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Research Article

The Use of Artificial Intelligence in Aviation: A Bibliometric Analysis

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Abstract:

The bibliometric analysis of 395 articles selected from the Web of Science (WoS) database between 2004 and 2024 is designed to provide a foundation for future research by mapping scientific collaborations, conceptual clusters, citation relationships, and intellectual structures in the research field, highlighting the international scope of the research area and identifying emerging trends and influential works. The results show that dominant topics such as machine learning, deep learning, aviation safety, atmospheric modeling, and anomaly detection are being studied in academia, highlighting the central role of AI in improving aviation safety and operational efficiency. High-impact journals such as IEEE Access and Aerospace have emerged as leading platforms. At the same time, Transportation Research Part C and the Journal of Air Transport Management are prominent in logistics and aviation-focused research. China and the United States lead aerospace and AI research with high publication volumes and significant impact. Italy contributes fewer publications but makes a notable impact, while the United Kingdom plays an important role in this field with active research efforts. Institutions such as Nanjing University of Aeronautics and Astronautics, as well as Vanderbilt University, play an important role in advancing the field. This data shows that, on both a journal and country basis, specific centers and countries play dominant roles in the global research agenda in aerospace and AI, directly contributing to the formation of the aerospace ecosystem. These results provide important clues on where to focus future research and show that research communities are increasingly collaborating.

1. Introduction

The increasing demand for air travel, coupled with current limitations in airport routing capabilities, has increased the need for advanced Artificial Intelligence (AI) solutions in air traffic management and airport operations [1]. AI systems are defined as systems that exhibit intelligent behavior by analyzing their environment and taking autonomous actions to achieve specific goals. Integrating AI into aviation systems is becoming increasingly common, primarily through Machine Learning algorithms for flight assistance [2].

Integrating AI into the aviation industry is progressing rapidly and significantly impacting various aspects of the field. AI applications are of great importance for data analytics, autonomous flight systems, safety and future trends in aviation. These developments highlight the need to analyze and understand the role of AI and assess its future impact.

This study, which aims to identify the areas where academic studies on the use of artificial intelligence in aviation are concentrated and to reveal the scientific importance of the subject, focuses on increasing collaboration, conceptual clustering, citation networks, and intellectual structures in research on the use of artificial intelligence in aviation, and reviews the important contributions to the field by mapping the performance of different research streams within the framework of performance analysis and science mapping.

Several studies highlighted the role of artificial intelligence and data analytics-driven technologies in the aviation ecosystem. For example, a study on digital twin technology, its features, applications, and design implications highlights the extensive developments in this field, while studies on specific technical applications, such as the use of convolutional neural networks in intelligent fault diagnosis for rotating machinery are also noteworthy. Innovative proposals such as metaverse-based neuro-symbolic speech understanding in aviation maintenance processes and approaches for operational aircraft maintenance planning demonstrate the pace of digital transformation in the industry. Furthermore, integrating machine learning models for aviation incident risk prediction and using Bayesian neural networks for flight trajectory prediction and safety assessment demonstrate the applicability of safety-enhancing technologies.

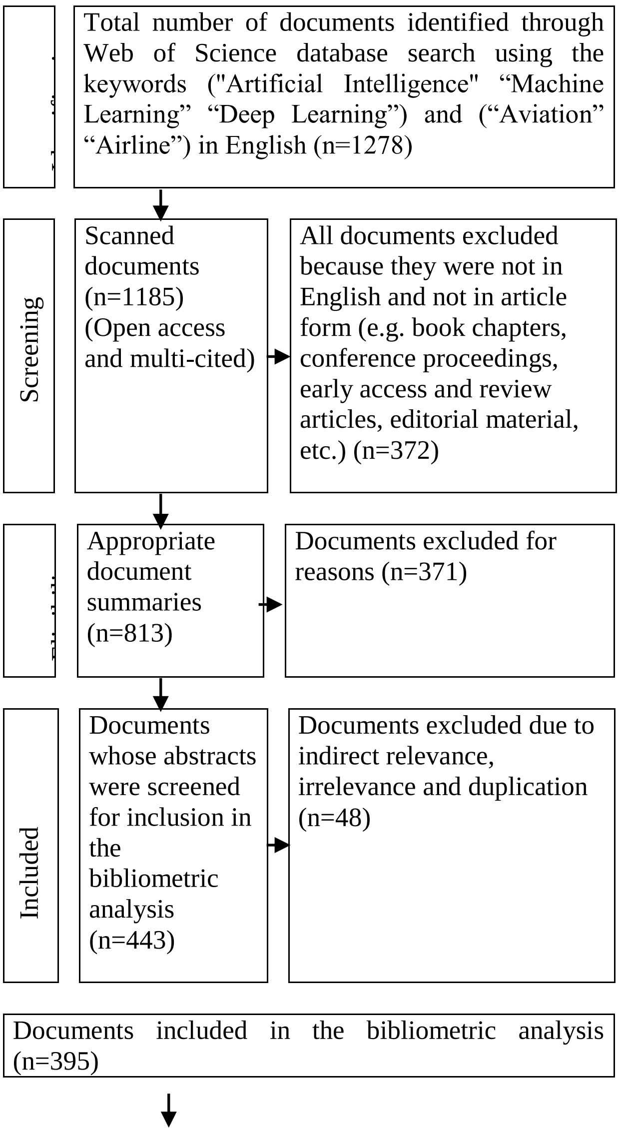
Machine learning-assisted analysis with aviation big data has been used in operational optimization areas such as flight delay prediction and air traffic flow analysis. At the same time, the role of artificial intelligence in improving real-time decision-making in high-impact weather situations offers remarkable results. Furthermore, specific applications such as unsupervised anomaly detection, sequential deep learning based on NTSB reports, and decision support systems with automatic fault detection in gas turbine blade inspection demonstrate the expanding impact of data-driven approaches in the aviation ecosystem. These academic studies significantly increase industry efficiency, safety, and innovation. The study identifies influential studies and methodological trends that offer valuable insights into the aviation ecosystem. It is intended to provide researchers and industry professionals with a better understanding of the state of the art in integrating AI into the aviation ecosystem. The findings will help develop and improve the aviation ecosystem and industries.

