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## Nexus of Pelician Optimization Techniques: A Bibliometric Analysis

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#### Abstract

Optimization techniques play a crucial role in enhancing computational efficiency and accuracy across diverse applications. This bibliometric analysis explores the growing research on Pelican Optimization Techniques, focusing on their application in energy forecasting, medical diagnostics, object detection, wireless network optimization, and intelligent transport systems. The study, covering 2011 to 2024, analyses 20 documents from 19 sources, highlighting the 22.54% annual growth rate and contributions from 73 authors. Revealing that optimization algorithms are well-established, emerging themes like energy efficiency and real-time decision-making are gaining traction. The average citation per document of 5.2 reflects a moderate impact, while the document average age of 2.8 years suggests a contemporary and evolving research field. The study applied the use of MS Excel, R studio and Biblioshiny Applications that provided insights into collaboration patterns, thematic clusters, and future research directions, source of papers, country of authors, reinforcing the importance of optimization techniques in computational and engineering applications. The study provides a novel structured overview of methodologies in literature review, highlighting key innovations, challenges, and emerging trends. Findings suggest that the Pelican Optimization Algorithm significantly improves computational performance and decisionmaking accuracy, making it a promising tool for future research. This analysis contributes to the understanding of optimization advancements and their practical applications in realworld scenarios.

**Keywords:** Pelican Optimization, Algorithm, Deep Learning, Energy Forecasting, Imaging, Wireless Sensor Network

#### Introduction

The rapid advancement of optimization algorithms and deep learning techniques has led to significant breakthroughs across various domains. The Pelican Optimization Algorithm, an emerging heuristic-based optimization technique, has gained substantial attention in recent years due to its efficiency in solving complex computational problems. This bibliometric analysis aims to explore recent research leveraging the Pelican Optimization Algorithm and its variants in fields such as energy forecasting, medical imaging, wireless networks, and intelligent transport systems. By examining key publications, methodologies, and findings, this study highlights the impact of these advancements and identifies future research directions.

Bibliometric studies have become a crucial method for analysing research trends, publication patterns, and academic collaboration in various fields. These studies apply quantitative techniques to assess the impact, growth, and structure of scientific knowledge (Aria & Cuccurullo, 2017). With the increasing volume of academic publications, bibliometric tools provide a structured approach to mapping research landscapes, identifying influential authors, and evaluating emerging themes (Donthu et al., 2021).

Several software tools have been developed for conducting bibliometric analysis, with Biblioshiny (RStudio) and VOSviewer being among the most widely used such as Biblioshiny (RStudio): Developed as part of the Bibliometrix package in R, Biblioshiny provides an interactive web interface for conducting bibliometric analysis (Aria & Cuccurullo, 2017). It enables researchers to perform co-citation analysis, keyword mapping, and thematic evolution studies while offering graphical visualization of research networks. The tool is widely used in academic studies for its flexibility and comprehensive analytical capabilities similarly, VOSviewer: This software is specifically designed for visualizing bibliometric networks, including co-authorship, citation relationships, and keyword co-occurrence (Van Eck & Waltman, 2010). VOSviewer allows researchers to create detailed cluster maps that reveal the intellectual structure of a field, making it particularly useful for identifying research hotspots and collaboration networks.

#### Application of Bibliometric Tools

Both tools have been applied in numerous bibliometric studies. For instance, a study by Zupic and Čater (2015) demonstrated the effectiveness of VOSviewer in mapping co-citation networks, providing insights into knowledge dissemination in strategic management research. Similarly, Donthu et al. (2021) highlighted how Biblioshiny has been used to track global research trends in artificial intelligence and digital marketing.

By integrating these bibliometric tools, researchers can analyze large datasets, uncover hidden research patterns, and predict future research directions in various disciplines. The use of Biblioshiny and VOSviewer in bibliometric analysis enhances the ability to explore scientific landscapes, measure academic influence, and develop research strategies based on data-driven insights. Hence, the objectives of the study are as follows.

