the causes of problems such as plummeting inventory turnover and abnormal fluctuations in free cash flow.

As a core technology tool to drive enterprise digital transformation and intelligent upgrading, Knowledge Graph has demonstrated significant technological advantages in the fields of data mining, correlation network visualization, and intelligent decision support, and has formed a mature solution system in vertical fields such as medical and healthcare, financial services, and information retrieval. The integration of knowledge graph and enterprise financial analysis can be better for financial data mining and scientific decision-making. In view of this, this study is based on the Neo4j graph database to build a knowledge graph of the financial capabilities of petroleum enterprises, through structured modeling of the multidimensional correlation between financial elements, to break the dilemma of the information silos in the traditional financial analysis, and to realize the value of the financial data assets in-depth excavation, to construct an intelligent data governance base for the digital transformation of the petroleum industry, and to promote the financial decision-making mechanism to the direction of intelligent and forward-looking evolution.

2. Overview of Knowledge Graph

2.1. Knowledge Graph Concept

In order to enhance the semantic understanding of the search engine and improve the quality and relevance of search results. Google formally proposed the concept of Knowledge Graph in 2012 (HOGANA et al.,2022) [2]. At present, Knowledge Graph is mainly categorized into Scientific Knowledge Graph and Semantic Knowledge Graph, and there are many differences between the two in terms of data sources, construction methods, application goals and technical characteristics. Scientific knowledge mapping is a kind of graphic that displays the development process and structural relationship of disciplines by means of citation analysis method and information visualization technology, mainly visualizing the knowledge units of literature and literature content. Semantic knowledge mapping, on the other hand, focuses on depicting a wide variety of entities or concepts in the real world and the connections between them, forming a large semantic network (Tang liang et al.,2019) [3]. In short, knowledge graphs can abstractly extract concepts and interrelationships in the real world and store them in an intuitive and structured way, which ultimately improves the efficiency of knowledge retrieval and makes information acquisition more efficient and precise (Bo Zhang et al.,2025) [4]. The knowledge graph studied in this paper is semantic knowledge graph.

2.2. Role of Knowledge Graph

Scientific knowledge mapping is mainly used to collect and analyze literature and information through tools such as CiteSpace to realize the visual presentation of existing scientific research information and its development trend. Its core functions mainly include: first, dynamic structure analysis. Through citation network, co-occurrence analysis and other techniques, it visualizes the birth, development and inheritance relationship of discipline theories and

technologies. Second, research ecology optimization. Through the sudden word detection and theme clustering to locate the research focus, assisting in research topic selection and resource tilting. Third, cross-domain knowledge interconnection. Transform complex scientific research results into publicly understandable maps to assist the dissemination of scientific and technological policies and the formation of social consensus.

Semantic knowledge graph, on the other hand, builds a unified semantic network based on graph databases, and its powerful semantic processing capability and interconnectivity provide support for the development of artificial intelligence and the application of intelligent information, which plays an important role in the fields of intelligent question and answer, intelligent search and risk identification.

2.3. Knowledge Graph Characteristics

Knowledge graph, as a semantic network, has many unique and key features, which make it show a powerful ability in knowledge representation, storage and application.

2.3.1. Semantic Richness

Knowledge graph organizes knowledge in the form of triples (entity, relationship, entity) or (entity, attribute, value), which can accurately portray the rich and complex semantic associations among various things and concepts in the real world. For example, in the biomedical knowledge graph, the multiple relationships between diseases and related genes, symptoms, and therapeutic drugs can be clearly presented, such as "Alzheimer's disease-associated genes-APOE genes", "Alzheimer's disease-symptoms-cognitive impairment", "Alzheimer's disease - therapeutic drugs - donepezil", etc., to provide comprehensive semantic support for understanding the disease mechanism and the development of diagnosis and treatment programs.