2. Research Methodology

Bibliometric methods or analyses have become well-established scientific specializations essential to research evaluation methodologies, especially in scientific and applied disciplines [3]. When conducted precisely, bibliometric studies can provide a solid foundation for advancing research in innovative and effective ways [4]. Qualitative and quantitative analysis of scientific publications, especially articles, is crucial for understanding the development of scientific fields [5].

Using bibliometric analysis, this research identifies relevant academic documents, focusing on open-access and highly cited studies to ensure the inclusion of influential research in line with revealing current research trends, most cited studies, and future research directions in this field, including the use of 'Artificial Intelligence', 'Machine Learning' and 'Deep Learning' technology in the aviation ecosystem. Quantitative methods such as citation analysis, co-authorship networks, and thematic clustering are used to identify key trends, research areas, and influential participants in this rapidly evolving field. Key areas analyzed include co-author networks, keywords, citation impact, and bibliometric links.

Table 1. *Flowchart of Bibliometric Analysis of the Use of Artificial Intelligence in Aviation*



The bibliometric analysis summarized in Table 1 outlines a systematic process involving four key phases to identify and analyze publications related to artificial intelligence in aviation within the Web of Science (WoS) database between 2000 and 2024. In the identification phase, a keyword search using terms such as "Artificial Intelligence," "Machine

Learning," "Deep Learning," "Aviation," and "Airline" was conducted. This initial search yielded a total of 1278 documents. In the screening phase, documents that were non-English or not in article format (e.g., book chapters, conference proceedings, editorial materials) were excluded. As a result, 372 documents were removed, leaving 1185 documents, which consisted of open-access and highly cited studies. During the eligibility phase, document summaries were reviewed for relevance. Out of the 813 documents analyzed, 371 documents were excluded for being unrelated to the topic when evaluated under specific citation topics or WoS categories. Finally, in the inclusion phase, only articles indexed in SCI-Expanded, SSCI, and ESCI were selected. After filtering for language, relevance, and format, 395 English-language articles published between 2004 and 2024 were included in the final dataset for detailed bibliometric analysis. This methodological approach ensures a focused and high-quality dataset, providing valuable insights into the intersection of artificial intelligence and aviation research. The bibliographic information of the final 395 articles was exported to a text document (.txt) file and included in the analysis using VOSviewer software (version 1.6.20) on the cleaned data to perform performance analysis to focus on productivity and citation metrics, science mapping to reveal relationships between research areas, and network analysis to examine links between authors or publications. The dataset was analyzed to understand research collaboration in leading papers in the field; Co-author Analysis, Co-occurrence Analysis, Citation Analysis, Bibliometric Matching, Co-Citation Analysis, and bibliometric indicators were examined in detail.

a) Co-author Analysis is a formal collaboration in scientific research in which two or more authors work together to produce outputs of high quality and quantity compared to individual efforts [6]. Co-authorship is a key indicator to understanding research collaboration that links different skills to produce research outputs. Examining these patterns reveals the mechanisms that shape the scientific community [7]. In the co-authorship analysis in table 2, Chan Pak-wai, Chen Feng, and Khattak Afaq emerge as the most prolific authors with 10 and 9 articles each. Despite their high publication numbers, their citation impact is moderate, as their work is cited less frequently. A total of 27 link strengths indicates strong collaborative networks, but their impact in the field may not be as significant as that of some other authors. Looking at the papers of the top 3 most prolific authors, Chan Pak-wai "Deep Neural Network Modeling for Big Data

