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ORIGINAL

# Biblans: an application for managing, sharing, representing and interpreting article data for bibliometric studies

## Biblans: aplicación para gestionar, compartir, representar e interpretar los datos de artículos para estudios bibliométricos

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## ABSTRACT

**Introduction:** Bibliometric studies have gained popularity with the increase in scientific publications. However, there is no software that effectively manages all the data and allows its analysis, representation and interpretation.
**Objective:** to design an application to collect, share, represent and interpret article data in bibliometric studies.
**Method:** a technological development research was carried out in August 2024. The application was designed in Ubuntu 14.04 using Python 3.12, C++17 and MySQL. Pandas and MatPlotLib were used for data processing, FastAPI for the backend, and QtCreator for the interface. The application was converted into a Windows executable with auto-py-to-exe.
**Results:** the application created despite running completely offline requires an initial connection to load user and license data, and to enable the collaborative sharing mode of users affiliated to the projects. Its article part detection system with the Grobid artificial intelligence model coupled with the scraping system of GoogleScholar, Mendeley and others was a strong point in the creation of the project database. It allows data analysis using the speed potential of C++ and representation using the versatility of Python libraries.
**Conclusions:** the application is a useful tool for managing, sharing, representing and interpreting bibliometric data. It integrates powerful technologies such as Grobid, proving to be effective in its purpose.

**Keywords:** Bibliometrics; Software Design; Literature; Software; Technology.

## RESUMEN

**Introducción:** Los estudios bibliométricos han ganado popularidad con el aumento de publicaciones científicas. Sin embargo, no existe un software que gestione eficazmente todos los datos y permita su análisis, representación e interpretación.
**Objetivo:** diseñar una aplicación para recolectar, compartir, representar e interpretar datos de artículos en estudios bibliométricos.
**Método:** se realizó una investigación de desarrollo tecnológico en agosto de 2024. La aplicación se diseñó en

Ubuntu 14.04 utilizando Python 3.12, C++17 y MySQL. Se emplearon Pandas y MatPlotLib para el tratamiento de datos, FastAPI para el backend, y QtCreator para la interfaz. La aplicación se convirtió en un ejecutable de Windows con auto-py-to-exe.
**Resultados:** la aplicación creada a pesar de funcionar completamente offline requiere una conexión inicial para cargar los datos de usuario y licencia, y para habilitar el modo de intercambio colaborativo de usuarios afiliados a los proyectos. Su sistema de detección de partes del articulo con el modelo de Inteligencia artificial Grobid unido al sistema de scraping de GoogleScholar, Mendeley y otros fueron un punto fuerte en la creación de la base de datos del proyecto. Permite el análisis de datos usando las potencialidades de rapidez de C++ y la representación usando la versatilidad de las librerías de Python.
**Conclusiones:** la aplicación es una herramienta útil para gestionar, compartir, representar e interpretar datos bibliométricos. Integra tecnologías potentes como Grobid, demostrando ser eficaz en su propósito.

**Palabras clave:** Bibliometría; Diseño de Software; Literatura; Programas Informáticos; Tecnología.

## INTRODUCTION

Bibliometrics, a discipline that uses mathematical and statistical tools, has become a fundamental pillar in evaluating and categorizing scientific production. Analyzing publications, journals, and authors allows for the creation of a detailed map of science and its interconnections. The essence of bibliometrics lies in its ability to transform raw data into meaningful knowledge using bibliometric indices that quantify and qualify the impact and relevance of research.[1]

Historically, bibliometric analysis was carried out manually, a laborious and error-prone process. However, the digital revolution has radically transformed this discipline. The emergence of advanced computer tools integrated into scientific databases and specialized software has driven unprecedented evolution.[2] This transformation has democratized access to bibliometrics, allowing researchers from diverse areas to explore and understand the dynamics of science with greater depth and precision.