2.3.2. Structured Organization

Knowledge graphs store knowledge in a structured way, with entities and relationships forming a directed graph structure. This structure makes the storage and query of knowledge efficient and orderly. Taking the e-commerce knowledge graph as an example, the entities such as products, brands, users, reviews and the relationships between them such as purchase, evaluation and brand constitute a structured network, which can quickly query complex problems such as "the highest-selling products under a certain brand", "what other products have been purchased by users who have purchased a certain product?" and other complex issues, greatly enhancing the efficiency of information retrieval and analysis.

2.3.3. Multi-Source Integration

Knowledge graph can integrate knowledge from different data sources, including text, databases, images, sensor data and so on. In the field of intelligent transportation, it can integrate road data from traffic management systems, map data, driving data collected by vehicle sensors, etc., to build a knowledge graph that comprehensively reflects the traffic situation, and provides a comprehensive knowledge base for traffic planning and intelligent driving decision-making.

2.3.4. Dynamic Updatability

Knowledge in the real world is constantly evolving and changing, and the knowledge graph has the ability to be dynamically updated. Social media knowledge graph can be updated in real time according to the new content released by users, updating the knowledge of character relationships, event progress, etc., always maintaining the timeliness and accuracy of knowledge to adapt to the rapidly changing information environment.

2.3.5. Interpretability

The graph structure and semantic relationship of knowledge graph makes the knowledge reasoning and decision-making process interpretable. In financial risk assessment, by displaying the knowledge map composed of the equity relationship between enterprises and the relationship between funds, it can clearly explain the basis of the risk assessment results of an enterprise, i.e., why the enterprise is judged to be at risk, and provide transparent and comprehensible support for financial institutions to make decisions.

3. Financial Analysis of Oil Enterprises: Current Status and Problems

In the context of the era of big data and information technology, the financial analysis of petroleum enterprises has made some progress in the application of technology, data integration and decision-making support, but still faces many practical problems. The following is a detailed analysis of the current situation and core issues of financial analysis of oil companies.

3.1. Current Situation of Financial Analysis

3.1.1. Complexity of Enterprise Data

With the deep penetration of information technology in the production and operation of petroleum enterprises, the scale of data has increased exponentially from the massive real-time data collected by the sensors of exploration and extraction equipment to the transaction records generated by the sales terminals and the logistic information of each node in the supply chain. However, these data come from a wide range of sources and formats, and are dispersed in different departments and business systems. For example, the data of exploration department focuses on geological structure and oil reservoir parameters, and is stored in specialized geological data format; while the data of sales department focuses on sales orders and customer information, and is stored in sales management system. The data interface between different systems is not unified, and there is a lack of effective data integration mechanism, which makes it difficult to obtain comprehensive and coherent data support for financial analysis, and it is impossible to grasp the operation status of the enterprise as a whole.

3.1.2. Financial Analysis is Relatively Basic

At present, most of the financial analysis of petroleum enterprises is still focused on the calculation and interpretation of traditional financial indicators, such as gearing ratio, gross profit margin, net interest rate and so on. A large oil company, for example, the monthly financial reports are mainly centered on balance sheet, income statement, cash flow statement for conventional analysis, calculation of solvency, profitability, operating capacity indicators, used to report to the management of the enterprise's basic financial situation. This basic analysis reflects the past operating results of the enterprise to a certain extent, but the market dynamics, industry trends and the potential risks of the enterprise is not enough to dig, and it is difficult to meet the needs of the enterprise's strategic decision-making on forward-looking financial analysis.

3.1.3. Insufficient Application of Informationization Tools

In order to comply with the development of the information age, many oil companies have introduced financial software, enterprise resource planning system and other information technology tools to assist financial analysis. These tools play an important role in data storage, simple calculations and report generation to improve the efficiency of financial analysis. For example, financial software can quickly account for costs, generate financial statements, compared with manual bookkeeping to save time. However, in the depth and breadth of data analysis, the application of information technology tools is still shallow, most of them only realize the electronic processing of data, failing to make full use of its data analysis, mining

functions, the construction of complex data models, visualization and other high-level applications involve less (Cai Yong et al.,2023) [5].

