

Requirements Identification and Change Management of Artificial Intelligence in Software Requirements Engineering

Ping Xu^{1*}

¹ School of Information Science and Technology, Taishan University, Taian, China

Email Address

taianxp@163.com (Ping Xu)

*Correspondence: taianxp@163.com

Received: 18 October 2025; **Accepted:** 14 November 2025; **Published:** 2 December 2025

Abstract:

With the increasing complexity of software systems, the disadvantages of traditional requirements identification and change management methods are becoming more and more obvious, and the integration of AI technology has become the key to improve the efficiency and quality in this field. This paper focuses on the application of AI (Artificial Intelligence) in requirements identification and change management of software requirements engineering. By analyzing AI technologies such as NLP (Natural Language Processing), machine learning and deep learning, this paper explores their specific applications in requirements identification and change management. In the aspect of requirements identification, these technologies can deeply analyze, accurately classify and cluster requirements texts; In terms of change management, it can realize impact assessment, scope definition and efficient communication and document management. AI helps software requirements engineering in all directions, significantly improves the accuracy and efficiency of requirements identification, effectively supports change management, and ensures the smooth progress of software projects. This research provides innovation path and technical support for software requirements engineering.

Keywords:

Artificial Intelligence, Software Requirements Engineering, Demand Identification, Change Management, Natural Language Processing

1. Introduction

As a key initial link of software development, software requirements engineering plays a decisive role in the success or failure of software projects [1]. Accurate identification of software requirements and effective management of requirements changes are the core elements to ensure software quality, improve user satisfaction and control project cost and schedule [2]. Traditional software requirements identification and change management methods mostly rely on manual operation, which is often inadequate in the face of massive, complex and changeable requirements [3]. In the aspect of requirement change management, it is difficult to comprehensively consider all aspects of the system by manually evaluating the impact

of change and formulating change strategies, which may trigger a series of chain reactions and have a negative impact on software projects.

The rise of AI technology has brought a new dawn to software requirements engineering [4]. It is expected to break through the limitations of traditional methods by virtue of its powerful data processing ability, pattern recognition ability and intelligent reasoning ability [5]. In the requirement identification stage, AI can automatically analyze and extract the requirements described by natural language, mine the key information hidden in the text, and improve the accuracy and efficiency of requirement identification [6]. In terms of change management, AI can accurately predict the possible impact of changes with the help of machine learning algorithms, and assist in formulating more scientific and reasonable change strategies.

In view of this, it is of great practical significance to study the application of AI in requirements identification and change management in software requirements engineering. This will not only enrich the theoretical system of software requirements engineering, but also provide practical methods and technical support for software development practice, and promote the development of software industry in a more efficient and intelligent direction. This paper aims to systematically discuss the application principle, advantages, challenges and coping strategies of AI in the two key links of software requirements engineering.

2. Traceability of Technology and Principle

Software requirements engineering covers requirements identification, requirements analysis, requirements specification, requirements verification and requirements management [7]. Among them, requirement identification is devoted to discovering, extracting and sorting out the functional and non-functional requirements that a software system should have, while requirement change management focuses on controlling and coordinating the changes of software requirements in the development process.

In the field of AI, various technologies can provide support for software requirements engineering. Machine learning technology is one of the key ones, which can build a demand identification model and a change impact prediction model by learning a large number of historical demand data. NLP technology is also crucial. Software requirements are mostly presented in the form of natural language. NLP technology can parse these texts, extract key information, understand semantics, enable computers to process and analyze requirements documents, and transform unstructured requirements into structured data [8]. In addition, knowledge mapping technology can express all kinds of knowledge related to software requirements in a structured way, establish the relationship between requirements, assist the understanding and analysis of requirements, and help to quickly locate the affected scope when requirements change.

3. AI Helps Demand Identification

In today's era of vigorous development of software industry, the scale and complexity of software requirements are increasing day by day. Accurate and efficient identification of software requirements has become the key to the success of software projects. As an important branch of AI, NLP plays an important role in the process of requirement identification. Software requirements are usually presented in the form of natural language texts, and NLP technology can deeply analyze these texts. Named

entity recognition can extract key entity information from the text, such as people, organizations, system modules and so on. Dependent syntactic analysis further reveals the dependency relationship between words in sentences, so that computers can understand the semantics of sentences like humans. Information extraction of NLP technology in e-commerce platform demand identification is shown in Table 1:

Table 1. Information Extraction of NLP Technology in Demand Identification on E-commerce Platforms.