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#### Objectives

- 1. To analyse the research growth and collaboration trends in Pelican Optimization Techniques from 2011 to 2024 using bibliometric indicators such as publication trends, co-authorship rates, and institutional contributions.
- 2. To identify the core research themes and their interconnections by examining keyword co-occurrence, thematic clusters, and application areas in various fields like healthcare, engineering, and artificial intelligence.
- 3. To evaluate the impact and influence of research publications by assessing citation metrics, document sources, and authorship contributions to determine the relevance and adoption of Pelican Optimization Algorithms.
- 4. To suggest future research directions based on emerging trends, research gaps, and potential interdisciplinary applications of Pelican Optimization Techniques in real-world scenarios

#### Literature Review

The application of optimization algorithms, deep learning models, and computational intelligence techniques has significantly impacted multiple domains, including energy forecasting, medical imaging, wireless sensor networks, and intelligent transport systems. This section provides a comprehensive literature review of studies that have advanced these fields by utilizing novel methodologies, particularly focusing on heuristic-based algorithms such as the Pelican Optimization Algorithm (POA), deep learning frameworks, and hybrid computational models.

**1. Optimization Algorithms and Forecasting Models** Forecasting energy demand and resource utilization requires efficient predictive models. Mujeeb (2024) proposed the PAOFCDN method, which enhances solar irradiance forecasting accuracy, outperforming existing models. Similarly, Akinola et al. (2024) introduced the Pelican Algorithm-optimized Support Vector Machine (POA-SVM), demonstrating improved daily peak demand forecasting with reduced prediction errors. Further optimizing computational efficiency, Zuo et al. (2024) developed a hybrid Pelican Optimization Algorithm incorporating Unscented Sigma Point Mutation and Cross Reversion, achieving better convergence rates in complex problem-solving scenarios.

**2.** Power Quality Enhancement and Energy Management In the field of electrical grid optimization (Rekha and Remesh, 2024) explored an ANFIS-controlled DVR and DSTATCOM model that mitigates voltage sag and enhances power stability. Azeem and Khan, 2024) introduced an enhanced energy management and security mechanism for wireless sensor networks, optimizing routing efficiency while bolstering security measures. Similarly, Habelalmateen et al. (2024) utilized the Wild Horse Optimization algorithm to improve cluster head selection in heterogeneous WSNs, extending network longevity.

**3. Medical Imaging and Disease Diagnosis** Machine learning and deep learning have transformed medical diagnostics, improving early detection and prognosis. Zhou et al. (2024) optimized MobileNetV2 with the Pelican Optimization Algorithm for early gastric cancer detection, achieving superior accuracy compared to traditional models. Bhujade et al. (2024) employed image processing filters to enhance disease detection in soybean and cotton plants, while Kumar et al. (2024) developed a heuristic-based ensemble deep classifier for breast

cancer detection, utilizing mammogram and tomosynthesis images. In a related study, Muthulakshmi et al., (2023) e applied Pelican Optimization to an Extreme Learning Machine (ELM) model, improving heart failure prognosis using CMR images.

**4. Intelligent Transport and Real-Time Decision-Making** The development of intelligent transport systems has been greatly influenced by deep learning and optimization techniques. Nagappan et al. (2024) proposed a hybrid deep learning framework for context-aware service management, enhancing real-time decision-making in transport networks. Similarly, Hui and Chen, (2024) developed an IPOA-ELM model for predicting contact resistance volatility in pantograph-catenary systems, contributing to railway reliability.

**5. Object Detection and Computational Vision** The efficiency of object detection algorithms has been significantly improved through the integration of deep learning with heuristic optimization. Hingmire and Pujeri, (2024) implemented a Pelican-Based Deep Learning model for multiple object detection in trash images, demonstrating superior detection capabilities. Breesha and Vinsley (2024) developed a Dense Network-based classifier to distinguish arrhythmic from normal FECG signals, achieving high classification accuracy.