3.2. Problems

3.2.1. Uneven Data Quality

On the one hand, some oil companies lack standardized processes and quality control mechanisms in data collection, resulting in poor data accuracy and completeness. In the equipment operation data collection, due to sensor failure or data transmission errors, there may be missing data, outliers, etc. On the other hand, the data standards of different departments are not uniform, and there is the phenomenon of inconsistency of the same business data recorded in different systems, such as the quantity of oil in stock in the warehousing department and the financial department records deviation. Low-quality data into the financial analysis process, will make the analysis results deviate from the actual, misleading corporate decision-making.

3.2.2. Relatively Outdated Analysis Methods

Most of the financial analysis of oil companies still rely on traditional methods such as ratio analysis, trend analysis, etc., and less application of emerging analysis methods such as data mining and machine learning in the era of big data. Traditional methods are not capable of dealing with the non-linear and multi-variable problems faced by oil companies in the complex economic environment. For example, to predict the impact of oil price fluctuations on corporate profits, traditional regression analysis is difficult to comprehensively consider geopolitics, the international economic situation, the development of new energy sources and many other complex factors, and machine learning-based prediction models can better fit the data characteristics and improve the accuracy of prediction, but the oil companies in this regard is less applied.

3.2.3. Insufficient Integration of Finance and Business

Poor communication and collaboration between the finance department and the business department, financial personnel do not have in-depth understanding of the business processes of exploration, extraction, refining and sales of petroleum enterprises, resulting in a disconnect between financial analysis and the actual business. In the cost analysis, financial staff only based on financial data for accounting, did not go into the business line to understand the specific links and reasons for the cost, unable to accurately identify the key points of cost control. Business departments also lack the use of financial analysis results to guide business decision-making awareness, such as sales departments to develop sales strategies without full reference to the cost and profit analysis provided by the financial sector, which may lead to unreasonable pricing of products, affecting corporate profitability.

3.2.4. Shortage of Financial Analysis Talents

The era of big data and information technology requires oil companies to financial analysts are proficient in financial knowledge, but also have the ability to analyze data and information technology. However, in reality, most of the oil companies have a single knowledge structure of financial personnel, familiar with traditional financial accounting, big data analysis tools, programming language mastery is insufficient, it is difficult to meet the demand for in-depth financial analysis of enterprises. In addition, the enterprise has not invested enough in talent training and introduction, and lacks a perfect talent training system and attractive talent introduction mechanism, which leads to difficulties in improving the overall quality of the financial analysis team (Li Chang,2023) [6].

3.2.5. Data Asset Management Needs to Be Strengthened

In the process of digital transformation and intelligent enhancement of petroleum enterprises, the use of advanced technologies such as digitalization and intelligence has provided a strong

impetus for the innovative development of petroleum enterprises. However, these key technologies have not been fully developed or applied. For example, in the actual operation of oil and gas fields, major oil fields show significant imbalances in hardware facilities and informationization levels, and the old field systems of some old oil fields are usually difficult to meet the high standards of contemporary data collection, transmission, processing and application. In addition, although oil enterprises have established numerous blocked and modularized information systems and professional systems, and these systems are relatively mature in providing specialized services, the integration and integration among these systems have encountered serious challenges due to the existence of a certain degree of closure of these systems, and it is difficult to realize effective interconnection and resource sharing (Yu Jiayue,2025) [7].

4. Construction of Knowledge Graph for Financial Capability of Oil Enterprises

Knowledge mapping is a data structure used to describe real-world entities and their relationships with each other. It organizes data in the form of a graph, where nodes represent entities (e.g., people, places, things, etc.) and edges represent the relationships between these entities. Knowledge graphs not only store information about entities, but also contain semantic links between them, thus enabling richer and more structured information. There are usually four steps in constructing a knowledge graph, namely data acquisition and preprocessing, knowledge extraction, knowledge optimization and knowledge adaptation. Its specific construction process is shown in Figure 1. In the knowledge graph construction process of this paper, the knowledge graph is regarded as a static graph, so knowledge self-adaptation is not considered.

