

SLR for DSS

by kikipuntadewa

General metrics

27,552

characters

4,283

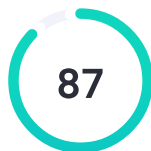
words

253

sentences

17 min 7 secreading
time**32 min 56 sec**speaking
time

Score



This text scores better than 87%
of all texts checked by Grammarly

Writing Issues

138

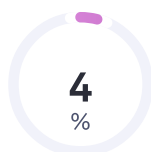
Issues left



Critical

138Advanced

Plagiarism

**11**

sources

4% of your text matches 11 sources on the web
or in archives of academic publications

Writing Issues

109

Clarity

43

Passive voice misuse



31

Wordy sentences



19

Unclear sentences



12

Intricate text



4

Hard-to-read text



22

Engagement

1

Monotonous sentences



21

Word choice



7

Delivery

5

Inappropriate colloquialisms



1

Incomplete sentences



1

Tone suggestions



Unique Words

21%

Measures vocabulary diversity by calculating the percentage of words used only once in your document

unique words

Rare Words

36%

Measures depth of vocabulary by identifying words that are not among the 5,000 most common English words.

rare words

Word Length

Measures average word length

4.5

characters per word

Sentence Length

Measures average sentence length

16.9

words per sentence

SLR for DSS

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40

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Decision Support System for Stock Trading: Systematic Literature Review using PRISMA

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Abstract

So many traders rely on algorithm-based utilities with indicators taken from historical data and running trade data on the exchange. However, applied research on decision support systems (DSS) for short-term stock trading

interests is generally carried out by methods that are difficult to implement. Therefore, for researchers to understand more deeply trends in this scope, it is necessary to conduct a literature review so that the following research is no longer in vain and gets a novelty. Based on the initial analysis, the following research questions were obtained: (1) what trends are the main concerns of researchers in the scope of DSS for stock trading, and (2) what are the research's gaps in the context. A Systematic Literature Review (SLR) was carried out¹ to answer this question, and the PRISMA method was used². The initial selection resulted in a total of 136 articles since 2017. The final result of this stage makes a total of 36. The answer to the first question is Machine Learning and Neural Networks³. As for the answer to the second, there are many algorithms and methods that have not been applied⁴ within the scope⁵.

Keywords: Decision Support System, Stock Trading, Systematic Literature Review, PRISMA

INTRODUCTION

Research on stock trading is very interesting to do⁶⁷, especially during the pandemic and also⁷ post-pandemic. During the pandemic that caused the majority of⁹ people in the world to do⁹ work from home, trading stocks became an interesting⁸ alternative to running [1]. In the end, the rapid increase of traders occurred on various stock exchanges in the world at that time. This¹⁰ includes Indonesia, which during the pandemic¹¹, experienced a four-fold increase in the number of investors on the stock exchange and has broken the number of more than 7.5 million investors on the stock exchange [2]. This¹² has caused many

novice traders to look for shortcuts in understanding stock trading in general, either by searching for news or by¹³ using bots or utilities that use decision support systems in it.¹³

The implementation of a decision support system in stock selection generally aims to assist novice traders in carrying out the process of buying and selling shares. This¹⁴ is because more than 80% of investors behave as traders due to a lack of education in it¹⁵ [3]. So many of them¹⁶ rely on certain algorithm-based utilities with indicators taken from historical data and running trade data on the exchange. The algorithm used¹⁸ generally uses parameters derived from technical analysis or from¹⁸ historical data, which are then applied¹⁷ to supporting variables.

Although short-term trading behavior has quite challenging risks [4], many beginners actually^{19,20} jump into it, as quite tempting rewards await as²⁰ a return from this process. So that there are more enthusiasts of this behavior which ultimately leads researchers to also conduct²¹ applied research that ultimately supports the implementation of short-term stock trading. The applied research ultimately tries to prevent beginners from becoming gamblers in the process of trading stocks [5], [6] because, without good technical analysis, short-term stock trading can plunge beginners into gamblers who are²² ready to lose at any time.

However, applied research on decision support systems for short-term stock trading interests is generally carried out by methods that are difficult to implement in general²³ because each country has unique exchange conditions in it²³ [7]. So it is believed that applied research that discusses decision support systems within the scope of short-term stock trading becomes sporadic and spontaneous for each country's conditions, as has been done in European countries [7], Iran [8], Taiwan [9], Turkey [10] and Indonesia [11]. Therefore, in

²⁴order for researchers to understand more deeply trends in this scope, it is necessary to conduct a literature review so that the ²⁵next research is no longer in vain and gets a novelty as a result. In addition, ²⁷it can be studied in the end the gaps of research within that scope so that the ²⁶next research can apply even better and proper algorithms.