Currently, many applications are designed to assist researchers in their bibliometric projects. These tools range from collecting essential data, such as keywords, abstracts, and authors, to advanced data visualization through specialized graphing tools. However, despite this diversity of tools, a fundamental shortcoming persists: the absence of comprehensive software that allows data to be collected, interpreted, and visualized in a unified way. This fragmentation of the workflow forces researchers to use multiple applications, which generates inefficiencies and makes it difficult to carry out exhaustive bibliometric studies.

This leads to the need to create an application that integrates the functionalities of various bibliometric tools, allowing the comprehensive processing of data from scientific articles efficiently. This is the reason for the present research, which aims to design an application to collect, share, represent, and interpret data from articles in bibliometric studies.

## METHOD

Technological or applied development research was carried out between August 2023 and May 2024.

The software creation process was carried out in 4 major steps, with a view to guaranteeing the project's subsequent scalability and providing a solid foundation for its creation.

### Conceptualization, planning, and requirements gathering

An exhaustive bibliographic review was done using the automated search engine Google Scholar. The search terms used included bibliometric indicators, bibliometrics, scientometrics, computer applications, and other terms related to the subject of the review, both in Spanish and English.

Information was collected regarding other applications with similar purposes and the availability of open-access resources to be included in the application.

In this step, a list of all the future functionalities that would be attempted to be implemented was made.

### Selection of programming tools and software design

Python 3.12 was selected for the application creation, using Microsoft Visual Studio Code 1.60 as the code editor. To create the graphical interface, the external module PyQt6 and to work on the .ui files (extension of the Qt appearance files) with the software QtCreator 5.0.2(Community).

Some data was processed by command-line applications created with C++ due to its speed compared to Python. CodeBlocks 20.03 was used as the compiler in the cpp-17 standard.

FastAPI was used for the back, and the MariaDB database manager was used to store the SQL databases.

A Model-View-Controller software architecture model was chosen.

**Implementation**

It was done in three parts. First, the graphical interface was created, then the API, and then the desktop application was given functionality and its connection to the API via HTTPS protocol.

**Product testing and approval**

It was evaluated on a computer. Testing was done using pytest-qt on the graphical interface and using OpenAPI's FastAPI documentation system on the backend.

Similarly, it was tested on devices with different technical specifications to detect the existence of additional dependencies or other technical problems that could arise in them.

## RESULTS

The application was built taking into account that a bibliometric study project comprises several articles or entries, which are the object of analysis of the project.

An application was created for Windows systems with a user-friendly graphical interface that is easy to use and a predetermined dark colors design, as shown in figure 1.