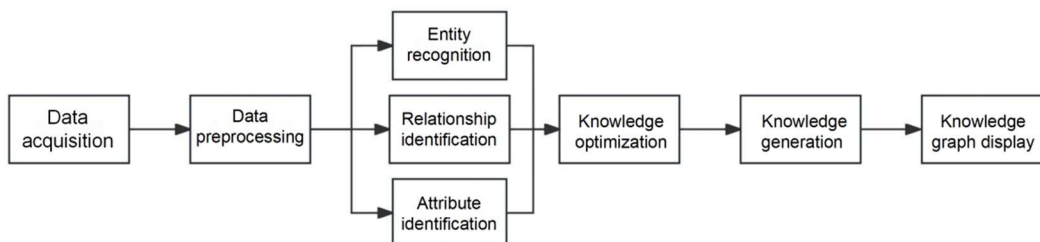


Figure 1. Knowledge graph construction process

4.1. Data Acquisition

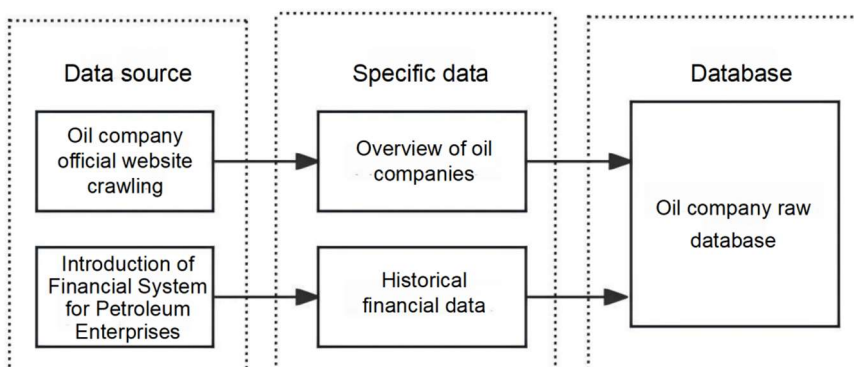


Figure 2. Data Acquisition Process for Oil Enterprises' Financial Capability Knowledge Map

For the analysis of the financial capacity of oil enterprises, it is necessary to obtain the general overview of oil enterprises and the financial data of previous years. For the basic information of oil enterprises, technical means such as python can be used to crawl. Historical financial data can be imported directly through the oil enterprise financial data system such as ERP. Thus, the acquired data can be used to construct the original database of the oil enterprise. The specific process is shown in Figure 2.

4.2. Data Preprocessing

Data preprocessing is aimed at cleaning the data in the original library, eliminating a large number of noise or missing values that may exist in the original data, so as to obtain continuous, clean and standardized data, and improve the quality of the data and the accuracy of the mapping. Since the data crawled from the official website of the oil companies and directly imported from the financial system are structured data, the data preprocessing mainly focuses on the identification of the attributes of accounting accounts and financial indicators. Accounting accounts and financial indicators with the same or similar semantic meanings are merged or deleted, and finally the data knowledge base after data processing is obtained. The specific process is shown in Figure 3.

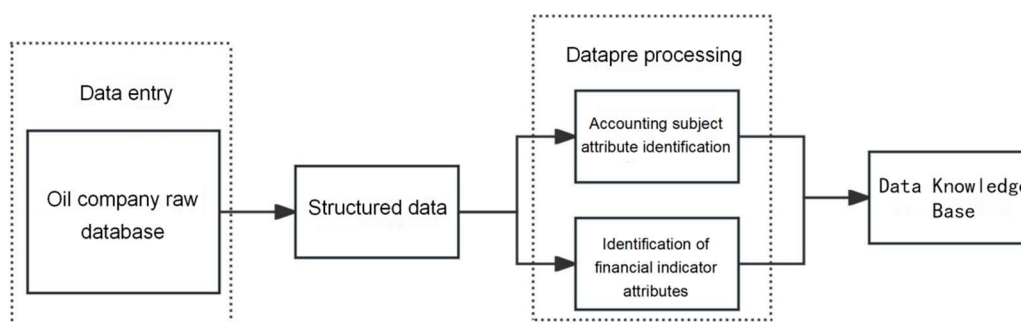


Figure 3. Data Acquisition for Petroleum Enterprises' Financial Capability Knowledge Map

