

# Drivers and Risks of Generative AI Technology in Research Innovation: A Survey on Technology Acceptance and Usage Behavior of Researchers

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## Abstract

Since 2018, global AI technology has entered a new phase of explosive growth, with continued breakthroughs in language, vision, and multimodal macromodels, among many other areas. 2025 Generative AI, represented by the DeepSeek model, is emerging as a powerful reinforcement learning capability that provides researchers with a highly flexible space for adapting technologies and promotes interdisciplinary collaboration. The AI technology has been a major factor in accelerating scientific research. However, while AI technology accelerates the scientific research process, it also triggers a series of contradictions. On the technical level, the black box of algorithms and the lack of model interpretability have called into question the reliability of scientific research conclusions; on the ethical level, the problem of data privacy leakage and the controversy over the right of authorship of academic results are growing. Based on the above background, this study focuses on researchers in universities in Henan Province, and comprehensively utilizes various methods, such as questionnaire survey, support vector machine, and structural equation modeling, to explore the current status of generative AI application in academic research. The results of the study show that cognitive differences, researchers in the field of natural sciences and engineering technology due to high frequency used for experimental design, data processing and recognized efficiency; humanities field use and satisfaction is lower. In terms of satisfaction, the literature query function is highly satisfactory, the research planning and design and data processing and analysis functions are moderate, and the academic article writing function is low. The findings of this paper provide theoretical support and practical insights for the popularization and application of AI technology.

## Keywords

Generative AI; University Researchers; Support Vector Machines; BP Neural Networks.

## 1. Introduction

In recent years, global artificial intelligence technology has ushered in major breakthroughs, with large-scale models represented by GPT-5 showing strong text processing capabilities, and open-source models promoting innovation in multiple fields, but issues such as the opacity of algorithms have sparked controversy. Artificial Intelligence has shown a “basic innovation-engineering landing” double-wheel drive trend. The “Artificial Intelligence+Higher Education” demonstration project in Henan Province provides empirical scenarios for the study. In this context, the application of AI technology in the field of scientific research not only significantly improves the efficiency of literature processing, but also brings ethical risks such as academic misconduct, whose “efficiency-ethics” contradictions as well as the complex social attitudes towards the technology urgently need systematic research to balance innovation and risk.

## 2. Review of Relevant Studie

### 2.1. Studies Related to AI Technology Writing

Writing technology is becoming increasingly widespread in academic applications. From the level of technological development, the improvement of its maturity has promoted the progress of writing technology (Dandan Yang, 2024)<sup>[1]</sup>. In terms of functional implementation, generative AI has multiple functions such as drafting thesis outlines, optimizing language expression, and suggesting revisions (Lu Che et al., 2024)<sup>[2]</sup>. Existing studies have pointed out that in the context of the rapid development of AI technology, its application in the field of writing has penetrated into many fields such as literary creation and news reporting. However, in the process of meeting the needs of writing, some problems have been exposed, such as the ethical dilemma, the lack of humanity in literary works, and the challenge of journalistic professionalism.

### 2.2. Research Related to the Cultivation of Scientific Research Ability by AI Technology

AI technology is of great significance to the cultivation of scientific research ability. For undergraduate students, it can promote the comprehensive ability of their scientific research knowledge, scientific research skills and scientific research emotions (Bian Wu et al., 2024)<sup>[3]</sup>. In graduate education, nearly 90% of graduate students have used AIGC in the research process, mainly for language embellishment and literature review (Yinqi Ma et al., 2024)<sup>[4]</sup>. Nonetheless, AI technology still faces challenges in the cultivation of research ability, such as students' over-reliance on the technology and the limitations of the technology itself (Junhao Shan and Yonggui Liu, 2024)<sup>[5]</sup>. These studies provide strong theoretical support for the application of AI technology in education.