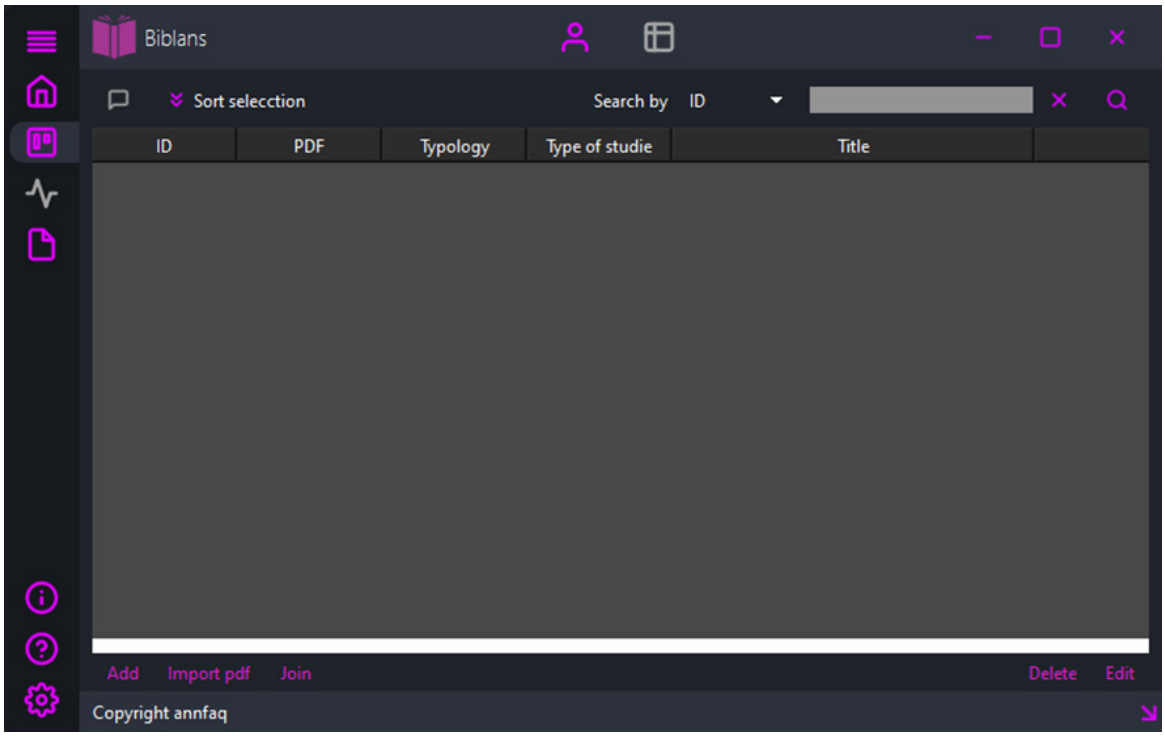


**Figure 1.** Blank project in BiblAnS

It has a title bar (upper) divided into three blocks:

1. Logo and title.
2. User and user projects (only enabled when the user is activated or registered)
3. General window control (minimize, maximize/restore, close)

A sidebar or menu bar is divided into two blocks:

1. Project control: (start, database, representation, project options)
2. Information/help and application settings

A property bar (bottom).

The central area is the workspace, where the project, graphics, and other configuration elements are displayed. In figure 1, we can see a blank project in the workspace, which has options for searching and filtering articles (top), adding articles (bottom left), and deleting or editing articles (bottom right).

Figure 2 shows the general options for the project file, along with their access keys or shortcuts.

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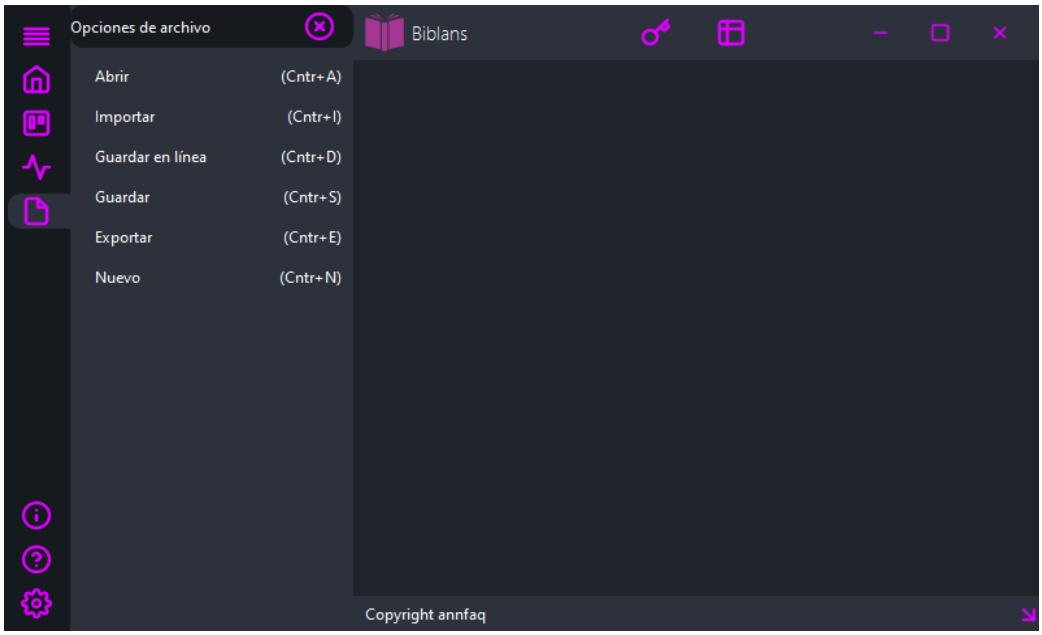


**Figure 2.** Project file options

The project articles can be added from a PDF, where the metadata will be extracted. The parts will be automatically recognized with Grobid or by manual entry, as shown in figure 3.