Table 2. *Authors with the Most Publications in Co-Author Analysis*

Authors	Number of Publications	Number of Citation	Total Connection Power
Chan, Pak-wai	**10**	14	27
Chen, Feng	**9**	12	27
Khattak, Afaq	**9**	12	27
Mavris, Dimitri N.	**7**	114	12
Puranik, Tejas G.	**7**	114	12
Zhang, Jianping	**6**	3	18
Gui, Guan	**4**	259	11
Matthews, Bryan	**4**	55	5
Zhang, Xiaoge	**4**	225	3
Sun, Jinlong	**3**	250	9

Weather Forecasting", "Deep neural network-based feature representation for weather forecasting", "Evaluation of wind field features along airport runway landing slope: A wind tunnel study assisted by an explainable augmenting machine". Chen Feng, second place; "Missed Approach, a Critical Safety Procedure in Aviation: Prediction Based on Machine Learning-Ensemble Imbalance Learning", "TabNet-SHAP: A Framework for Predicting Wind Shear-Induced Aviation Turbulence Near Airport Runways", "Prediction and interpretation of low-level wind shear criticality based on height above runway level: Application of Bayesian optimization-community learning" co-authored with Chan and Khattak, and another prolific author Khattak Afaq co-authored "An Explainable Boosting Machine for Predicting Aircraft Takeoff Due to Wind Shear Based on Pilot Reports". It is understood that the authors' research interests focus on the application of AI technology in predicting and managing various risks in aviation, especially the application of data science and machine learning techniques, in-depth research on topics such as weather forecasting and wind shear to ensure aviation safety and improve operational challenges. In the Overlap/Scope visualization of VOSviewer's co-authorship analysis, obtained by filtering from the list of 90 authors listed in figure 1 by choosing to appear in at least two articles with at least two citations, the coloring from blue (2020) to yellow (2023) reflects the timeline of existing publications and presents a network of co-authorship showing the collaborative relationships between them.

b) Co-occurrence Analysis is a content analysis technique that examines the relationships between words in documents to build the conceptual structure

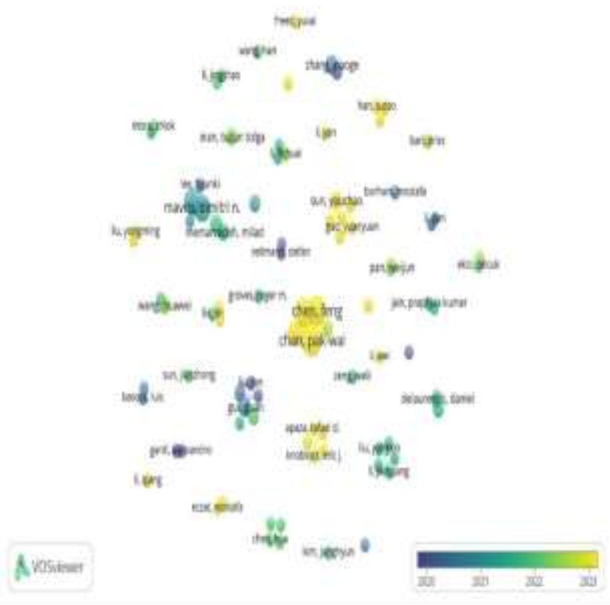


Figure 1. *Co-Author Analysis Overlap / Overlay Visualization*

of a particular domain. The method is based on the idea that the concepts they represent are closely related when words occur together frequently in documents. The technique can be applied to titles, keywords, abstracts, or complete texts and focuses on concepts rather than documents, authors, or journals [8].

Table 3. *Most Frequently Used Keywords in Publications in Common Word Analysis*

Keywords	Frequency of Occurrence	Total Connection Power
Machine Learning	**124**	300
Deep Learning	**82**	220
Aviation	**26**	76
Artificial Intelligence	**25**	78
Aviation Safety	**20**	48
Aircraft	**16**	90
Anomaly Detection	**14**	53
Atmospheric Modeling	**11**	77
Feature Extraction	**11**	65
Neural Networks	**11**	45

In Table 3, 218 out of 1367 keywords were included because of filtering that at least two words should be shared in the analysis of 1367 keywords, and the top 10 words revealed the central themes in the research area. The most prominent keywords were "Machine Learning" and "Deep Learning," appearing 124 and 82 times, respectively, with a total link strength of 300 and 220. These terms underline the focus on techniques for using artificial intelligence in aviation. The keywords network visualization in