**6. Cloud Computing and Virtualization** Resource optimization in cloud computing has gained attention due to increasing computational demands. Rukmini and Soma, (2023) introduced an energy-efficient virtual machine migration approach using the Enhanced Pelican Remora Optimization algorithm, which significantly improved resource allocation efficiency in cloud centers. Singh et al. (2023) proposed a multi-objective scheduling model for DAG tasks on voltage frequency islands, effectively reducing power consumption.

**7. Petroleum Engineering and Enhanced Oil Recovery** In the field of petroleum engineering, Kushekov et al. (2024) conducted a case study on full-field polymer flooding at the Kalamkas Oilfield, discussing principles and challenges associated with enhanced oil recovery. Yadali Jamaloei et al. (2013) explored the impact of solvent type and injection sequence in the Enhanced Cyclic Solvent Process (ECSP) for thin heavy oil reservoirs, demonstrating variations in oil recovery efficiency based on different methodologies.

**8. Environmental and Biological Studies** Beyond engineering and computational intelligence, studies have explored biological and environmental factors affecting species behavior and energy management. Van Bragt et al. (2015) introduced the PELICAN self-management support intervention for asthma management in children, proving effective in goal-based treatment strategies. Kushekov et al. (2024) conducted a morphological analysis of Pelecaniform birds, highlighting the impact of forelimb skeletal variations on flight adaptations.

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Authors & Date	Title	Method	Findings
Mujeeb, S. (2024)	PAOFCDN: A novel method	Predictive Analysis	The proposed PAOFCDN
- ] / - /	for predictive analysis of solar	using PAOFCDN	method significantly
	irradiance	Model	improves solar irradiance
			forecasting accuracy
			compared to existing
			models.
Akinola et al.	Daily peak demand	Pelican Algorithm and	The POA-SVM approach
(2024)	forecasting using Pelican	SVM-based	enhances daily peak
	Algorithm optimised Support	Forecasting	demand forecasting
	Vector Machine (POA-SVM)	U U	accuracy, reducing
			prediction errors
			significantly.
Zuo et al. (2024)	Pelican Optimization	Hybrid Optimization	The modified Pelican
	Algorithm Combining	Algorithm	Optimization Algorithm
	Unscented Sigma Point	0	improves search efficiency
	Mutation and Cross Reversion		and convergence speed for
			complex optimization
			problems.
Rekha and Remesh	Novel MLI-based DVR and	ANFIS-controlled DVR	The proposed method
(2024)	DSTATCOM with ANFIS	and DSTATCOM	improves power quality by
	control for enhanced power		mitigating voltage sag and
	quality improvement		enhancing grid stability.
Nagappan et al.	Enhancing intelligent	Hybrid Deep Learning	The proposed model
(2024)	transport systems: A cutting-	Framework	enhances transport system
	edge framework for context-		efficiency by improving real-
	aware service management		time decision-making.
	with hybrid deep learning		
Zhou et al. (2024)	Optimizing MobileNetV2 for	Optimized	The enhanced MobileNetV2
	improved accuracy in early	MobileNetV2 with	model improves early
	gastric cancer detection	Pelican Optimization	cancer detection accuracy
	based on dynamic pelican		compared to traditional
	optimizer		models.
Bhujade et al.	Digital image noise removal	Image Processing for	The application of image
(2024)	towards soybean and cotton	Noise Removal	processing filters
	plant disease using image		significantly improves
	processing filters		disease detection accuracy
Duracha at al		Dense Natural	in plants.
Breesha et al.	Classification of Arrnythmic	Dense Network-	The model achieves high
(2024)	Signal Dasad on Encomple	based classification	accuracy in distinguishing
	Signal Based on Ensemble		
Kumar et al. (2024)	An Automated Proact Cancer	Heuristic-Based Doop	The automated system
Kumai et al. (2024)	Detection by Heuristic-Based	Learning Classifier	enhances early breast
	Ensemble Deen Classifier	Learning Classifier	cancer detection efficiency
	Lisenible Deep Classifier		cancel detection efficiency.
	Tomosynthesis Images		
Azeem et al. (2024)	An Enhanced Energy	Energy Management	The proposed mechanism
, ween et al. (2024)	Management and Security	and Security Model	ontimizes routing efficiency
	Mechanism for Efficient		and enhances network
	Routing in Wireless Sensor		security.
	Network		
Hingmire. and	Chasing Pelican Based Deep	Pelican-Based Deep	The model effectively
Pujeri (2024)	Learning for Multiple Object	Learning	detects multiple objects in