Based on the initial analysis, the following research questions were obtained: (1) what trends are the main concerns of researchers in the scope of decision support systems for stock trading, and (2) what are the gaps in research in the context. To answer this question, a Systematic Literature Review (SLR) was carried out, which tried to collect data from various research sources, ²⁸especially journal articles that have been proven ²⁹to undergo a peer review process well so that their validity and eligibility can be accounted for ^{30 31 32}. In ³³implementing the SLR, the PRISMA method is used, which has ³⁴been proven to be a solution in research using SLR [12]. PRISMA, ³⁶which was ³⁵originally used in the health sector [12], can also be used in ³⁶the field of software engineering [13]. So it can be said to have the right fit for this research.

METHODS

PRISMA, which stands for The Preferred Reporting Items for Systematic reviews and Meta-Analyses, is a method for conducting systematic literature reviews by prioritizing ³⁷clearly formulated research questions [14]. So that credible results and high confidence are obtained from the answers produced based on the review. PRISMA conducts at least 27 identifiable checklists in order to filter from the articles that will be selected and further analyzed. In this study, filtering ³⁸was carried out from three index databases, which are Scopus, Google Scholar, and Semantic Scholar, for ³⁹the selection of journals with the keyword "decision support system stock trading." Furthermore,

selective filtering is carried out by prioritizing articles ⁴⁰that already have at least ten citations so that the impact factor can ^{41 42}be accounted for. Then further filtering is carried out by ignoring search results in the form of book chapters and ⁴⁴types of articles from fellow literature reviews ⁴⁴in order to get articles that ⁴³actually contain applied research according to the research questions at the beginning.

Next, check each article that has ⁴⁵been filtered to whether it is accessible for full-text format and has a valid link to be reviewed and analyzed. Furthermore, grouping is carried out based on the algorithm or method used ^{46,47}so that heterogeneity and homogeneity can be obtained from the selected articles. The results of each check of this article form the basis of the analysis in the ⁴⁸next discussion. ⁴⁹Briefly, the results of fulfilling the PRISMA checklist can ⁵⁰be seen in table 1, ⁴⁹which is an adapted version of PRISMA framework.

Table 1. Method checklist for PRISMA

Method for PRISMA

Eligibility criteria

From 2017 to 2022 with citations of more than 10 and from journal article

Information sources

S = Scopus

GS = Google Scholar

SS = Semantic Scholar

Search strategy

From a single keyword: "decision support system stock trading."

Selection process

After filtering using eligible criteria, ⁵¹then filtering out by title. Then it omits any literature review articles and also omits any theoretical review.

Data collection process

Using ⁵²Publish and Perish v 8, ⁵²and repeat at least three times to ensure search results. Then export the result to Excel for further filtering ⁵³process, and split them for each information source.

Data items

There is no specific filter for data items except for a real case study and direct implementation of any DSS algorithm. All selected items were downloaded in full-text PDF format for further review and inserted into Mendeley for ⁵⁴an easier process.

Synthesis methods

Grouping the result from each database and observing each article from its abstract

If abstract shows literature review or theoretical comparison, then omit it

Grouping is carried out based on the ⁵⁵greatest similarities

The results of the subsequent grouping are further analyzed and then unified between databases

The results of the grouping reviewed ⁵⁶were based on an abstract and full-text paper ⁵⁷in order to get a level of heterogeneity and homogeneity to answer research questions and describe any methods used to tabulate or visually display the results of individual studies and syntheses.

RESULT AND DISCUSSION

Initial Selection

The initial selection was made using the Publish and Perish application version 8 with keywords ⁵⁸as described in the previous section. The results of the first

search for the Scopus (S) database resulted in a total of 136 articles since 2017, for the Google Scholar (GS) and Semantic Scholar (SS) databases each limited to 500 articles since the same year limit. The results are then filtered, assuming citations greater than 10 to ensure the impact factor of each article is properly guaranteed⁵⁹. After that, the process of⁶⁰ searching for the same articles from the three databases was carried out⁶¹ to ensure the uniqueness of the subsequent analysis study.

