

1. The literature inclusion process for RSs following the PRISMA guidelines
2. Literature Exclusion Criteria and Descriptions for RS Research

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| **Criteria** | **Description** |
| Duplication | 1. Identical papers across different databases. 2. Papers with the same authors, topics, and high content overlap, such as conference papers and journal articles. |
| Missing basic information | Incomplete information such as names, affiliations, abstracts, and journal sources. |
| Lacking full text | Unable to access the full text of the paper. |
| Non-research articles | Papers not related to scientific research. For example: conference reviews, call for papers’ announcements, special issue introductions, etc. |
| Unrelated to RSs | 1. The keyword “RSs” appears multiple times in the text but is not directly related to RSs. 2. The paper does not focus on RSs in terms of review, survey, discussion, or problem-solving (theoretical or practical): 1) RSs are only used as an example in the text; 2) RSs are mentioned only in relation to future research, perspectives, or needs in the text; 3) RSs are cited only once in the text; 4) RSs appear only in the title, abstract, keywords, or references. |
| Methodologically non-standard | The research design, experimental setup, data collection, and analysis process of the paper are unreliable or invalid. For example: not specifying the parameters of the control algorithm, not open-sourcing data or code, having too few references, or using outdated control algorithms. |



1. The Classification of Key Technologies in RS Research
2. Literature Exclusion Criteria and Explanations for RS Research

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| **Primary classification** | **Secondary classification** | **Description** | **Number of papers** |
| Data bias | System bias | Pre-existing interaction design limits data representation of user preferences. | 13 |
| Misleading bias | Obvious item attributes misrepresent the data’s representation of user preferences. | 9 |
| Feedback bias | Effects such as long tail, herd and exposure lead to imbalanced user feedback data. | 10 |
| Data missing | Data sparsity | The 2D interaction space between the user and the item is missing most of the interaction data. | 22 |
| Cold start | Data for new scenarios, new users, and new projects is completely missing. | 17 |
| Data noise | Artificial noise | Data noise introduced by subjective user error or historical limitations. | 4 |
| Data poisoning | Data noise deliberately introduced into the system (e.g. fake reviews of goods). | 11 |
| Data abuse | Data kill | It refers to the recommendation of the same product or service to users under different data transaction conditions. | 8 |

1. Algorithmic Problems and Their Classification in RS Research

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| **Primary classification** | **Secondary classification** | **Description** | **Number of papers** |
| Low performance | Cross-domain adaptive | Users' interests migrate between different domains. | 11 |
| Device-cloud collaboration | Efficient recommendation with limited computing, storage, and bandwidth resources. | 9 |
| Multitask conflicts | A balance of possible conflicts between users' different interests. | 12 |
| Low accuracy | Lack of accuracy in recommendations (e.g. low accuracy and recall rates). | 28 |
| Environmental awareness | Consider the user's environmental information (such as geographic location and device type). | 14 |
| Interest drift | Users’ interests, behaviors and needs change over time, showing temporal and drift. | 8 |
| Low sustainability | Non-causal drivers | Generating recommendations based on non-causal relationships (association rules and user behavior patterns). | 12 |
| Uninterpretable | Recommendations are difficult to interpret. | 13 |
| Algorithmic black box | Algorithms obscure the data processing and decision-making process, or users cannot understand the algorithm logic. | 7 |
| Algorithmic discrimination | Excessive preference or discrimination towards certain users/items (e.g., gender discrimination). | 10 |
| Information cocoon | Reinforcing existing user interests, reducing exposure to diverse content. | 11 |
| Privacy security | User privacy data is compromised due to algorithm vulnerabilities or hacker attacks. | 18 |



1. A Research Framework for a Multimodel RS Incorporating EEG Data



1. A Research Framework for a RS based on the Berrypicking Model to Prevent Data Poisoning



1. A Research Framework for Evaluating Generative RSs’ Effectiveness Using Controlled Field Experiments



1. A Research Framework for Device-Cloud Collaborative RSs Based on Fine-Tuning ChatGPT-Like Large Language Models



1. A research Framework for RSs Enhancing Causal Inference Through Actor-Critic Reinforcement Learning



1. A Research Framework for Multi-Task Learning RSs based on Probability Distribution Loss Function



1. A Training Set and Testing Set Splitting Strategy Across Local and Global Temporal



1. An Evaluation Framework for Multi-Objective RSs Based on the Full Software Lifecycle