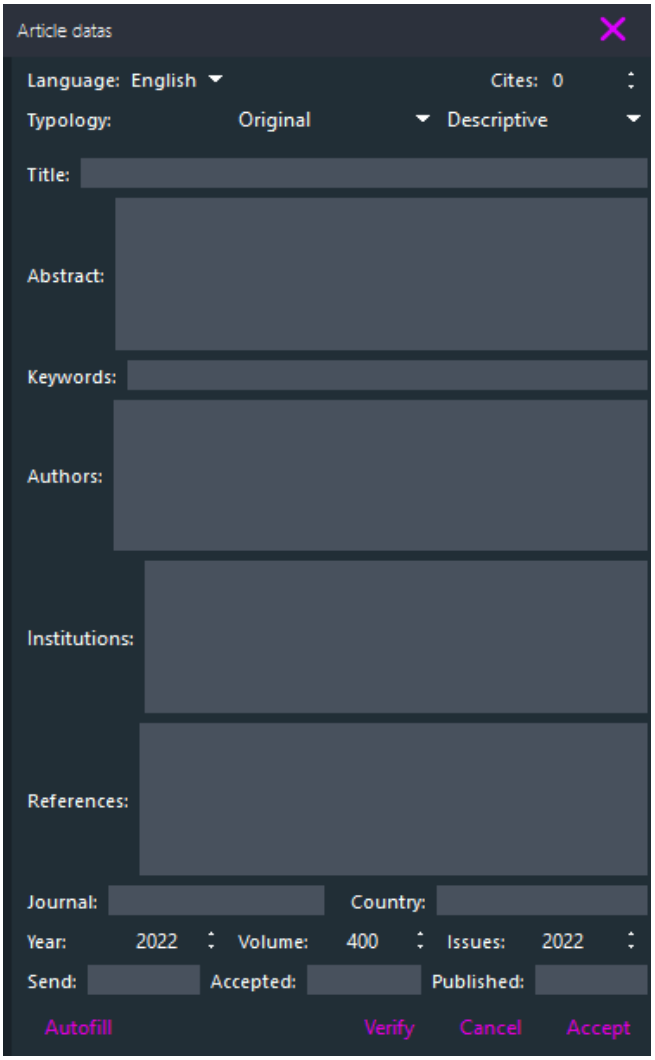


**Figure 3.** Manual entry of articles

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Manual entry has an auto-fill option based on the title. Once the title has been entered, the application will search for it in some databases and fill in the rest of the fields.

The application has an authentication and user registration system, as shown in figure 4. This enables users to collaborate on the same project and the system of licenses and privileges.