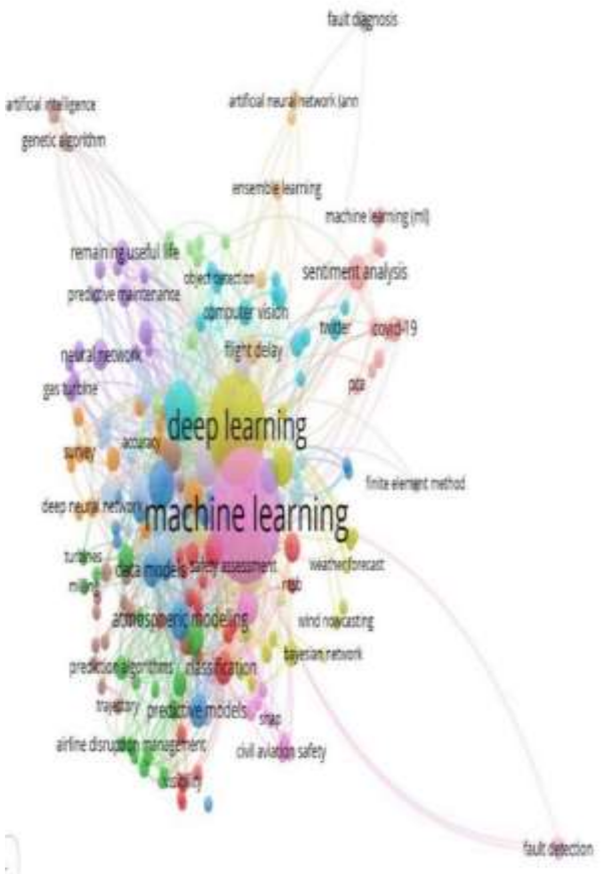


Figure 2. *Keywords Network Visualization*

Figure 2 represents 1148 links with a total link strength of 1554 links and 215 publications in 20 clusters, according to the information obtained from the Vosviewer interface. According to the table, large nodes such as "machine learning" and "deep learning" indicate that these terms are heavily researched and widely discussed in the literature. Machine learning and deep learning dominate as the central topic in the research area, appearing to be linked to many other subtopics such as predictive models, classification, predictive maintenance, and neural networks. In addition, other prominent terms such as atmospheric modeling, computer vision, and aviation safety and aircraft highlight specific research areas within machine learning.

c) Citation Analysis has evolved with new techniques, tools, and units of work, leading to a significant increase in its application. The simplest method is citation counting, which tracks how often a document or group of documents is cited over time. The impact factor improves on this by measuring the average number of journal citation articles, allowing comparisons between journals [9]. Table 4 reveals that authors with fewer publications, such as Gui Guan, Sun Jinlong, Liu Fan, and Zhou Ziqi, have been significantly impacted due to their high citation

Table 4. *The Most Cited Authors in Citation Analysis*

Authors	Number of Publications	Number of Citation	Total Connection Power
Gui, Guan	4	**259**	19
Sun, Jinlong	3	**250**	19
Liu, Fan	2	**236**	19
Zhou, Ziqi	2	**236**	19
Zhang, Xiaoge	4	**225**	10
Mahadevan, Sankaran	3	**219**	10
Yang, Jie	3	**180**	18
Mavris, Dimitri N.	7	**114**	3
Puranik, Tejas G.	7	**114**	3
Groves, Roger M.	2	**61**	0