### 2.3. Research on Influencing Factors of AI Technology Use

Diverse perspectives exist on the factors affecting students' use of AI technology for academic activities. From the perspective of technological characteristics, the rapid development of AI technology, but due to its high learning cost and technical threshold, it is difficult for ordinary users to master and apply (Zhe Wang and Qingquan Xia, 2023)<sup>[6]</sup>. From the perspective of disciplinary differences, there are significant differences in the dimensions of generative AI used by students in different major categories. On the dimensions, students in the Department of Informatics and the Department of Engineering have a clear advantage, and students in other major categories have different performances on different dimensions (Guoshuai Lan et al., 2024)<sup>[7]</sup>. From an ethical perspective, the general public has limited knowledge and understanding of AI technology (Hongxiu Yan and Yingyu Yang, 2024)<sup>[8]</sup>. Existing studies have revealed the factors affecting students' use of AI technology for academic activities from multiple aspects, but there is still room for expansion, which should provide more targeted suggestions for education and teaching reform and technology optimization, promote the deep integration of AI technology and academic activities, and promote education development.

## 3. Empirical Analysis

### 3.1. Analysis of Differences in Perceptions of Generative AI among University Researchers based on Support Vector Machine Modeling

#### 3.1.1. SVM Modeling

Respondents were categorized into three groups: AI tools as “academic gas pedals” (significantly and slightly increased), neutral (no effect) AI tools as “academic disruptors” (slightly and significantly decreased), and then the categorization results were used as target variables (labels). Second, the data were normalized using the StandardScaler feature

preprocessing technique of the ScikitLearn preprocessing package to ensure that all features were on the same scale and to avoid certain features from overly influencing the model due to differences in scale. Finally, data with imbalanced categories were processed using SMOTE (Synthetic Minority Over Sampling Technique) to ensure that the number of samples in each category was similar. Besides, recursive Feature Selection (RFE) is used to filter a subset of features from the original features that are most useful for classification. The features are then ranked according to how much they affect the model, and the ones that have the greatest impact on the classification results are selected. Finally, the dataset is first divided into a training set and a test set (usually in the ratio of 80% training set and 20% test set). Next, the SVM model is trained using the training set, and the model performance is optimized by adjusting the kernel function (RBF kernel) and regularization parameter (C-value).

3.1.2. SVM Model Evaluation

In order to evaluate the goodness of the model, this study uses F1 value, AUC value and PMSE value to evaluate the model comprehensively. The SVM model was trained on the training set of three types of respondents using python and predicted on the validation set to calculate the F1 value, AUC value and PESE value on the validation set:

Table 1. Model evaluation table

| Model | Positive |           |            | Neutral  |           |            | Negative |           |            |
|-------|----------|-----------|------------|----------|-----------|------------|----------|-----------|------------|
|       | F1 Value | AUC Value | RESE Value | F1 Value | AUC Value | RESE Value | F1 Value | AUC Value | RESE Value |
| SVM   | 0.9156   | 0.9346    | 2.3442     | 0.9357   | 0.9287    | 2.5631     | 0.9259   | 0.9242    | 2.1473     |

According to the F1 value, AUC value, and RMSE value, the model is known to be robust and adaptable, which provides a reliable support for the subsequent analysis.

3.1.3. Analysis of SVM Model Results

Table 2. Feature selection table

| Feature Selection Methods | Results                             |                                      |                                     |
|---------------------------|-------------------------------------|--------------------------------------|-------------------------------------|
|                           | Positive                            | Neutral                              | Negative                            |
| SVM                       | Q5, Q7, Q9, Q11, Q13, Q15, Q17, Q19 | Q6, Q8, Q10, Q12, Q14, Q16, Q18, Q20 | Q5, Q7, Q8, Q10, Q12, Q14, Q16, Q22 |

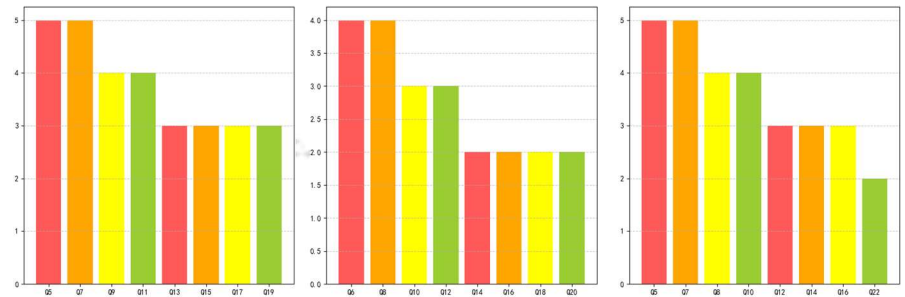


Fig. 1 Number of feature occurrences

For feature selection results, there are significant differences in researchers' perceptions of AI technology, which can be divided into three categories: the academic gas pedal population is concentrated in the fields of natural sciences and engineering technology, highly recognizes AI, frequently uses AI for experimental design, data processing, and literature retrieval, and believes that AI can significantly improve the efficiency and the quality of the results; the neutral population has a neutral attitude towards AI, with a low frequency of use, prefers the traditional