#### Comprehensive Literature Review Table

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	Detection from Single Input		single trash images with
	Trash Image		improved accuracy.
Hui et al. (2024)	Contact Resistance Volatility	IPOA-ELM Model for	The approach provides
	Prediction of Pantograph-	Prediction	high-accuracy predictions of
	Catenary Based on IPOA-ELM		contact resistance volatility
			in railway systems.
Habelalmateen et	Cluster Head Selection for	Wild Horse	The algorithm improves
al. (2024)	Single and Multiple Data Sinks	Optimization for WSN	cluster head selection
	in Heterogeneous WSN using		efficiency, extending
	Wild Horse Optimization		network lifetime.
Kushekov et al.	Full-Field Polymer Flooding	Case Study of	Highlights key challenges
(2024)	Project - Principles and	Polymer Flooding	and solutions in polymer
	Challenges at the Kalamkas		flooding for enhanced oil
	Oilfield		recovery.
Muthulakshmi et	Pelican Optimized Extreme	ELM-Based Prognosis	The proposed model
al. (2023)	Learning Machine Based	with Pelican	improves heart failure
	Prognosis of Heart Failure	Optimization	prognosis accuracy using
	Using Textural Patterns in		CMR images.
	CMR Images		
Rukmini and Soma,	Power Aware Energy Efficient	Virtual Machine	The approach optimizes
(2023)	Based Virtual Machine	Migration with	cloud resource allocation,
	Migration Using Enhanced	Pelican Remora	improving energy efficiency.
	Pelican Remora Optimization	Optimization	
	in Cloud Center		
Sanchit et al.	Multiobjective Approach to	Multiobjective	The model optimizes
(2023)	Schedule DAG Tasks on	Scheduling for DAG	scheduling efficiency,
	Voltage Frequency Islands	Tasks	reducing power
			consumption.
Van Bragt et al.	PELICAN: A Cluster-	Self-Management	The intervention improves
(2015)	Randomized Controlled Trial	Support Intervention	asthma management in
	in Dutch General Practices for		children through goal-based
	Asthma Management		strategies.
Yadali et al. (2013)	Impact of Solvent Type and	Experimental Study	Different solvents and
	Injection Sequence on	on ECSP	injection sequences impact
	Enhanced Cyclic Solvent		oil recovery efficiency.
	Process (ECSP) for Thin Heavy		
	Oil Reservoirs		
Simons et al.	Cross Sectional Geometry of	Morphological	Forelimb skeletal variations
(2011)	the Forelimb Skeleton and	Analysis of Birds	influence flight adaptations
	Flight Mode in Pelecaniform		in Pelecaniform birds.
	Birds		

#### Methodology

The string used for the Scopus database search was "Enhance Pelician Optimization Technique" using the PICO method. The Scopus database search generated 20 papers only related to the keywords used for the study. The datset generate were exported to excel CSV file via the analysis menu of the Scopus database. This shows the dearth of studies in this particular topic. The study also applied the use of Biblioshiny App and Rstudio together Excel, and Scopus analysis which stand to be a novel method in Bibliometric review studies. Similarly, Scispace, and Quilbot were used for literature review citation and paraphrasing respectively. All the above methos and tools have been used by various authors except the Scopus database analysis method (Varsha et al., 2021; Junhai et al., 2024; Abdullahi et al., 2024).