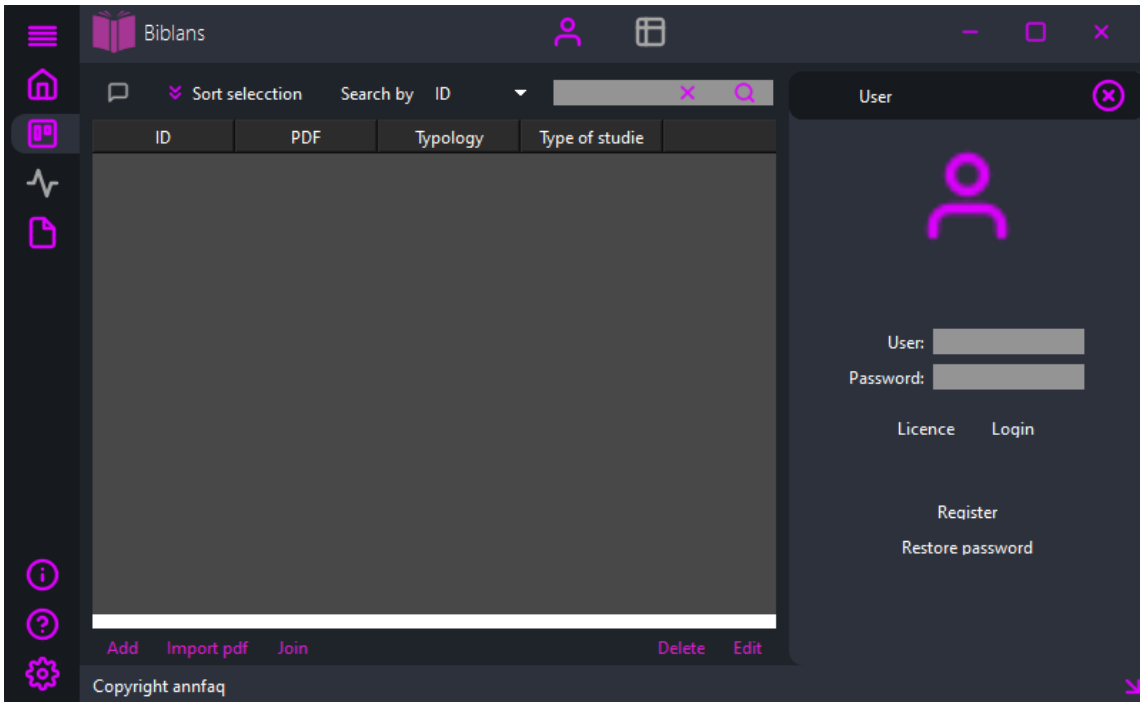


**Figure 4.** User tab

Once registered and connected to the internet, it is possible to access projects saved by the user, as well as those in which they are a member (figure 5).