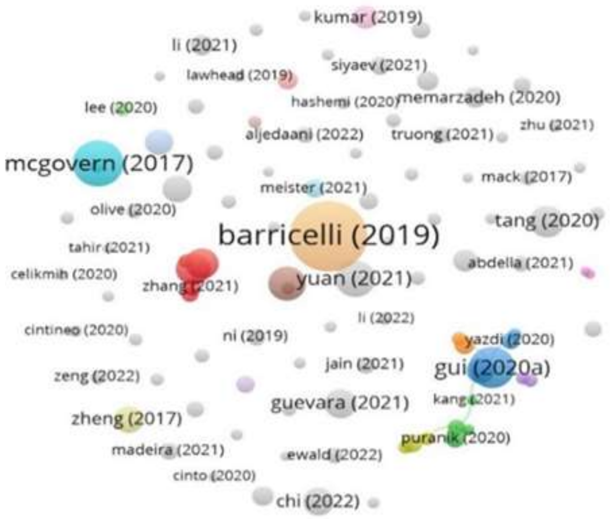


Figure 3. *Document Citation Analysis Network Visualizations*

counts and strong network connections. In contrast, authors such as Mavris, Dimitri N., and Puranik, Tejas G. published more but had lower citation counts and weaker network connections. The analysis emphasizes that academic impact is determined by the number of publications and the strength of connections and citations within the research community.According to the vosviewer document citation network visualizations in Figure 3, covering ten studies with 9 clusters and 101 studies with 84 clusters, the Barricelli [10] paper is highlighted as the central and most influential study in this citation network, showing broad relevance and high citation frequency (1148 citations) within the field. There are several clusters around this paper, with authors such as Zhang (166 citations) and Papakostas (233 citations) having strong links with Barricelli, indicating thematic or citation overlap. More recent authors such as Tang (120 citations), Chi (154 citations), and Guevara (103 citations) are positioned to point to publications that are emerging or less cited but still influential. Older works, such as Papakostas (233 citations), indicate a solid foundation in the field, while including more recent papers indicates an actively evolving research environment.

Table 5. *According to Citation Analysis*

Institution	Number of Publications	Number of Citation	Total Connection Power
VanderbiltUniversity	5	**247**	3
Nanjing University of Aeronautics and Astronautics	18	**134**	7
Georgia Institute of Technology	9	**122**	5
Beihang University	11	**106**	6
Embry-Riddle Aeronautical University	8	**91**	0
Delft University of Technology	8	**88**	1
Hong Kong Polytechnic University	5	**88**	0
Nasa	6	**80**	0
Sichuan University	6	**47**	3
Cranfield University	9	**42**	5

Table 5 highlights the influence and connections of various institutions in the research community by examining institutions by citation analysis. When filtering for at least five publications, Vanderbilt University, with five publications and 247 citations, stands out for its high impact, although its connectivity within the network is moderate. In contrast, despite receiving a reasonable number of citations, institutions such as Embry-Riddle Aeronautical University and the Delft University of Technology show limited connectivity, and their research appears to be less integrated into the wider citation network. The analysis highlights the different degrees of influence and network integration among leading institutions. Table 6 presents the citation analysis of countries, again filtered by the minimum five publication requirements. It shows the leading countries regarding publication volume, citation impact, and network connectivity. Overall, China and the United States dominate the field in terms of both volume and impact, while countries such as Italy and the

***Table1** . Countries According to Citation Analysis*

Country	Number of Publications	Number of Citation	Total Connection Power
People's Republic of China	125	**1318**	43
United States of America	89	**1176**	24
Italy	6	**530**	1
England	24	**239**	20
Netherlands	15	**233**	4
Germany	18	**157**	3
Greece	5	**142**	1
Canada	14	**132**	8
Spain	5	**99**	6
Australia	12	**92**	4

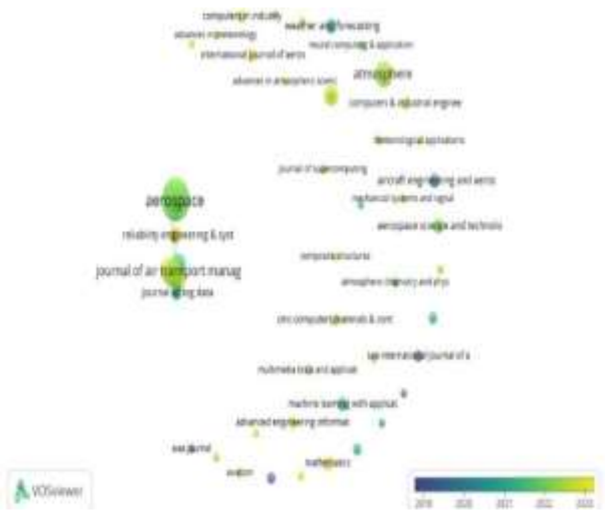


***Figure 1** . Citation Analysis Publisher Overlap/Scope Visualization*

United Kingdom also make significant, albeit more specialized, contributions. Figure 4 shows VOSviewer's publisher citation analysis Overlap/Coverage visualization of VOSviewer's publisher citation analysis Overlap/Coverage visualization, which includes 62 publisher lists in 45 clusters listed as a result of filtering by choosing to appear in at least two articles with at least two citations, journal clusters based on standard citation frequency and related research topics. The colors from yellow to blue (2019-2023) show the temporal evolution of the research. The network strongly focuses on aerospace topics, emerging trends in specific areas, and interdisciplinary linkages connecting to areas such as big data and weather forecasting.

d) Bibliometric Coupling is a bibliometric technique that identifies links between publications by analyzing overlaps in reference lists. By showing the interconnectedness of ideas and emerging trends, bibliographic aggregation helps researchers discover relevant, more recent articles and map the intellectual structure of a research field [11]. The difference between bibliographic linkage and co-citation is that bibliographic linkage looks at the relationship between two documents according to whether they share the same references. In comparison, co-citation looks at how often two documents are cited by other articles [12]. In the Voswiewer bibliometric merging field, two options, document and author, were included in the analysis from the document, source, author, university, and cross-country analysis options. First, bibliometric merging analysis was used by filtering at least ten publication conditions in the document title.