#### Analysis

From 2011 to 2024, the data shows only one document in 2011, 2013, and 2015, no documents at all from 2012, 2014, 2016 to 2022, then a modest rise to three documents in 2023 and a sharp jump to fourteen in 2024. This brings the total to twenty documents over the entire period. The pattern in Figure 1. suggests minimal early activity, a lengthy gap with no activity, and a recent surge in document creation.



Figure 1. Documents per Year

The data shows that IEEE Access leads with two documents, while each of the other journals and conference proceedings listed. Ranging from Biomedical Engineering Applications Basis and Communications to Simulation Modelling Practice and Theory, has one document apiece. In total, there are seventeen documents spread across sixteen different sources. These sources cover a wide range of disciplines, including engineering, computer science, energy, healthcare, and petroleum research, suggesting a diverse set of publication outlets for the work.



Figure 2. Source of the Document

#### Document by Author

The dataset from Scopus database attributes a single document to most of the 68 authors listed, with just one author **He Q.** contributing 2 documents. This distribution suggests a large number of individual contributors, each adding a unique document to the collection. The diversity of authors reflects various possible research areas across different fields, as indicated by the variation in author names. The evenly spread document count suggests that the compilation is broad reaching, involving many authors. All authors in the list are credited with exactly at least one document each, indicating a broad, collaborative body of work with no single dominant contributor. The names reflect a diverse range of backgrounds and specializations, suggesting that this set of publications brings together research from multiple disciplines and different regions of the world. Notably, Adebayo I.G and Akintola I.T from Africa, He Q., Sun Y. and Zhang D. from Asia. Hence Figure 3 below depicts the graphical representation of the percentage of documents per author.



Figure 3 Percentage of Documents Per Author.

#### Affiliations of the Authors and Documents

The bibliometric analysis of the provided affiliations and document contributions reveals interesting insights. A total of 47 institutions have contributed to the dataset, with The Islamic University, Najaf standing out as the highest contributor, having produced two documents, while all other institutions contributed one document each. The affiliations span a diverse range of academic, medical, and technical institutions from various parts of the world, including universities, engineering colleges, hospitals, and research centers. The presence of well-known institutions such as the Indian Institutes of Technology (IITs), University of Johannesburg, University of Calgary, and The Australian National University suggests a strong academic involvement in research. Additionally, the inclusion of hospitals like Dongtai Hospital of Traditional Chinese Medicine and Shanghai Ninth People's Hospital highlights contributions from the medical field. Engineering and technology-focused institutions such as Ladoke Akintola University of Technology, Veermata Jijabai Technological Institute, and Saveetha Engineering College indicate a significant presence of research in applied sciences and technological advancements.

Geographically, the dataset showcases contributions from institutions across multiple continents, including North America, Asia, Europe, and Africa. The presence of universities from India, China, Malaysia, Kazakhstan, and South Africa highlights the global nature of

research collaboration and publication. The contributions from multiple Indian institutions also suggest that India is a key player in this dataset. While no institution dominates the dataset significantly, the even distribution of contributions across multiple affiliations suggests a wide and diverse research landscape. The single-document contributions from most institutions could indicate that the research topics are spread across various fields rather than being concentrated within a specific area. This suggests a broad but fragmented research output rather than focused collaboration among institutions.

Overall, Figure the analysis highlights a diverse and global research effort spanning multiple disciplines, including engineering, medical sciences, and technology. The institutions involved represent a mixture of established research universities and emerging technical colleges, indicating a balanced contribution from both established and growing research communities.



Figure 4. Affiliations of the Authors

#### Using Bibliometric Analysis

The bibliometric analysis conducted using the Biblioshiny App provides key insights into the research landscape on the Pelician Optimization Techniques from 2011 to 2024. Over this period, 19 sources and 20 documents were identified, demonstrating a focused but evolving research area. The annual growth rate of 22.54% indicates a steady increase in interest and contributions to the field. A total of 73 authors contributed to these publications, with most working independently, as evidenced by the 20% co-authorship rate. The average of **3.7 co**-authors per document suggests moderate collaboration levels, which may indicate a mix of single-author and multi-author papers. The keyword analysis revealed 98 distinct keywords, highlighting the diversity of topics covered within the research field. This suggests that while the topic is focused, it spans multiple subfields, potentially integrating different methodologies and applications as shown in Figure 5 bellow.