4.3. Knowledge Extraction

Knowledge extraction aims to transform unstructured or semi-structured accounting standards into structured information (stored in the form of tuples). The main task is to perform entity identification, relationship identification and attribute identification, and categorize the extracted entities and relationships into different Entity Type (Entity Type) and Relationship Type (Relationship Type). As the financial capability knowledge mapping model designed in this paper is relatively simple, the choice of using manual identification method can greatly save time and ensure the accuracy of knowledge extraction, so this method is adopted for knowledge extraction (Li Jianping et al.,2024) [8].

4.3.1. Entity Recognition

Financial capability knowledge mapping entities include the company, financial statements, accounting accounts and financial capability indicators, according to which the entity types are designed as shown in Table 1, in which the financial capability analysis indicators are subdivided into profitability indicators, solvency indicators, operating capability indicators and development capability indicators (Songsheng Chen&Ming Wang,2025) [9].

Table 1. Financial capability knowledge mapping entity types

Entity type	Example
Company	XX Petroleum Enterprise
Financial statements	Balance sheet, income statement, cash flow statement
Accounting items	e.g. current assets, current liabilities, inventories, net profit, shareholders' equity, etc.
Profitability indicators	For example, net profit margin, return on assets, return on shareholders, etc.
Solvency indicators	For example, current ratio, quick ratio, gearing ratio, etc.
Operating Capacity Indicators	For example, accounts receivable turnover ratio, inventory turnover ratio, total asset turnover ratio, etc.
Development capacity indicators	For example, sales (operating) growth rate, net profit growth rate, total asset growth rate, etc.

4.3.2. Relationship Identification

The relationship between financial capability knowledge mapping entities includes three parts, namely, the company's "ownership" of financial statements, the financial statements' "inclusion" of accounting accounts, and the financial capability indicators' "based on" relationship with accounting accounts. "relationship. The process of entity identification and relationship processing of financial capability knowledge mapping of oil enterprises is shown in Figure 4.

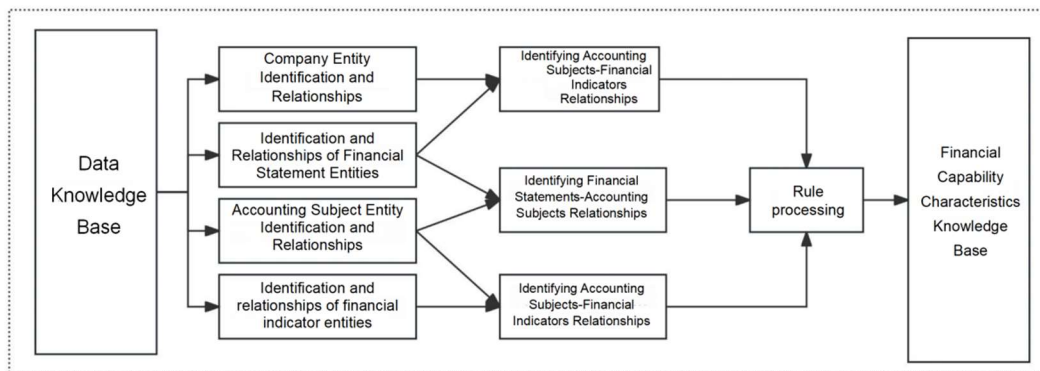


Figure 4. Entity Identification and Relationship Processing for Petroleum Enterprises' Financial Capability Knowledge Mapping

4.3.3. Attribute Identification

After manual identification and analysis, the attributes of financial capability knowledge mapping entities are shown in Table 2.