method, and is cautious about AI risks attitude; the academic disruptor crowd is mostly concentrated in the fields of psychology and economics, is skeptical of AI, worries about its negative impact, is highly concerned about the potential risks of AI, such as data privacy, reliability of results, and academic ethics, and uses it less frequently for fear of violating academic norms.

Furthermore, by analyzing the feature weights of the SVM model, the features that contribute the most to the classification results are identified. The following is the feature importance ranking: According to the feature importance ranking of the SVM model, the differences in researchers' perceptions of generative AI are mainly influenced by the following factors: willingness to use AI tools (Q5), specific aspects of using AI technology in research (Q7), and perceptions of the advantages of AI technology (Q9).

The significance of these characteristics suggests that researchers who are willing to use AI tools, who frequently use AI technology in core aspects such as experimental design and data processing, and who believe that AI can significantly improve the efficiency of their research are more inclined to view AI as an “academic gas pedal”. On the other hand, researchers who have limited understanding of the functions of AI technology, use it less frequently, or use it only for auxiliary tasks are likely to be neutral or skeptical. In addition, perception of AI technology risks (Q10), although less influential, still plays a role in the attitudes of some researchers, especially in groups with high concerns about data privacy and ethical issues. Overall, the feature importance ranking reveals differences in researchers' attitudes toward AI technology, reflecting their different perceptions of willingness to use, familiarity with the technology, and depth of application.

3.2. Satisfaction Evaluation of University Researchers Using Generative AI based on BP Neural Network Modeling

3.2.1. BP Neural Network Establishment

Table 3. Indicators of satisfaction

| Level I indicators                     | Level II indicators          | Level III indicators                              |
|----------------------------------------|------------------------------|---------------------------------------------------|
| Satisfaction of scientific researchers | Research planning and design | Automatic generation of experimental protocols    |
|                                        |                              | Providing novel ideas                             |
|                                        |                              | Give feasible options                             |
|                                        |                              | Revealing patterns in the data                    |
|                                        |                              | Support for multiple references                   |
|                                        | Literature query             | Automatic index generation                        |
|                                        |                              | Literature summary generation                     |
|                                        |                              | Intelligent Screening of Literature               |
|                                        | Data processing and analysis | Automatic data recognition and classification     |
|                                        |                              | Automatic detection of anomalous data             |
|                                        |                              | Integration of data from different sources        |
|                                        |                              | Mining the complex relationships between data     |
|                                        | Academic Article Writing     | Automatic modification and optimization on demand |
|                                        |                              | Provide a platform for academic exchange          |
|                                        |                              | Grammar checking and reference management         |
|                                        |                              | Automatically detect academic norms               |

Analyzing the satisfaction of university researchers with AI technology in Henan Province requires first establishing a scientific and reasonable evaluation index system. This establishes three-level indicators, correlates the indicators with people's satisfaction, and uses the three-level indicators to evaluate the effects of various aspects of university researchers' satisfaction with AI technology. The indicator system is shown in the table 3.

For the neural network model of people's satisfaction with various aspects of childcare institutions, this paper adopts a "three-layer" BP network, the number of neurons in the first input layer (17 indicators affecting satisfaction) is 17, the number of neurons in the third output layer is 1, and the number of neurons in the second hidden layer is  $H = \sqrt{N \times M} + C$  according to the empirical formula (where N and M are the number of neurons in the input and output layers, respectively), after many attempts, we finally determined that the number of neurons in the second layer is 13. M are the number of neurons in the input and output layers, respectively, and C is a constant usually taken between 1 and 10), the number of neurons in the second layer is finally determined to be 13 after many attempts.