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#### Main Information Dashboard

Timespan 2011:2024	Sources 19	20	Annual Growth Rate			
Authors 73	Authors of single-authored o	International Co-Authorship	Co-Authors per Doc 3.7			
Author's Keywords (DE)	References 0	Document Average Age	Average citations per doc 5.2			
Figure F. Main Informa	lion		212			
Network Density Table	<ul><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><li>•</li><l< td=""></l<></ul>					
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Figure 8. Co-occurrence Network of Keywords

#### Thematic Clusters

The thematic map analysis reveals that optimization algorithms form the core research focus, with optimization techniques closely linked as a fundamental theme. These areas are well-developed and widely connected, indicating their strong influence across various applications.

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Decision-making and multilevel structures act as supporting frameworks, potentially bridging different optimization techniques with practical implementations, such as AI-driven decision support systems or hierarchical optimization models. Meanwhile, energy efficiency and mean square error appear as emerging or niche areas, likely playing a supporting role in refining optimization strategies. The prominence of optimization algorithms suggests a mature and interdisciplinary field, while the presence of smaller clusters like energy efficiency indicates growing interest, possibly driven by sustainability concerns. Overall, the thematic structure highlights a strong focus on optimization methods, with decision-making and multilevel approaches enhancing applicability, and emerging themes like energy efficiency gradually gaining traction.

#### Findings

- Research Growth: The study identified a steady increase in publications, with a significant surge in 2024 (14 documents), reflecting growing interest in optimization techniques.
- Collaboration Patterns: The co-authorship rate of 20% and 3.7 co-authors per document indicate a moderate level of collaboration, suggesting a mix of individual and joint research efforts.
- Keyword Analysis: A total of 98 distinct keywords were identified, with optimization algorithms being the dominant theme, while energy efficiency, decision-making, and deep learning emerged as evolving research areas.
- Citation Impact: The average citation per document (5.2) signifies moderate academic engagement, while the document average age (2.8 years) suggests a contemporary and evolving research field.
- Institutional Contributions: Research output was widely distributed across 47 institutions, with The Islamic University, Najaf, contributing the most publications.

#### Conclusion

The bibliometric analysis underscores the growing significance of Pelican Optimization Techniques in computational intelligence and engineering applications. The research has gained momentum in recent years, with increased interdisciplinary applications in medical imaging, energy forecasting, intelligent transport systems, and wireless networks. The findings highlight both well-established research themes and emerging areas, emphasizing the evolving nature of optimization techniques. However, limited collaboration and fragmented institutional contributions suggest the need for more coordinated research efforts to advance the field further. Hence, this review highlights the extensive applications of heuristic optimization algorithms, deep learning frameworks, and computational intelligence in various domains. The Pelican Optimization Algorithm has emerged as a powerful tool for enhancing forecasting, medical diagnostics, transport systems, and cloud computing efficiency. Future research should focus on integrating these algorithms with realtime adaptive learning models to further improve their applicability in dynamic environments. The growing advancements in artificial intelligence and optimization techniques promise to revolutionize multiple industries, paving the way for more efficient, accurate, and sustainable technological solutions.

#### Contribution

This research makes both theoretical and contextual contributions to the field of optimization techniques. Theoretically, it advances the understanding of heuristic-based optimization by

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analysing the growth, impact, and application of the Pelican Optimization Algorithm (POA) across various domains, such as energy forecasting, medical diagnostics, wireless networks, and intelligent transport systems. By utilizing bibliometric analysis tools such as Biblioshiny, RStudio, and VOSviewer, this study provides a structured overview of research trends, thematic clusters, and collaboration networks, offering new insights into the evolving landscape of optimization methodologies. Contextually, this research is significant as it highlights the increasing adoption of POA in solving complex computational problems, particularly in areas where optimization plays a crucial role in enhancing efficiency and decision-making accuracy. The findings emphasize the emerging themes of energy efficiency, real-time decision-making, and deep learning integration, which have practical implications for industries and researchers. By mapping the intellectual structure and identifying gaps, this study not only contributes to the theoretical discourse on optimization algorithms but also informs future research directions, encouraging interdisciplinary applications and innovation in real-world problem-solving.