Next, preliminary filtering is carried out based on titles and abstracts to determine whether the content of the article⁶³ does not fall into the category of⁶³ literature review or comparison theory, as well as determine whether the article really⁶² contains the application of algorithms into stock trading. The next⁶⁴ filtering was done⁶⁵ by eliminating articles related to Twitter sentiment analysis in stock trading. This is done⁶⁶ because⁶⁷ Twitter sentiment is dominated⁶⁸ by text and news analysis compared to the use of technical analysis parameters, which are the main⁶⁹ reference for research questions in this study. The results of this second filtering obtained more than 80% of the number of articles reduced from the initial number.

Furthermore, filtering was carried out⁷⁰ for redundant data from the three different index databases, and it turned out that only five articles were found⁷¹ to be redundant. Then the final stage of filtering is carried out, namely the suitability between the journal content and the context of the research questions. So it was found that there were 4 articles that did⁷² not display the application of case studies, the other 20 articles contained comparisons of the algorithms applied, and 10 articles that came from journals that were doubtful of their existence (too short format, archives that did not come from the original site or journals that had many articles in one issue). The final result of this stage makes a total of 36 articles which are then merged⁷³ ⁷⁴ into one list,

which becomes the ⁷⁵basic list in the next stage. An overview of this initial selection can ⁷⁶be seen in figure 1 as PRISMA flow, which is the framework of the systematic literature review using PRISMA.

140

Previous studies

Identification of new studies via databases and registers

Records identified from:

Databases (n = 3)

Scopus (S) = 136

Google Scholar (GS) = 500

Semantic Scholar (SS) = 500

141

Studies included in previous version of review (n = 0)

Reports of studies included in previous version of review (n = 0)

Records removed before screening:

Citation < 10:

S = 120

GS= 310

SS = 300

Duplicate records removed (n = 5)

Identification

Records screened

Omit Twitter analysis

Ensure stock trading case

(n = 121)

Reports sought for retrieval (full text available)

(n = 81)

Records excluded**

(n = 569)

Reports not retrieved (full text unavailable)

(n = 21)

Screening

Reports assessed for eligibility

(n = 60)

Reports excluded:

Reason 1 (4 = not case study)

Reason 2 (20 = comparison)

Reason 3 (10 = doubted journal)

New studies ⁷⁷are included in review.

(n = 36)

Reports of new included studies

(n = 36)

Included

⁷⁸Total studies included in review.

(n = 36)

Reports of total included studies

(n = 36)

Figure 1. PRISMA flow framework

Analytical Process

Based on the initial filtering results, further grouping of selected articles based on existing content categories ⁷⁹is carried out. Most categories ⁸⁰were obtained in themes grouped into Neural Network and Deep Learning, ⁸¹specifically 19 articles, as shown in table 2. The majority of this group discusses Deep Learning combined with LSTM (Long Short-Term Memory Neural Network) to get predictions of stocks traded. Nevertheless, not all articles carry out the backtesting process of the results of the calculations of the applied algorithm. There are only a few that display the backtest results in full in order to prove whether the algorithm is indeed applicable. Some of the articles that showed the backtest results included Wang [15], who unfortunately did not explicitly mention the market exchanges that ⁸²were tested, then from Kusuma's article [16], which conducted testing on the Taiwanese exchange, as well as an article from Long [17] who conducted testing on the Chinese exchange. ⁸³This is very unfortunate because backtests in the decision support system for stock trading are needed so that readers of articles from researchers can understand for further research whether it needs to ⁸⁴be developed again or they have to find alternatives to other algorithms. So, in the end, the articles in this group seem to be just applying algorithms to stock trading cases by entering parameters from technical analysis ⁸⁵and performing calculations, and displaying charts to convince readers that the algorithm was successfully applied. ⁸⁶In fact, research for stock trading should ⁸⁷be anticipated by ordinary readers, ⁸⁸both brokers and retail traders, who want a scientific way of trading stocks. ⁸⁹But in the end, the published article does not provide a pragmatic conclusion and can be easily applied ⁹⁰either in software applications or ⁹¹simply incorporated into the public utilities available securities.