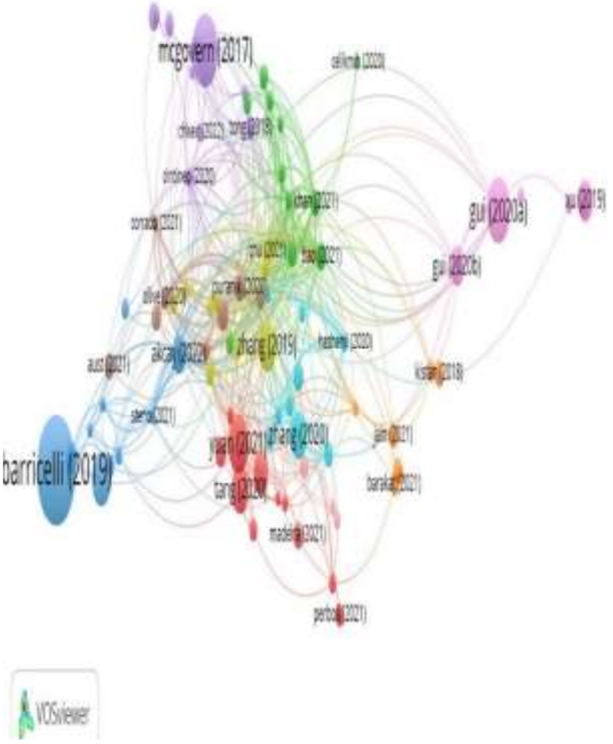


***Figure 5.** Bibliometric Matching Document Network Visualization*

According to the bibliometric matching document network visualization of 89 documents and 499 links across 10 clusters in Figure 5, authors are located in different color-coded clusters, each representing a focused research area within the field. Publications are recent, post-2017, with the blue cluster led by "Barricelli (2019)" highlighting a group of researchers with strong collaborative ties, indicating high impact in their research area. Figure 6 shows the bibliometric matching author network visualization, representing 1154 links with a total link strength of 16144 in 10 clusters covering 90 authors. The visualization is filtered by the overlap of reference lists in at least two publications and at least two citations in the Vosviewer interface. The top 10 most cited authors in the citation analysis in Table 4 are similarly ranked here.

e) Co-citation analysis is an analysis that examines how often other documents cite two documents together. Co-citation is a dynamic measure that evolves and, when analyzed longitudinally, can reveal shifts in paradigms and emerging schools of thought within a discipline [13].

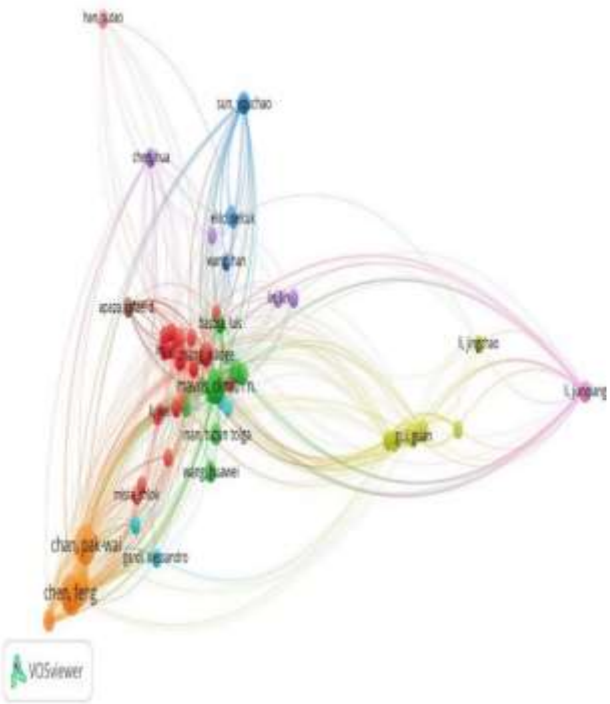


Figure 6. *Bibliometric Matching Author Network Visualization*

Bibliographic co-citation is a widely used criterion for determining subject similarity between two items. If a third item cites items A, B, and C, they are considered related, even if they do not directly cite each other. The more items that refer to both A and B, the stronger the relationship between them [14]. Figure 7 shows the network visualization of co-citation analysis-referenced publications. It represents 1637 links with a total link strength of 2588 links in 5 clusters covering 123 publications. The co-citation analysis network shows the links between various publications and highlights how often these publications are cited together. The network is divided into several color-coded clusters, each representing a thematic area where research publications share strong citation links. The Red cluster revolves around the accuracy of air traffic flow forecasting, while the blue cluster revolves around basic machine learning algorithms and statistical learning methods, including