Demand Text Segment	Part-of-Speech Tagging Example	Named Entity Recognition Result	Dependency Relation Example
Users can view the detailed parameters of products on the product detail page.	“Users” (noun), “on” (preposition), “product detail page” (noun), “can” (auxiliary verb), “view” (verb), “product” (noun), “detailed parameters” (noun)	Users, product detail page, product, detailed parameters	“Users” - subject-predicate - “view”; “view” - verb-object - “detailed parameters”
Including size, weight, and material.	“Including” (verb), “size” (noun), “weight” (noun), “material” (noun)	Size, weight, material	“Including” - verb-object - “size”; “Including” - verb-object - “weight”; “Including” - verb-object - “material”
And they can add their favorite products to the shopping cart.	“And” (conjunction), “can” (auxiliary verb), “will” (preposition), “favorite” (adjective), “product” (noun), “add” (verb), “shopping cart” (noun)	Product, shopping cart	“Product” - object of preposition - “will”; “add” - verb-object - “shopping cart”
Meanwhile, the system needs to recommend relevant products to users based on their browsing history.	“Meanwhile” (conjunction), “system” (noun), “needs” (auxiliary verb), “based on” (preposition), “user” (noun), “browsing history” (noun), “for” (preposition), “its” (pronoun), “recommend” (verb), “relevant products” (noun)	System, user, browsing history, relevant products	“System” - subject-predicate - “recommend”; “recommend” - verb-object - “relevant products”

In addition to NLP technology, machine learning algorithm also plays a key role in requirements identification. Supervised learning algorithm can be trained based on the labeled demand data to build an accurate classification model. After learning a large number of requirement samples with category labels, the model can automatically classify the newly input requirement texts. Unsupervised learning algorithm focuses on requirements clustering. By analyzing the similarity between requirements, similar requirements are grouped into the same group, which is convenient for the development team to find the commonness and differences in requirements and further improve the requirements identification. Deep learning models, such as RNN (Recurrent Neural Network) and its variant LSTM (Long Short-Term Memory Network), are especially suitable for processing demand texts with sequence characteristics. These models can capture the contextual information in the text and better understand the semantics of requirements, thus improving the accuracy of requirements identification.

4. AI Supports Change Management

In the life cycle of a software project, requirements change is normal. Requirements change management aims to control the changes of software requirements in the development process, ensure that changes can be promoted in an orderly manner, and minimize the negative impact on project schedule, cost and quality. With its powerful data analysis ability, AI can accurately evaluate the impact of change in the early stage of change management. The machine learning algorithm can deeply mine the historical change data, which covers the detailed content of the change request, the impact on software modules after the change is implemented, the change of project schedule and the fluctuation of cost. Through the study of massive historical data, the machine learning model can establish a complex relationship between change and influence.

Taking a large enterprise resource planning software project as an example, the development team plans to add real-time inventory early warning function in a demand change for inventory management module. Using the change impact assessment model based on machine learning, input the information related to the change. After analysis and operation, the model outputs the evaluation results of the impact of changes on system performance, other related modules (procurement module, sales module) and project duration. The change impact assessment based on machine learning is shown in Table 2:

Table 2. Change Impact Assessment Based on Machine Learning.

Change Description	Input Parameters	Change Type	Predicted Performance Impact	Impact on Related Modules	Estimated Cost Change	Predicted Risk Level	Estimated Project Duration Extension
Add real-time inventory warning function to the inventory management module.	Number of code lines involved: 500; Number of interfaces with the procurement module: 3; Number of interfaces with the sales module: 2; Business logic complexity: high	Functional change	System performance: Possible 10%-15% response time delay	Procurement module: Need to adjust 2 related functions; Sales module: Need to update 1 query interface	Estimated to increase development cost by 10%-15%	Medium-high risk	Estimated to extend by 2 weeks
Optimize the data encryption algorithm in the customer information management module.	Number of code lines involved: 300; Number of interfaces with the order processing	Security change	System performance: Possible 5%-8% processing speed decrease	Order processing module: Need to synchronously adjust the data transmission	Estimated to increase development cost by 8%-12%	Medium risk	Estimated to extend by 1.5 weeks

	module: 1; Business logic complexity: medium			encryption method			
Add new data statistical dimensions to the report generation module.	Number of code lines involved: 200; Number of interfaces with the data analysis module: 2; Business logic complexity: low	Data change	System performan ce: Possible 3%-6% increase in generation time	Data analysis module: Need to optimize 1 analysis model	Estimated to increase developm ent cost by 5%-10%	Low risk	Estimated to extend by 1 week

In the process of change implementation, AI can use knowledge mapping technology to clearly model the relationship between software system architecture and requirements. Knowledge map stores and represents all kinds of knowledge in software system with graphic structure, including functional modules, data entities, dependencies between requirements and so on. When the demand changes, the knowledge map can quickly locate the affected scope.