Even the parameters of the candlestick chart, which is the reference of the ⁹²majority of traders [18], are rarely applied in this group. There are only a few articles that include candlestick charts in his research in this group, namely from Kim [19], which involves a long short-term memory-convolutional neural ⁹³network (LSTM-CNN) model, as well as an article from Naranjo [20] that uses a fuzzy model, and an article from Kusuma who has even applied the results of his research to an interactive website for free [16]. ⁹⁴ ⁹⁵ ⁹⁶ ⁹⁷ ⁹⁸ This is also an important note for researchers because it is common knowledge that traders both on the stock exchange, forex, and crypto always use candlestick charts as the main reference in decision making.

Meanwhile, the majority of other articles focus more on the application of Neural Networks than the results of the application of the algorithm itself to the profitability of stock trading [19], [21]–[23]. So it seems that the research carried out is only the fulfillment of obligations for the application of algorithms, even though in stock trading, traders need empirical results that can be obtained from the backtest process so that they can be analyzed further during the trading process. The majority of articles also deal with the pretext that market conditions are always dynamic so that it is difficult to predict, ⁹⁹although, in the article, they also do not explicitly mention which market ¹⁰⁰is meant.

Table 2. Category Summary

Grouping Result

Count of Title

Machine learning

17

Neural Network & Deep Learning

19

Grand Total

36

The next group is articles ¹⁰¹that discuss the application of Machine Learning as a basis for ¹⁰¹the application of algorithms in their research. Some of them apply SVM (Support Vector Machine) ^{102,103}to be applied in the stock trading forecasting process. ¹⁰⁴Some of the articles that fall into this category include Yingjun [24], which combines SVM and K-nearest, and two articles from Weyori that combine genetic algorithms [25], [26], as well as an article from Sedighi that combines three algorithms at once, namely Artificial Bee Colony (ABC), Adaptive Neuro-Fuzzy Inference System (ANFIS), and Support Vector Machine (SVM)[27]. Other articles besides discussing SVM also implement clustering algorithms such as K-Nearest [24], entropy [28] discussed by Karaca, as well as the application of tree-based classifiers by Khaidem [29].

As was the case in the previous group, there are not many articles that display backtest results from his research. ¹⁰⁵In fact, more are only guided by datasets as training data but not used as material for backtesting. Similarly, the application of candlestick charts is very minimal in the application of its algorithm, both as a parameter and as a modeling reference. ¹⁰⁶This suggests that not many researchers ¹⁰⁷actually jumped in first to become real traders on the stock exchange, so they did not understand what the real needs of traders would expect from scientific research on stock trading.

Table 3. Pivot Table from Filtered List

Answering Research Questions

The initial results of this Systematic Literature Reviews stipulate that with the help of the PRISMA method, filtering of groups of articles can be obtained¹⁰⁸ strictly. So that a list of articles that are really¹⁰⁹ eligible for further review can be obtained¹¹⁰. The results of the three database indexes, which are Scopus, Google Scholar, and Semantic Scholar have been carefully studied and sorted both in terms of redundancy, the number of citations, and the update of the article year. So it can be believed that the list of articles is really¹¹¹ assumed to be the most appropriate to the research question.

Based on the review of existing articles, research questions that have been¹¹² described¹¹³ in the introduction can be answered¹¹⁴. The answer to the first question regarding the research trend of decision support systems in stock trading is in the two categories mentioned in table 3, which are¹¹⁵: Machine Learning and Neural Networks. This¹¹⁶ makes the two categories all articles have a fairly¹¹⁷ large number of citations, such as articles from Kraus [30], which reached 137 citations, or two articles from Weng [31], [32] which, if the two combined received 178 citations in July 2022. This¹¹⁸ indicates that research trends are indeed in these two categories.

¹⁴² As for the answer to the second question, namely the research gap that occurs, namely with the two major trends that have been described¹¹⁹ earlier¹²⁰, there are still many algorithms and methods that have not been applied¹²¹ in relation to¹²² decision support systems within the scope of stock trading. For example, in the MCDM (Multi-Criteria Decision Making) category, although there are already articles that discuss using methods from that category, they are not included in the SLR list due to the lack of citations. Similarly, the application of candlestick charts is very minimal, so there are still many things to be explored further. In

addition, the lack of backtest testing is ¹²³also a gap between the research results and the conditions in the real market. Even the parameters that are commonly used by traders on the exchange from the technical analysis are also still minimally appearing as the main variables.¹²⁴