Table 2. Financial capability knowledge mapping entity attributes

Entity type	Attribute
Company	Company name, establishment date, establishment address, main business
Financial statements	Date of statement (e.g. balance sheet) or period (e.g. income statement)
Accounts	Account name, value
Financial capability indicators	Name of the indicator, classification of the indicator, year to which the indicator belongs, formula and calculated value of the indicator

4.4. Knowledge Optimization

Since this paper focuses on the part of map construction, and the knowledge map constructed in this paper involves less information data and adopts the method of manual identification,

there is no entity ambiguity, noise interference and other problems, so there is no knowledge optimization. If the amount of information increases or the method of machine extraction is used in the course of subsequent research, the optimization can be carried out by the following steps.

First, redundant or repetitive information is removed, and the entries are deleted and simplified to ensure uniqueness of the entries. Second, synonymous or similar entities and relationships are merged to ensure the neatness of the knowledge structure and improve the usability of the knowledge. Finally, the noise generated in the extraction process should also be identified and cleaned up to ensure knowledge accuracy.

4.5. Knowledge Generation

Knowledge generation is mainly performed by clustering the data in the financial capability knowledge feature library and extracting the knowledge of companies, financial indexes, accounting items, etc. At the same time, the formation of dynamic associations between financial capability knowledge requires the establishment of associative relationships between the knowledge of companies, financial indicators, and accounting subjects. Finally, the generated financial capability knowledge with framework system is stored in the Neo4j graph database in accordance with the structured data storage to form the financial knowledge mapping capability. The specific process is shown in Figure 5 (Yufang Xu,2022) [10].

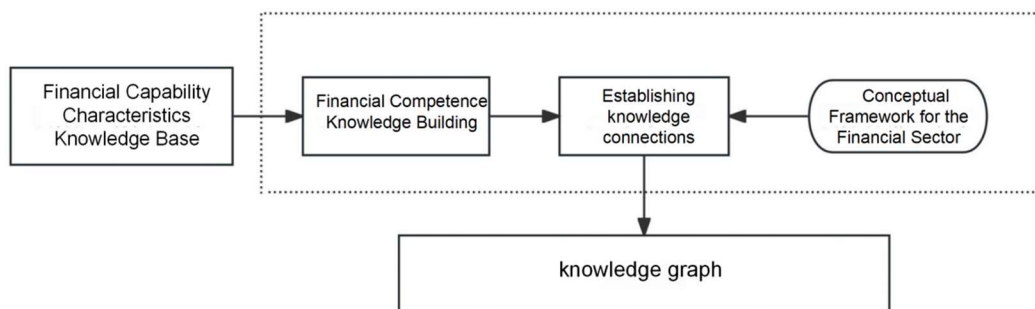


Figure 5. Knowledge Generation for Oil Enterprises' Financial Capability Knowledge Map

4.6. Mapping Application and Visualization Query

After the completion of the construction of the oil enterprise financial capability knowledge map, the map can be visualized in the Neo4j map database through the Cypher "MATCH (n) return n" statement, and the display results are shown in Figure 6. Through this knowledge graph, oil enterprise managers and financial personnel can quickly understand the relationship between each financial indicator and each accounting account. By clicking the nodes in the graph, the attributes of each entity can be quickly viewed. Taking the net profit growth rate, for example, which managers and shareholders are more concerned about, by clicking the node of net profit rate, the calculated value of the corresponding year can be quickly viewed. In addition, this paper embeds the calculation formula of financial indicators into the knowledge graph, realizing the automatic calculation of the indicator value, and if the subsequent financial data needs to be updated following the time, it is only necessary to re-import the financial data. Of course, if you want to realize the batch query of financial capability indicators, you can also realize the batch query of the table through Cypher statement.