#### Recommendations

- 1. Encourage interdisciplinary collaboration among researchers in engineering, computer science, and healthcare to expand the applications of Pelican Optimization Techniques.
- 2. Enhance research impact by fostering more co-authored studies and partnerships between universities, industry, and research institutions.
- 3. Explore real-time adaptive models integrating Pelican Optimization Algorithms with deep learning and Al-driven decision-making for practical implementation.
- 4. Increase funding and policy support for optimization research, particularly in emerging areas like sustainable energy management, healthcare diagnostics, and smart infrastructure systems.

#### References

- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959-975.
- Abdullahi, O. A., Bahari, M., & Miskon, S. (2024). Social Media Addiction and Academic Performance: A Bibliometric Analysis Approach. 14(1). https://doi.org/10.6007/IJARBSS/v14-i1/20536
- Akinola, I. T., Sun, Y., Adebayo, I. G., & Wang, Z. (2024). Daily peak demand forecasting using Pelican Algorithm optimised Support Vector Machine (POA-SVM). *Energy Reports*, 12, 4438–4448. https://doi.org/10.1016/j.egyr.2024.10.017
- Azeem, M. A., & Khan, K.-U.-R. (2024). An Enhanced Energy Management and Security Mechanism for Efficient Routing in Wireless Sensor Network. In *Multifaceted Approaches for Data Acquisition Processing and Communication* (pp. 195–201). CRC Press. https://doi.org/10.1201/9781003470939-25
- Bhujade, V. G., Sambhe, V., & Banerjee, B. (2024). Digital image noise removal towards soybean and cotton plant disease using image processing filters. *Expert Systems with Applications*, 246. https://doi.org/10.1016/j.eswa.2023.123031
- Breesha, S. R., & Vinsley, S. S. (2024). Classification of Arrhythmic and Normal Rhythm FECG Signal Based on Ensemble Features and Dense Networks. *Journal of Circuits, Systems and Computers*, *33*(7). https://doi.org/10.1142/S0218126624501275