CONCLUSION AND FUTURE RESEARCH

The results of the article review using SLR assisted by the PRISMA method succeeded in filtering according to the keywords needed and were able to answer research questions effectively. ¹²⁵This means that PRISMA can be used ¹²⁶as a reference for research implementation using Systematic Literature Review. However, a ¹²⁷wider database index coverage is still needed for subsequent research so that the analysis can be more accurate and have more options. Meanwhile, from the research questions at the beginning, both have been answered, namely, the trend of decision support system research in the scope of stock trading has been answered ^{129 128}. The trend, with the filtering and selection that has ¹³⁰been carried out, is more inclined to the application of Neural Networks as well as the application of ¹³¹Machine Learning for predictions in the scope of stock trading. ¹³²But in its application, there is still very little backtest testing, so there is a gap between the research results and ¹³³real conditions.

As for the second research question, the gap in the research that has been filtered is the lack of research involving methods other than those in the trend, such as MCDM, or the involvement of parameters that are very commonly used by traders, such as candlestick charts. ¹³⁴This is still an opportunity for ^{135 136}researchers to be used ¹³⁷as articles in future studies. So that the gap between the research results and the actual market conditions can be covered, in ¹³⁸

addition, if the gap is successfully closed, then the results of the study are expected to not only be output on paper but can be utilized empirically in the world of stock trading.

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| | | | |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------|
| 1. | <i>was carried out</i> | Passive voice misuse | Clarity |
| 2. | <i>was used</i> | Passive voice misuse | Clarity |
| 3. | <i>The initial selection resulted in a total of 136 articles since 2017. The final result of this stage makes a total of 36. The answer to the first question is Machine Learning and Neural Networks.</i> | Monotonous sentences | Engagement |
| 4. | <i>some many algorithms and methods have</i> | Wordy sentences | Clarity |
| 5. | <i>been applied</i> | Passive voice misuse | Clarity |
| 6. | <i>very interesting</i> → <i>exciting, fascinating</i> | Word choice | Engagement |
| 7. | <i>Research on stock trading is very interesting to do, especially during the pandemic and also post-pandemic.</i> | Unclear sentences | Clarity |
| 8. | <i>interesting</i> → <i>exciting</i> | Word choice | Engagement |
| 9. | <i>During the pandemic that caused the majority of people in the world to do work from home, trading stocks became an interesting alternative to running [1].</i> | Unclear sentences | Clarity |
| 10. | <i>This</i> | Intricate text | Clarity |
| 11. | <i>This includes Indonesia, which during the pandemic, experienced a four-fold increase in the number of investors on the stock exchange and has broken the number of more than 7.5 million investors on the stock exchange [2].</i> | Unclear sentences | Clarity |
| 12. | <i>This</i> | Intricate text | Clarity |

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| 13. | <i>This has caused many novice traders to look for shortcuts in understanding stock trading in general, either by searching for news or by using bots or utilities that use decision support systems in it.</i> | Unclear sentences | Clarity |
| 14. | <i>This</i> | Intricate text | Clarity |
| 15. | in it | Wordy sentences | Clarity |
| 16. | of them | Wordy sentences | Clarity |
| 17. | <i>are then applied</i> | Passive voice misuse | Clarity |
| 18. | <i>The algorithm used generally uses parameters derived from technical analysis or from historical data, which are then applied to supporting variables.</i> | Unclear sentences | Clarity |
| 19. | actually | Wordy sentences | Clarity |
| 20. | <i>Although short-term trading behavior has quite challenging risks [4], many beginners actually jump into it, as quite tempting rewards await as a return from this process.</i> | Unclear sentences | Clarity |
| 21. | to also conduct → also to conduct | Inappropriate colloquialisms | Delivery |
| 22. | who are | Wordy sentences | Clarity |
| 23. | <i>However, applied research on decision support systems for short-term stock trading interests is generally carried out by methods that are difficult to implement in general because each country has unique exchange conditions in it [7].</i> | Unclear sentences | Clarity |
| 24. | in order | Wordy sentences | Clarity |
| 25. | next → subsequent, following | Word choice | Engagement |