NLP technology also plays an important role in change communication and document management. In software projects, the communication of requirements change is usually carried out in the form of natural language, and there may be some problems such as vague expression and misunderstanding deviation. NLP technology can semantically analyze the text related to the change, and ensure that all parties have the same understanding of the change. It can also automatically generate standard change documents, accurately record the reasons, contents, impacts and implementation steps of changes, and improve the efficiency and quality of change document management.

5. Conclusions

In today's software industry development situation, the importance of software requirements engineering is self-evident, and its requirements identification and change management are more related to the success or failure of software projects. Traditional methods can't meet the actual needs when faced with complex and changeable software requirements, and the rise of AI technology has brought new opportunities to this field.

In the aspect of requirement recognition, NLP technology deeply analyzes the requirement text presented in the form of natural language, clearly analyzes the text structure and semantics by means of part-of-speech tagging, named entity recognition and dependency syntax analysis, and accurately extracts key information. Machine learning algorithm realizes requirements classification through supervised learning, completes requirements clustering through unsupervised learning, and deep learning models such as LSTM effectively capture text context information to improve the accuracy and efficiency of requirements identification. A variety of technologies

cooperate with each other to mine demand information from different levels, laying a solid foundation for the subsequent software development life cycle.

In terms of change management, AI uses machine learning to mine and analyze historical change data and accurately evaluate the impact of changes; Using knowledge mapping technology to model the relationship between software system architecture and requirements, and quickly locate the scope of change; Rely on NLP technology to ensure clear and accurate change communication, and automatically generate specification documents. These applications make change management more scientific and orderly, and reduce the negative impact of change on project schedule, cost and quality.

To sum up, AI has shown great advantages in requirements identification and change management of software requirements engineering, which has comprehensively improved the quality and efficiency of software requirements engineering. However, there are still some challenges in this field-the influence of data quality on the accuracy of the model, the cost and complexity of technology application, etc. With the continuous development and improvement of AI technology, it is expected to further optimize the application in software requirements engineering in the future, push the software industry towards a more intelligent and efficient direction, and bring more remarkable changes to software development.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

References

- [1] Xing, Y. A survey of software engineering technical methods based on explainable artificial intelligence. *Computer Science*, 2023, 50(05), 3-11. DOI: 10.11896/jsjcx.221100159.
- [2] Mao, X.J.; Wu, W.J.; Ma, X.X.; Liu, L. Preface to the special issue on software engineering and requirements engineering for complex systems. *Computer Science*, 2020, 47(12), 2.
- [3] Shan, C.S.; Yin, B.; Tong, L.J. et al. Incremental software engineering method for relay satellite systems based on requirement classification. *High Technology Letters*, 2025, 35(1), 47-55. DOI: 10.3772/j.issn.1002-0470.2025.01.005.
- [4] Ouyang, S.; Zhou, D.D.; Shang, M.F. et al. Development and engineering application of main control software system based on high-cohesion wind turbine. *Ship Engineering*, 2024, 46(S02), 59-61.
- [5] Li, G.Z. Practice and application of software engineering technology in the development of artificial intelligence systems. *Information & Computer (Theory Edition)*, 2024, 36(08), 119-121.
- [6] Li, J.W. Research on requirement analysis and change management in software development. *Wireless Internet Technology*, 2017, 10, 60-62.

- [7] Wang, Y.; Chen, J.W.; Xia, X. et al. A survey on intelligent requirement acquisition and modeling. *Journal of Computer Research and Development*, 2021, 58(04), 683-705.
- [8] Xing, Y. A survey of software engineering technical methods based on explainable artificial intelligence. *Computer Science*, 2023, 50(05), 3-11.



© 2025 by the author(s); licensee International Technology and Science Publications (ITS), this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (<http://creativecommons.org/licenses/by/4.0/>)