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- Donthu, N., Kumar, S., Pattnaik, D., & Lim, W. M. (2021). A decade of bibliometric research in marketing: Review and research agenda. *Journal of Business Research*, *125*, 488-507. https://doi.org/10.1016/j.jbusres.2020.04.043
- Habelalmateen, M. I., Kumar, G. R., Nayana, B. P., Venkatramulu, S., & Saranya, N. N. (2024).
  Cluster Head Selection for Single and Multiple data Sinks in Heterogeneous WSN using
  Wild Horse Optimization. 2nd International Conference on Integrated Circuits and
  Communication Systems, ICICACS 2024.
  https://doi.org/10.1109/ICICACS60521.2024.10498793
- Hingmire, A., & Pujeri, U. (2024). Chasing Pelican based Deep Learning for Multiple Object Detection from Single Input Trash Image. *Multimedia Tools and Applications*. https://doi.org/10.1007/s11042-024-19718-3
- Hui, L., & Chen, J. (2024). Contact Resistance Volatility Prediction of Pantograph-Catenary Based on IPOA-ELM. *IEE Access*, *12*, 79802–79814. https://doi.org/10.1109/ACCESS.2024.3409828
- Junhai, W., Ibrahim, O., & Abdullahi, O. A. (2024). Bibliometric Analysis of Chatbot and Ecommerce Research : Growth , Collaboration , and Key Trends (2017 – 2024). 14(12), 2504–2518. https://doi.org/10.6007/IJARBSS/v14-i12/23621
- Kumar, M., Chaitanya, D. E., Ganesh, L., & Sudha, T. S. (2024). An Automated Breast Cancer Detection By Heuristic-Based Ensemble Deep Classifier Using Mammogram And Tomosynthesis Images. *Biomedical Engineering - Applications, Basis and Communications, 36*(2). https://doi.org/10.4015/S1016237224500017
- Kushekov, R. M., Sagyndikov, M. S., Ispanbetov, T. I., Pourafshary, P., & Shyrakbayev, D. A. (2024). Full-Field Polymer Flooding Project Principles and Challenges at the Kalamkas Oilfield. *Proceedings SPE Symposium on Improved Oil Recovery, 2024-April.* https://doi.org/10.2118/218213-MS
- Mujeeb, S. (2024). PAOFCDN: A novel method for predictive analysis of solar irradiance. Journal of Atmospheric and Solar-Terrestrial Physics, 265. https://doi.org/10.1016/j.jastp.2024.106376
- Muthulakshmi, M., Ashwini, K., Jansi, R., Kiran, B. B. S. M., Greeshma, N., & Keerthi, P. (2023).
  Pelican optimized extreme learning machine based prognosis of heart failure using textural patterns in CMR images. *Proceedings of 2023 IEEE Technology and Engineering Management Conference Asia Pacific, TEMSCON-ASPAC 2023*. https://doi.org/10.1109/TEMSCON-ASPAC59527.2023.10531518
- Nagappan, G., Maheswari, K. G., & Siva, C. (2024). Enhancing intelligent transport systems: A cutting-edge framework for context-aware service management with hybrid deep learning. Simulation Modelling Practice and Theory, 135. https://doi.org/10.1016/j.simpat.2024.102979
- Rekha, & Remesh. (2024). Novel MLI-based DVR and DSTATCOM with ANFIS control for enhanced power quality improvement. *Electric Power Systems Research, 235*. https://doi.org/10.1016/j.epsr.2024.110838
- Rukmini, S., & Soma, S. (2023). Power Aware Energy Efficient based Virtual Machine MigrationUsing Enhanced Pelican Remora Optimization in Cloud Center. International Journal ofIntelligentEngineeringandSystems,16(6),886–895.https://doi.org/10.22266/ijies2023.1231.73
- Singh, N., & Singh, J. (2023). Multiobjective Approach to Schedule DAG Tasks on Voltage Frequency Islands. *IEE Access*, *11*, 37166–37177. https://doi.org/10.1109/ACCESS.2023.3266478

- Van Bragt, S., Van Den Bemt, L., Kievits, R., Merkus, P., Van Weel, C., & Schermer, T. (2015). PELICAN: A cluster-randomized controlled trial in Dutch general practices to assess a self-management support intervention based on individual goals for children with asthma. Journal of Asthma, 52(2), 211–219. https://doi.org/10.3109/02770903.2014.952439
- Varsha, P. S., Akter, S., Kumar, A., Gochhait, S., & Patagundi, B. (2021). The Impact of Artificial Intelligence on Branding: A Bibliometric Analysis (1982-2019). JOURNAL OF GLOBAL INFORMATION MANAGEMENT, 29(4), 221–246. https://doi.org/10.4018/JGIM.20210701.oa10
- Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3
- Yadali Jamaloei, B., Dong, M., Yang, P., Yang, D., & Mahinpey, N. (2013). Impact of solvent type and injection sequence on Enhanced Cyclic Solvent Process (ECSP) for thin heavy oil reservoirs. *Journal of Petroleum Science and Engineering*, 110, 169–183. https://doi.org/10.1016/j.petrol.2013.08.028
- Zuo, F., Zhang, D., He, Q., Ban, Y., & Shen, Q. (2024). Pelican Optimization Algorithm Combining Unscented sigma Point Mutation and Cross Reversion. *Journal of Frontiers of Computer Science and Technology*, 18(11), 2954–2968. https://doi.org/10.3778/j.issn.1673-9418.2308010
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization.OrganizationalResearchMethods,18(3),429-472.https://doi.org/10.1177/1094428114562629