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| 26. | next → following, subsequent | Word choice | Engagement |
| 27. | <i>In addition, it can be studied in the end the gaps of research within that scope so that the next research can apply even better and proper algorithms.</i> | Unclear sentences | Clarity |
| 28. | especially → significantly | Word choice | Engagement |
| 29. | <i>been proven</i> | Passive voice misuse | Clarity |
| 30. | <i>be accounted</i> | Passive voice misuse | Clarity |
| 31. | <i>for</i> | Inappropriate colloquialisms | Delivery |
| 32. | <i>To answer this question, a Systematic Literature Review (SLR) was carried out, which tried to collect data from various research sources, especially journal articles that have been proven to undergo a peer review process well so that their validity and eligibility can be accounted for.</i> | Hard-to-read text | Clarity |
| 33. | <i>In implementing the SLR, the PRISMA method is used, which has been proven to be a solution in research using SLR [12].</i> | Unclear sentences | Clarity |
| 34. | <i>been proven</i> | Passive voice misuse | Clarity |
| 35. | originally → initially | Word choice | Engagement |
| 36. | <i>PRISMA, which was originally used in the health sector [12], can also be used in the field of software engineering [13].</i> | Unclear sentences | Clarity |
| 37. | clearly | Wordy sentences | Clarity |
| 38. | <i>was carried out</i> | Passive voice misuse | Clarity |

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| 39. | the selection of → selecting | Wordy sentences | Clarity |
| 40. | that already have → with | Wordy sentences | Clarity |
| 41. | be accounted | Passive voice misuse | Clarity |
| 42. | for | Inappropriate colloquialisms | Delivery |
| 43. | actually | Wordy sentences | Clarity |
| 44. | <i>Then further filtering is carried out by ignoring search results in the form of book chapters and types of articles from fellow literature reviews in order to get articles that actually contain applied research according to the research questions at the beginning.</i> | Unclear sentences | Clarity |
| 45. | been filtered | Passive voice misuse | Clarity |
| 46. | be obtained | Passive voice misuse | Clarity |
| 47. | <i>Furthermore, grouping is carried out based on the algorithm or method used so that heterogeneity and homogeneity can be obtained from the selected articles.</i> | Unclear sentences | Clarity |
| 48. | next → following, subsequent | Word choice | Engagement |
| 49. | <i>Briefly, the results of fulfilling the PRISMA checklist can be seen in table 1, which is an adapted version of PRISMA framework.</i> | Unclear sentences | Clarity |
| 50. | be seen | Passive voice misuse | Clarity |
| 51. | it is then, or it was then | Incomplete sentences | Delivery |
| 52. | <i>Using Publish and Perish v 8, and repeat at least three times to ensure search results.</i> | Unclear sentences | Clarity |

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| 53. | process | Wordy sentences | Clarity |
| 54. | a more straightforward, a more manageable | Word choice | Engagement |
| 55. | greatest → most significant, most remarkable, most extraordinary, most incredible | Word choice | Engagement |
| 56. | were based | Passive voice misuse | Clarity |
| 57. | in order to → to | Wordy sentences | Clarity |
| 58. | as | Wordy sentences | Clarity |
| 59. | guaranteed correctly, appropriately guaranteed, adequately guaranteed | Word choice | Engagement |
| 60. | the process of | Wordy sentences | Clarity |
| 61. | was carried out | Passive voice misuse | Clarity |
| 62. | really | Wordy sentences | Clarity |
| 63. | Next, preliminary filtering is carried out based on titles and abstracts to determine whether the content of the article does not fall into the category of literature review or comparison theory, as well as determine whether the article really contains the application of algorithms into stock tradi... | Unclear sentences | Clarity |
| 64. | next → following, subsequent | Word choice | Engagement |
| 65. | was done | Passive voice misuse | Clarity |
| 66. | This | Intricate text | Clarity |
| 67. | is done | Passive voice misuse | Clarity |

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| 68. | <i>is dominated</i> | Passive voice misuse | Clarity |
| 69. | main → primary | Word choice | Engagement |
| 70. | <i>was carried out</i> | Passive voice misuse | Clarity |
| 71. | <i>were found</i> | Passive voice misuse | Clarity |
| 72. | 4 articles did | Wordy sentences | Clarity |
| 73. | which are then | Wordy sentences | Clarity |
| 74. | <i>are then merged</i> | Passive voice misuse | Clarity |
| 75. | basic → primary, essential | Word choice | Engagement |
| 76. | <i>be seen</i> | Passive voice misuse | Clarity |
| 77. | <i>are included</i> | Passive voice misuse | Clarity |
| 78. | Total → Comprehensive | Word choice | Engagement |
| 79. | <i>is carried out</i> | Passive voice misuse | Clarity |
| 80. | <i>were obtained</i> | Passive voice misuse | Clarity |
| 81. | specifically → precisely | Word choice | Engagement |
| 82. | <i>were tested</i> | Passive voice misuse | Clarity |
| 83. | <i>This</i> | Intricate text | Clarity |
| 84. | <i>be developed</i> | Passive voice misuse | Clarity |
| 85. | <i>So, in the end, the articles in this group seem to be just applying algorithms to stock trading cases by entering parameters from technical analysis and performing calculations, and displaying charts to convince readers that the algorithm was successfully applied.</i> | Unclear sentences | Clarity |