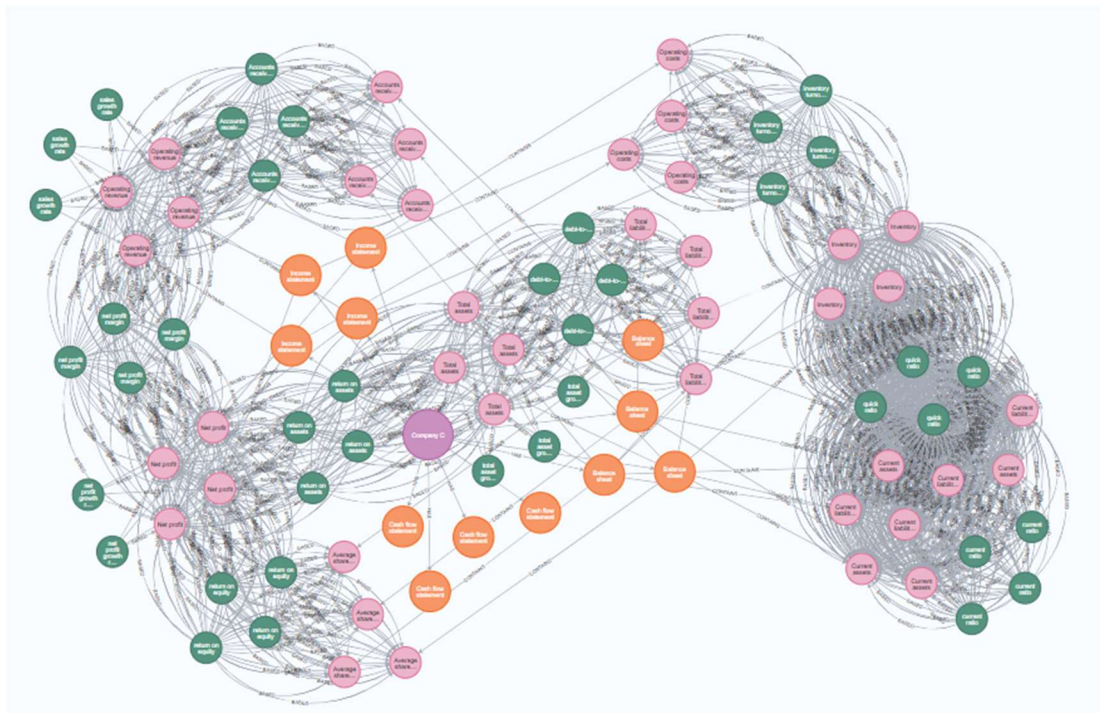


Figure 6. Financial capability knowledge graph visualization results

5. Conclusion and Recommendations

5.1. Conclusion

Based on the construction and application of the knowledge map of the financial capability of petroleum enterprises, this paper constructs a "map + finance" analysis framework, which not only expands the application boundaries of the knowledge map in the energy industry, but also provides a replicable methodology system for the digital transformation of petroleum enterprises' finance, and the results of the research are of great theoretical value and demonstrative significance for promoting the digital transformation of petroleum enterprises' finance. Its research results have important theoretical value and demonstrative significance for promoting the digital transformation of petroleum enterprises' finance.

5.2. Recommendations

Based on the above analysis, in order to better combine knowledge mapping with financial analysis of petroleum enterprises, so as to promote digital transformation and informationization development of petroleum enterprises, this paper puts forward the following suggestions:

First, oil enterprises should establish unified data standards, standardize the data collection process of each department, and clarify the data format and coding rules. At the same time, set up data quality monitoring positions, real-time monitoring of data quality, timely detection and correction of missing data, errors and other problems. Introduce data cleaning and data repair technology to pre-process the collected data to ensure that the data entering the financial analysis link is accurate, complete and consistent.