### 3.2.2. BP Neural Network Model Evaluation

In this paper, 70% of the data from the recovered valid questionnaires are randomly selected as the network training data, and the remaining 30% of the data are used as the network test data, and the model effects are as follows:

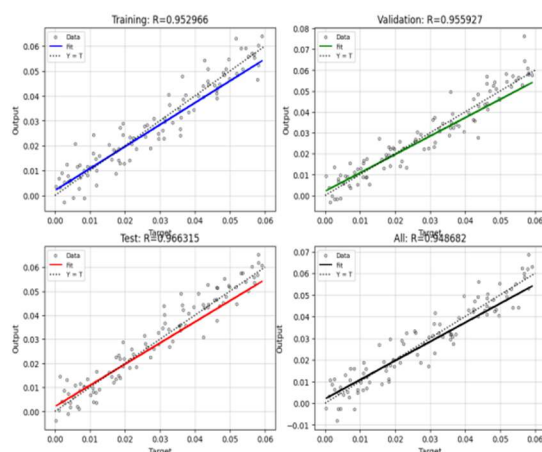


Fig. 2 R coefficients

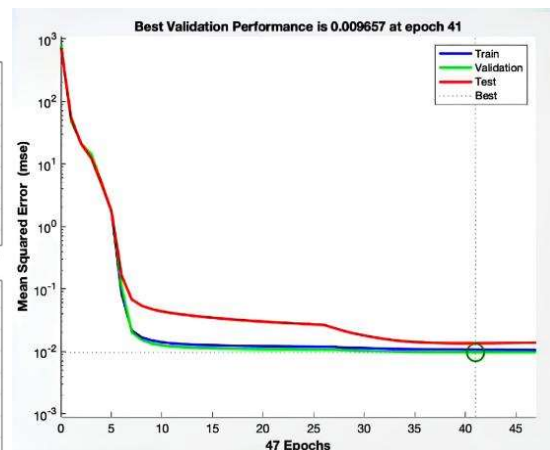


Fig. 3 Change in mean square error

It can be seen that its simulation effect is satisfactory, the R value is 0.948682, and the mean square error MSE is  $0.009657 < 0.05$ , which indicates that the accuracy of the model is more reliable and achieves the expected effect.

### 3.2.3. Analysis of BP Neural Network Model Results

Using the established evaluation model, the first 70% of the survey sample is solved to fit the unknown parameters in the model, and the second 30% of the survey data is used as the test sample data to obtain the results shown in Table 4.

Table 4. Quantitative results of satisfaction

| Satisfaction of scientific researchers | Output Value | Relative Error |
|----------------------------------------|--------------|----------------|
| Research planning and design           | 4.34         | -2.43%         |
| Literature Search                      | 4.62         | 1.45%          |
| Data processing and analysis           | 4.29         | 2.86%          |
| Academic Article Writing               | 3.56         | 1.21%          |

The output value of the item of researchers' demand for AI technology in universities and colleges in Henan Province is 4.248, which is higher than the theoretical mean value of 3. This indicates that the demand for AI technology among researchers in universities and colleges in Henan Province is moderately high. The relative errors in the above table are controlled within a small range, indicating that the model can better reflect the satisfaction of researchers of universities in Henan Province with AI technology, and the following conclusions are drawn:

The results of the model show that the participants are more satisfied with the function of literature query, and they are more satisfied with the design of scientific research planning and the processing and analysis of data, and they should continue to optimize and maintain the advantages in these aspects; the satisfaction with the writing of academic articles is relatively low. The satisfaction level of writing academic articles is lower.

## 4. Conclusion

Researchers' cognition and use of generative AI show significant differentiation. At the cognitive level, the differences in attitudes are mainly affected by the willingness to use, application fields and functional cognition, and can be summarized into three typical groups: natural science researchers generally regard AI as an "academic gas pedal" and have a higher degree of satisfaction due to the high-frequency use of the experimental design and data processing functions; people in the field of social sciences have limited use of the scenarios, and their attitudes are relatively cautious and neutral; scholars in the field of humanities are skeptical about AI applications based on ethical and privacy considerations. Scholars in the humanities are skeptical about AI applications based on ethical and privacy considerations. In terms of satisfaction, the effectiveness of the tool shows significant functional differentiation, with the literature query function getting a high evaluation by virtue of its technological maturity, the research planning and design and data processing and analysis functions being at a medium level, and the academic article writing assistance function becoming a shortcoming that needs to be optimized due to the deficiencies in semantic comprehension and logical coherence.

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