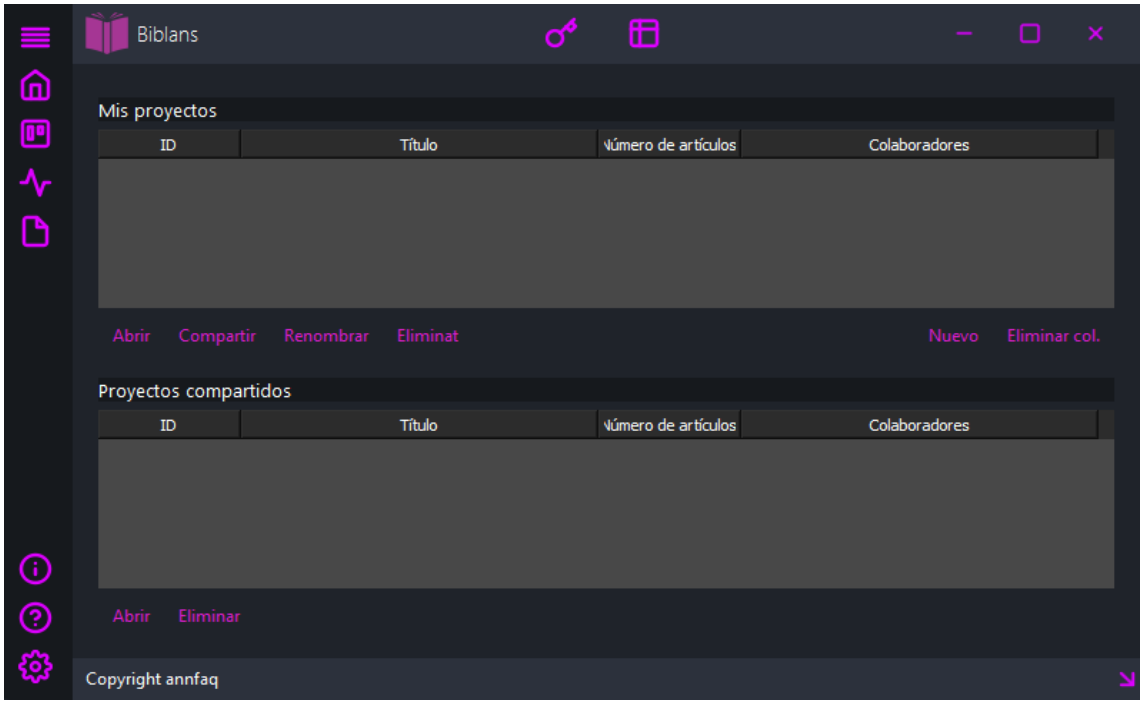


**Figure 5.** User projects

All projects have a chat, which is shared among collaborators. This can be seen in the upper left-hand corner of the project workspace.

Once the project items have been uploaded, the results can be analyzed in the data representation area

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(figure 6). Different types of representation of these results can be selected (text, tables, graphs, graphs, maps, and reports).


**Figure 6.** Data representation area

The application was tested on the Windows 11, Windows 10, Windows 8, and Windows 7 operating systems. With minimum computer specifications, Intel Pentium Silver 4Gb RAM 8 cores at 1,10 GHz. Requires a minimum disk space of 1Gb, without external dependencies.

## DISCUSSION

Currently, a wide range of applications are designed to facilitate bibliometric studies, ranging from data collection to advanced analysis and visualization.[2] many of these tools focus on specific areas, forcing researchers to use multiple platforms to complete a study. This workflow fragmentation can lead to inefficiencies and difficulties in data management. The developed application seeks to address this issue by integrating all these functionalities into a single unified platform, thus simplifying the research process and improving overall efficiency.

One of the main challenges when working with various bibliometric applications is the potential incompatibility between native file formats. This lack of interoperability can lead to the loss of information during format conversions. For example, converting PubMed files (.txt) to RIS format can remove abstracts, a crucial element for co-occurrence analysis.[3] The present application solves this problem by providing an integrated environment that minimizes the need for format conversions and guarantees data integrity throughout the research process.

The collection and organization of bibliographic information can be tedious and time-consuming tasks. Fortunately, tools like Grobid use artificial intelligence models to detect metadata in scientific articles automatically. Grobid has proven highly accurate in identifying elements such as authors, institutions, and titles. Biblans takes advantage of Grobid's capabilities through an external API, which allows us to offer efficient and accurate metadata extraction. However, taking into account the rapid progress of AI, the flexibility to incorporate more advanced models in the future, such as Meta-llama-3, as they become available, is maintained.[4]

The visual representation of data is essential for bibliometric analysis. With its popular Matplotlib library, Python offers a wide range of options for data visualization.[5] However, for creating graphs and maps, which are fundamental in bibliometric studies, it was decided to use Graph and Geopandas' specialized libraries. These libraries provide advanced functionalities for visualizing spatial and network data, allowing for more comprehensive and detailed visual representations.

Bibliometric research often involves collaboration between multiple researchers.[6] Scientific social networks and research groups play a crucial role in facilitating this collaboration, enabling the distribution of tasks and the exchange of knowledge.[7] Biblans incorporates advanced functionalities for creating and managing collaborative projects, as well as integrated communication tools. This makes it a specialized scientific social network, encouraging collaboration and exchanging ideas among researchers.

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The cost of accessing bibliometric applications and databases can be an obstacle for many researchers. Platforms such as Scopus and Web of Science and the APIs of Google Scholar and Mendeley often require subscriptions or payments for data access.[8,9,10,11,12] This application seeks to democratize access to bibliometric research by offering free resources and an affordable licensing system. While recognizing the value of more powerful databases and APIs, the application's primary focus is to provide an accessible and low-cost platform for researchers of all levels.

## CONCLUSIONS

A desktop application for Windows was created to aid in developing bibliometric research and facilitating data collection, representation, and analysis. It implements the best options of the applications currently used for these purposes, providing an integrated development environment. It enables the development of community projects through exchanging information among its members.