Second, actively learn and apply advanced analysis techniques such as data mining and machine learning, and at the same time, integrate knowledge mapping technology to enhance the analysis effect. Utilize knowledge mapping to mine the hidden semantic relationships behind the data to provide richer a priori knowledge for the data mining algorithm. For example, through the knowledge system of the petroleum industry chain constructed in the knowledge

graph, the potential correlation rules between the sales of different products and costs, market demand, and macroeconomic indicators are mined to provide precise insight into business laws. Third, establish a regular communication mechanism between financial and business departments, and use knowledge mapping technology to break the data barriers between departments. Build an integrated knowledge graph covering financial and business information, integrating financial data (such as cost, profit, assets and liabilities, etc.) and business data (such as exploration progress, extraction volume, refining process, sales channels, etc.) into the same graph. Financial staff can understand the business process through the knowledge map, clearly see the financial impact of each business link, and provide more accurate professional advice from the financial perspective combined with the actual business when participating in business project discussions. Business personnel can also use knowledge mapping to intuitively understand the correlation between financial analysis results and business, and improve the ability to use financial analysis results to guide business decisions.

Fourth, the enterprise should formulate a systematic training plan, and regularly organize financial personnel to participate in training courses on big data analysis, information technology and the application of knowledge mapping technology, so as to enhance their comprehensive capabilities. The training content may include knowledge graph construction methods, cases combining knowledge graph and financial analysis, etc. Finance personnel are encouraged to learn independently, and incentives are given to those who have obtained relevant professional certificates (e.g. knowledge graph engineer certification). At the same time, facing the external market, actively introduce high-end talents with composite backgrounds of big data analysis, financial management and knowledge mapping technology to enrich the financial analysis team.

Fifth, oil companies should strengthen data asset management, firstly, they need to establish a perfect data governance system, clarify the ownership, responsibility and use rules of data, and ensure the accuracy, consistency and security of data. Second, they should integrate the data resources of exploration, production, transportation, refining and other links through digital transformation to achieve centralized storage and efficient sharing of data. At the same time, artificial intelligence, big data analysis and other technologies are used to explore the value of data, optimize the decision-making process, and improve production efficiency and resource utilization. In addition, it is necessary to strengthen data security protection and establish data backup and recovery mechanisms to prevent data leakage and loss. Finally, data-driven sustainable development can be realized by fostering a data culture, enhancing employees' data awareness and skills, and promoting the comprehensive application of data assets in corporate operations.

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References

- [1] Yan Yuyong. Financial capability analysis based on corporate social responsibility[J]. Productivity Research,2006,(06):268-270.
- [2] HOGANA, BLOMQUISTE, COCHEZM, et al. Knowledge graphs[J].ACM computing surveys, 2022, 54(4):1.

- [3] Tang liang, Luo Xuan, Wang Ying. Identification of differences between two types of knowledge graphs and their application in scientific and technical publishing[J]. Publishing Reference, 2019,(1): 66-68.
- [4] Bo Zhang,Yinglei Ma,Jinyu Ma. Research on publishing application model based on semantic knowledge graph[J]. Publishing and Distribution Research,2025,(02):45-53.
- [5] Cai Yong,Rao Ruijiu,Jia Yongchang,et al. Practice and Exploration of PetroChina's Application of Big Data Technology for Financial Supervision[J]. Finance and Accounting,2023,(07):40-43.
- [6] Li Chang. Development and Challenges of Accounting Informatization in Petroleum Enterprises[J/OL]. Friends of Accounting,2023,(S1):209-211.
- [7] Yu Jiayue. Research on Data Asset Management of Petroleum Enterprises[J]. Business Watch,2025, 11(02):54-57.
- [8] Li Jianping,Sun Hao,Chang Yanpeng,et al. Financial fraud identification considering multiple semantic associations of audit elements[J]. Journal of Management Science,2024,27(03):58-70.
- [9] Songsheng Chen,Ming Wang. Construction and Application Prospect of Accounting Knowledge Graph Based on Big Language Modeling[J]. Friends of Accounting,2025,(05):152-161.
- [10] Yufang Xu. Construction and application of knowledge mapping in the field of financial auditing in colleges and universities[J]. Journal of Finance and Accounting,2022,(15):118-122.