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| 86. | In fact, research | Wordy sentences | Clarity |
| 87. | <i>be anticipated</i> | Passive voice misuse | Clarity |
| 88. | both | Wordy sentences | Clarity |
| 89. | But → However,, Nevertheless, | Inappropriate colloquialisms | Delivery |
| 90. | either | Wordy sentences | Clarity |
| 91. | simply | Tone suggestions | Delivery |
| 92. | the majority of → most | Wordy sentences | Clarity |
| 93. | a long → an extended | Word choice | Engagement |
| 94. | <i>There are only a few articles that include candlestick charts in his research in this group, namely from Kim [19], which involves a long short-term memory-convolutional neural network (LSTM-CNN) model, as well as an article from Naranjo [20] that uses a fuzzy model, and an article from Kusuma who h...</i> | Hard-to-read text | Clarity |
| 95. | <i>This</i> | Intricate text | Clarity |
| 96. | important → essential | Word choice | Engagement |
| 97. | both | Wordy sentences | Clarity |
| 98. | main → primary | Word choice | Engagement |
| 99. | ,although → . However | Hard-to-read text | Clarity |
| 100. | <i>is meant</i> | Passive voice misuse | Clarity |
| 101. | <i>The next group is articles that discuss the application of Machine Learning as a basis for the application of algorithms in their research.</i> | Unclear sentences | Clarity |

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| 102. | to be applied | Wordy sentences | Clarity |
| 103. | <i>be applied</i> | Passive voice misuse | Clarity |
| 104. | <i>Some of the articles that fall into this category include Yingjun [24], which combines SVM and K-nearest, and two articles from Weyori that combine genetic algorithms [25], [26], as well as an article from Sedighi that combines three algorithms at once, namely Artificial Bee Colony (ABC), Adaptive ...</i> | Hard-to-read text | Clarity |
| 105. | In fact, more | Wordy sentences | Clarity |
| 106. | <i>This</i> | Intricate text | Clarity |
| 107. | actually | Wordy sentences | Clarity |
| 108. | <i>be obtained</i> | Passive voice misuse | Clarity |
| 109. | really | Wordy sentences | Clarity |
| 110. | <i>be obtained</i> | Passive voice misuse | Clarity |
| 111. | really | Wordy sentences | Clarity |
| 112. | that have been | Wordy sentences | Clarity |
| 113. | <i>been described</i> | Passive voice misuse | Clarity |
| 114. | <i>be answered</i> | Passive voice misuse | Clarity |
| 115. | <i>The answer to the first question regarding the research trend of decision support systems in stock trading is in the two categories mentioned in table 3, which are: Machine Learning and Neural Networks.</i> | Unclear sentences | Clarity |
| 116. | <i>This</i> | Intricate text | Clarity |

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| 117. | fairly → relatively, reasonably | Word choice | Engagement |
| 118. | <i>This</i> | Intricate text | Clarity |
| 119. | that have been | Wordy sentences | Clarity |
| 120. | <i>been described</i> | Passive voice misuse | Clarity |
| 121. | <i>been applied</i> | Passive voice misuse | Clarity |
| 122. | in relation to → about, to, with, concerning | Wordy sentences | Clarity |
| 123. | also | Wordy sentences | Clarity |
| 124. | <i>Even the parameters that are commonly used by traders on the exchange from the technical analysis are also still minimally appearing as the main variables.</i> | Passive voice misuse | Clarity |
| 125. | <i>This</i> | Intricate text | Clarity |
| 126. | <i>be used</i> | Passive voice misuse | Clarity |
| 127. | wider → more comprehensive, broader | Word choice | Engagement |
| 128. | <i>Meanwhile, from the research questions at the beginning, both have been answered, namely, the trend of decision support system research in the scope of stock trading has been answered.</i> | Intricate text | Clarity |
| 129. | <i>been answered</i> | Passive voice misuse | Clarity |
| 130. | <i>been carried out</i> | Passive voice misuse | Clarity |
| 131. | <i>The trend, with the filtering and selection that has been carried out, is more inclined to the application of Neural Networks as well as the application of Machine Learning for</i> | Unclear sentences | Clarity |