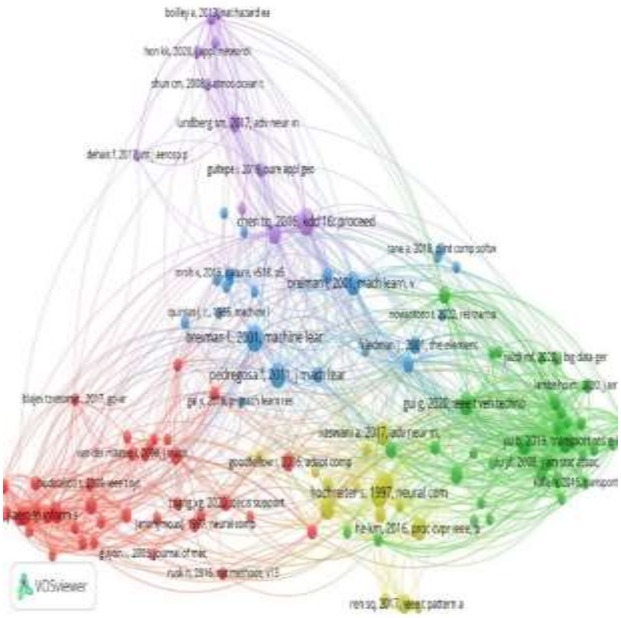


Figure 7. *Co-Citation Analysis Publications Referenced*

foundational work such as Breiman's Random Forests. The green cluster highlights machine learning applications in transportation and logistics, such as predicting flight delays and optimizing operations by analyzing high-dimensional data. The yellow cluster focuses on profound learning developments, showcasing important contributions to computer vision and neural networks. Finally, the purple cluster highlights the interdisciplinary nature of this work by linking machine learning to environmental and natural hazard research (such as meteorological phenomena that can endanger flight, such as wind shears). The dense connectivity within and between clusters underscores the fundamental role of some studies, such as Breiman's, in bridging different research fields. Overall, the network reflects the broad and growing impact of machine learning in aerospace and various scientific fields. Table 7 below summarizes the top 10 most cited studies in the co-citation publication analysis clusters. Using the option to have at least 20 referenced source magazines in the Voswiewer interface, the table below shows the data obtained from the program that calculates the total strength of the standard station links with other sources for each of the 128 sources. The data in Table 8 highlights the most influential Journals in the field based on the number of co-citations and total link strength, showing their influence on academic research and interconnectedness. "Journal of Air Transport Management" is the most cited and linked journal, reflecting its central role in transportation studies."Transportation Research Part C: Emerging

Table7. *Most Cited Publications According to Co-Citation Analysis*

Articles
[15] Chen, T., & Guestrin, C. (2016, August). Xgboost: A scalable tree boosting system. In Proceedings of the 22nd acm sigkdd international conference on knowledge discovery and data mining (pp. 785-794). (***24 cities)***
[16] Graves, A., & Graves, A. (2012). Supervised sequence labelling (pp. 5-13). Springer Berlin Heidelberg. **(22 *cities)***
[17] Breiman, L. (2001). Random forests. Machine learning, 45, 5-32. **(22 *cities)***
[18] Bai, M., Shi, Y., Cui, N., Liao, Y., Zhao, C., Shanshan, C., ... & Ding, Y. Mapping the knowledge of machine learning in pharmacy: a scientometric analysis in CiteSpace and VOSviewer. **(20 *cities)***
[19] Yu, B., Guo, Z., Asian, S., Wang, H., & Chen, G. (2019). Flight delay prediction for commercial air transport: A deep learning approach. Transportation Research Part E: Logistics and Transportation Review, 125, 203-221. **(18 *cities)***
[20] He, K., Zhang, X., Ren, S., & Sun, J. (2016). Deep residual learning for image recognition. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 770-778). **(18 *cities)***
[21] Gui, G., Liu, F., Sun, J., Yang, J., Zhou, Z., & Zhao, D. (2019). Flight delay prediction based on aviation big data and machine learning. IEEE Transactions on Vehicular Technology, 69(1), 140-150. **(17 *cities)***
[22] Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2017). ImageNet classification with deep convolutional neural networks. Communications of the ACM, 60(6), 84-90. **(16 *cities)***
[23] Vaswani, A. (2017). Attention is all you need. Advances in Neural Information Processing Systems. **(16 *cities)***
[24] Rebollo, J. J., & Balakrishnan, H. (2014). Characterization and prediction of air traffic delays. Transportation research part C: Emerging technologies, 44, 231-241. **(15 *cities)***

Technologies" and "arXiv" also significantly impact and demonstrate their important contributions to new technologies and broad interdisciplinary research. In addition, journals such as "IEEE Access" and "CVPR" stand out for their strong links in computer vision and intelligent systems based on artificial intelligence, underlining their importance in technology and engineering. Table 9 shows the top 10 most cited authors out of the 100 authors listed when filtered by at least ten co-citation analysis references in the Vosviewer program. Leo Breiman is the most co-cited author, with 53 citations and a total link strength 309. This shows Breiman's work is highly cited and linked to other influential research. Breiman's work on classification, regression trees, and ensembles of trees that fit bootstrap samples has helped bridge the gap between statistics and computer science in machine learning.