## BIBLIOGRAPHICAL REFERENCES

1. Manzo JC, Fabian F, González B, Carlos L, Barba O, Sergio F, et al. Bibliometría del Uso del Blockchain en la Economía Circular: Decisión Hacia la Sostenibilidad. Cienc Lat Rev Científica Multidiscip [Internet]. 2024 [citado 2 de marzo de 2025];8(5):9165-80. Disponible en: https://www.ciencialatina.org/index.php/cienciala/article/view/14304/20476

2. Almirón Cuentas JA, Bernedo-Moreira DH. Designing Spaces for Learning: The Role of Architecture in Education. Land and Architecture. 2023; 2:54. https://doi.org/10.56294/la202354

3. Iyelolu TV, Agu EE, Idemudia C, Ijomah TI. Driving SME innovation with AI solutions: overcoming adoption barriers and future growth opportunities. Int J Sci Technol Res Arch [Internet]. 2024 [citado 2 de marzo de 2025];7(1):036-54. Disponible en: https://shibata.yubetsu.com/article/3fjdqymC

4. Bukar UA, Sayeed MS, Razak SFA, Yogarayan S, Amodu OA, Mahmood RAR. A method for analyzing text using VOSviewer. MethodsX [Internet]. 2023 [citado 2 de marzo de 2025];11:102339. Disponible en: https://www.sciencedirect.com/science/article/pii/S2215016123003369

5. Ariza Devia A, Renteria Suaza M. Historical context of the agroecological transition process in the Buenos Aires property of the municipality of Florencia Caquetá. Enviromental Research and Ecotoxicity. 2023; 2:51. https://doi.org/10.56294/ere202351

6. Masalkhi M, Ong J, Waisberg E, Zaman N, Sarker P, Lee AG, et al. A side-by-side evaluation of Llama 2 by meta with ChatGPT and its application in ophthalmology. Eye 2024 3810 [Internet]. 2024 [citado 2 de marzo de 2025];38(10):1789-92. Disponible en: https://www.nature.com/articles/s41433-024-02972-y

7. Pahira Dongoran N, Cahyati Sitorus Pane A, Amalia Wardani S, William Iskandar Ps J V, Baru K, Percut Sei Tuan K, et al. Pemanfaatan MATLAB dalam Analisis Turunan Parsial : Visualisasi dan Implementasi Fungsi Multivariat. J Pengabdi Masy Sains dan Teknol [Internet]. 2024 [citado 2 de marzo de 2025];3(4):92-7. Disponible en: https://ftuncen.com/index.php/JPMSAINTEK/article/view/638

8. Arellano Molina M, Guillén Durán A, González García H. Evaluation of vermicompost leachate in the organic fertilization of the chili pepper cropEnviromental Research and Ecotoxicity. 2025; 4:154. https://doi.org/10.56294/ere2025154

9. 6. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. J Bus Res. 2021;133:285-96.

10. Prakash A, Khusru Akhtar A. A hybrid environmental multi-objective optimization algorithm for eco-friendly vehicle routing in smart citiesLand and Architecture. 2025; 4:151. https://doi.org/10.56294/la2025151

11. Thornhill-Miller B, Camarda A, Mercier M, Burkhardt JM, Morisseau T, Bourgeois-Bougrine S, et al. Creativity, Critical Thinking, Communication, and Collaboration: Assessment, Certification, and Promotion of 21st Century Skills for the Future of Work and Education. J Intell 2023, Vol 11, Page 54 [Internet]. 2023 [citado 2 de marzo de 2025];11(3):54. Disponible en: https://www.mdpi.com/2079-3200/11/3/54/htm

12. De Moraes LL, Kafure I. Bibliometrics and data Science: An example search and analysis of scientific

information from the Web of Science (WoS). Rev Digit Bibliotecon e Cienc da Inf [Internet]. 24 de julio de 2020 [citado 2 de marzo de 2025];18:e020016. Disponible en: https://www.scielo.br/j/rdbci/a/WkSBdJB9zNjc7zhx7CHqBcJ/?lang=en

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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