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| | <i>predictions in the scope of stock trading.</i> | | |
| 132. | But → However,, Nevertheless, | Inappropriate colloquialisms | Delivery |
| 133. | real → natural, actual, objective | Word choice | Engagement |
| 134. | <i>been filtered</i> | Passive voice misuse | Clarity |
| 135. | <i>As for the second research question, the gap in the research that has been filtered is the lack of research involving methods other than those in the trend, such as MCDM, or the involvement of parameters that are very commonly used by traders, such as candlestick charts.</i> | Passive voice misuse | Clarity |
| 136. | <i>This</i> | Intricate text | Clarity |
| 137. | <i>be used</i> | Passive voice misuse | Clarity |
| 138. | <i>be covered</i> | Passive voice misuse | Clarity |
| 139. | <i>The results of the first search for the</i> | Search for the decay $\{B\}_{s}^{0} \rightarrow \text{ensuremath{\{B\}_{s}^{0} \rightarrow \text{row ...}}$ https://link.aps.org/doi/10.1103/PhysRevD.104.L031101 | Originality |
| 140. | <i>Previous studies Identification of new studies via databases and registers</i> | Risk of Bias Assessment in Non-Randomized Studies of Interventions for ... https://jfrh.tums.ac.ir/index.php/jfrh/article/view/1865/597 | Originality |
| 141. | <i>Studies included in previous version of review (n = 0) Reports of studies included in previous version of review (n = 0</i> | Risk of Bias Assessment in Non-Randomized Studies of Interventions for ... https://jfrh.tums.ac.ir/index.php/jfrh/article/view/1865/597 | Originality |
| 142. | <i>As for the answer to the second question,</i> | Taylor Swift's 10-Minute 'All Too Well' Is Here—And, Oof, the Jake ... | Originality |

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| | | https://www.glamour.com/story/taylor-swifts-10-minute-all-too-well-is-here-and-oof-the-jake-gyllenhaal-tweets | |
| 143. | A. Kumar, "Who gambles in the stock market" | Inverse S-shaped probability weighting and its impact on investment https://www.aims sciences.org/article/doi/10.3934/mcrf.2018029 | Originality |
| 144. | Predicting direction of stock price index movement using artificial neural networks and support vector machines: The sample of the Istanbul Stock Exchange, | Predicting direction of stock price index movement ... - ScienceDirect https://www.sciencedirect.com/science/article/pii/S0957417410011711 | Originality |
| 145. | Kao, Y.-Y. Ou, and K.-L. Hua, "Using Deep Learning Neural Networks and Candlestick Chart Representation to Predict Stock Market," 2019. | A Stock Closing Price Prediction Model Based on CNN-BiSLSTM https://www.hindawi.com/journals/complexity/2021/5360828/ | Originality |
| 146. | Forecasting stock prices with a feature fusion LSTM-CNN model using different representations of the same data," PLoS One, | Deep architectures for long-term stock price prediction with a heuristic-based strategy for trading simulations | Originality |
| 147. | E. Hoseinzade and S. Haratizadeh, "CNNpred: CNN-based stock market prediction using a diverse set of variables," Expert | A Stock Closing Price Prediction Model Based on CNN-BiSLSTM https://www.hindawi.com/journals/complexity/2021/5360828/ | Originality |
| 148. | I. K. Nti, A. F. Adekoya, and B. A. Weyori, "A comprehensive evaluation of ensemble learning for stock-market prediction," J. Big Data, vol. 7, no. 1, | A Mini-Review of Machine Learning in Big Data Analytics: Applications ... https://www.sciopen.com/article/10.26599/BDMA.2021.9020028?issn=2096-0654 | Originality |
| 149. | I. K. Nti, A. F. Adekoya, and B. A. Weyori, "Efficient Stock-Market Prediction Using Ensemble Support Vector Machine," Open Comput. Sci., vol. 10, no. 1, pp. 153–163, 2020, doi: | A Mini-Review of Machine Learning in Big Data Analytics: Applications ... https://www.sciopen.com/article/10.26599/BDMA.2021.9020028?issn=2096-0654 | Originality |