When the academic data is analyzed, Michael Schultz, who works in areas such as airspace simulation and integrated air traffic flow management, and Pak W. Chan, who works in the fields of aviation meteorology and aviation safety in the context of atmospheric phenomena, show significant influence with high total link strengths of 317 and 242 respectively. However, they receive fewer citations than Breiman. This suggests that Breiman and Breiman's work is central to many

Table 8. *Most Cited Journals According to Common Citation Analysis*

Journal	Frequency of Occurrence	Total Connection Power
Journal of Air Transport Management	**320**	5681
Transportation Research Part C: Emerging Technologies	**229**	4987
arXiv	**207**	4304
IEEE Access	**165**	2816
Proceedings of the IEEE conference on computer vision and pattern Recognition (CVPR)	**146**	2761
Transportation Research Part E: Logistics and Transportation	**105**	2493
Lecture Notes in Computer Science (LNCS)	**124**	2385
IEEE Transactions on Intelligent Transportation Systems	**100**	2279
Expert Systems with Applications	**106**	2180
Journal of Air Transport Management	**320**	5681

Table 9. *Most Referenced Authors According to Co-Citation Analysis*

Keywords	Number of Citation	Total Connection Power
Breiman, L.	**53**	309
Wang, Y.	**36**	189
Schultz, M.	**33**	317
Chan, Pw.	**33**	242
Zhang, Xg.	**33**	163
Federal Aviation Administration (FAA)	**32**	194
Liu, Y.	**31**	168
Puranik, tg.	**28**	235
Lecun, Y.	**27**	192
Li, ls	**25**	225

important research debates in specialized fields such as transportation systems or aviation safety. Overall, the picture reflects the diversity of influential authors in the field, encompassing fundamental theoretical work, applied research, and institutional contributions, all interlinked within the broader academic discourse.

3. Conclusion

This bibliometric analysis of 395 articles selected from the Web of Science (WoS) database between 2004 and 2024 aimed to map scientific collaborations, conceptual clusters, citation relationships, and intellectual structures in the research field. The co-author analysis revealed strong and evolving collaboration networks, with prolific researchers such as Chan Pak-wai, Chen Feng, and Khattak Afaq making significant contributions. Despite fewer publications, authors such as Gui Guan and Sun Jinlong stood out for their influential and highly cited work. Connections between authors revealed increased collaboration and diversity in research outputs. Co-occurrence Analysis identified recurring themes such as Machine Learning, Deep Learning, Aviation AI, Safety, Anomaly Detection, Atmospheric Modeling, and Neural Networks. These findings underscore the dominance of AI-driven safety and operational improvements in aviation research. Citation Analysis highlighted influential studies focusing on digital twin technologies in aviation, with Barricelli et al. leading the way as the most cited paper. Other influential studies, such as McGovern et al. [25], highlighted AI's academic and practical relevance in aviation by emphasizing AI applications in forecasting severe weather events. Bibliometric Matching revealed strong network structures based on shared references, with the studies by Barricelli and McGovern serving as central nodes in the research field. These collaborations reflect key themes of the academic community. Collaborative Citation Analysis revealed the prominence of topics such as Deep Learning and Aviation Safety, demonstrating aviation's interdisciplinary importance and centrality in AI applications. The findings confirm the strong academic collaboration and interest in machine learning, deep learning, and predictive weather modeling. Highly cited studies have shaped the research landscape, laying a foundation for future exploration. Overall, this study highlights the transformative impact of digital technologies and AI applications on aviation safety and operational efficiency, while bibliometric analyses illuminate complex interactions within the scientific community.

Author statements:

- **Ethical approval:** The research is unrelated to human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that may have influenced the work reported in this article.

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- **Author contributions:** The authors declare they have equal rights to this article.

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- **Data availability statement:** Data supporting the findings of this study are available from the corresponding author upon request. Data are not publicly available due to confidentiality or ethical constraints.
- This article is derived from Rafet Ertekin's master's thesis titled "Bibliometric Analysis of Artificial Intelligence Usage in Aviation," submitted to Kocaeli University Institute of Social Sciences, Department of Aviation Management and accepted on 25.09.2024.

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