BIBLIOMETRIC ANALYSIS OF THE USE OF UAVS IN URBAN AREA CADASTRE

Authors:

Hatan Pinheiro Silva | Universidade Federal de Santa Catarina (UFSC) | hatanpinheiro@gmail.com

Everton da Silva | Universidade Federal de Santa Catarina (UFSC) | everton.silva@ufsc.br

Yasmim Rizzolli Fontana dos Santos | Universidade Federal de Santa Catarina (UFSC) | yasmimfontana.geo@gmail.com

Francisco Eduardo de Mello Franco Sá | Universidade Federal de Santa Catarina (UFSC) | franciscoeduardo.mfsa@gmail.com

Liane Ramos da Silva | Universidade Federal de Santa Catarina (UFSC) | liane.ramos@ufsc.br

INTRODUCTION

Land management faces challenges associated with urban growth and informal settlements, demanding agile and effective measures from decision-makers. Technological advancements related to the use of Unmanned Aerial Vehicle (UVA) bring new application possibilities that can be integrated into municipal organization.

The aim of this paper is to conduct a bibliometric analysis of the scientific production on the use of Unmanned Aerial Vehicles applied to the cadastre of urban areas, to identify its temporal evolution.

MATERIALS AND METHODS

Data analysis was structured along two main fronts: performance analysis and science mapping. To perform the analyses and generate graphical visualizations, the software VOSviewer and the Bibliometrix package in RStudio were used.

The Scopus database was selected as the primary source for collecting bibliographic data, the search was conducted in 2025, with a temporal cutoff defined until the year 2024.

MATERIALS AND METHODS

The search expression used was:

TITLE-ABS-KEY ((cadast* OR regist*) AND (urban)) AND (uav OR rpa)

The terms "UAV" and "RPA" were selected to represent the technology used for the cadastre. The terms "cadast" and "regist", using the asterisk "*", were used to include variations of words related to the theme (e.g., cadaster, cadastre, cadastral, register, registral), combined with the term "urban". The Boolean operators AND and OR were employed to refine and delimit the search results.

RESULTS

The results cover the period from 2004 to 2024, with an average annual growth rate of 16.71% (Fig. 01). Among these publications, there are 64 Conference Papers, 51 Articles, 21 Conference Reviews, 2 Book Chapters, 1 Editorial, and 1 Review. Publications are distributed across 16 different areas according to the Scopus classification (Fig. 02).
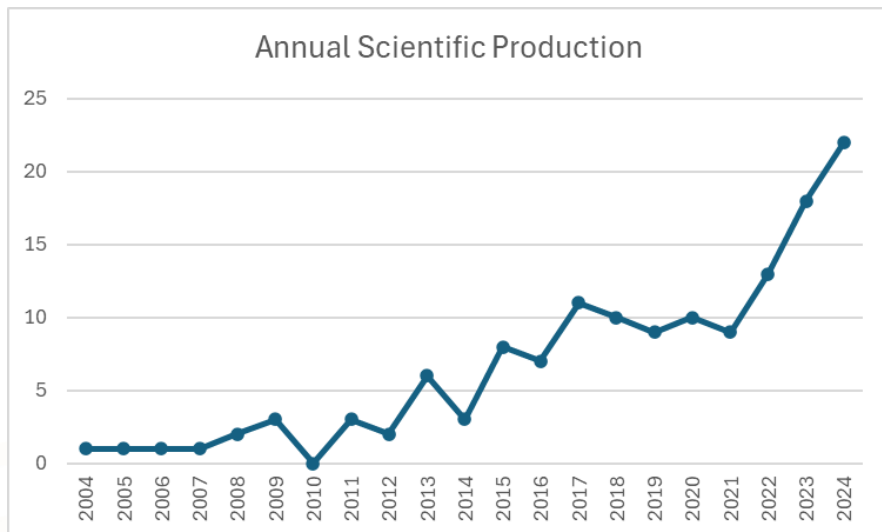

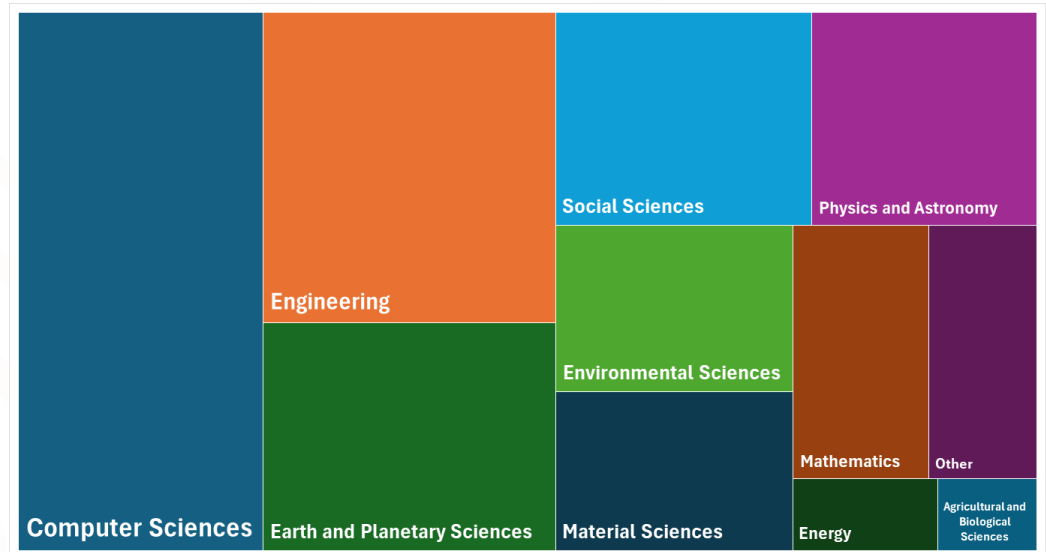Figure 01: Number of publications per year

Figure 02: Publications per area

RESULTS – Keywords map

The keyword map highlights the recurrence of some terms associated with 4 clusters. The term "unmanned aerial vehicles (UAV)" is the central term with 94 occurrences and is linked to all clusters. There are 45 words on the map with 5 occurrences or more. In this context, the terms "urban cadastre" or "urban registration" are not highlighted.
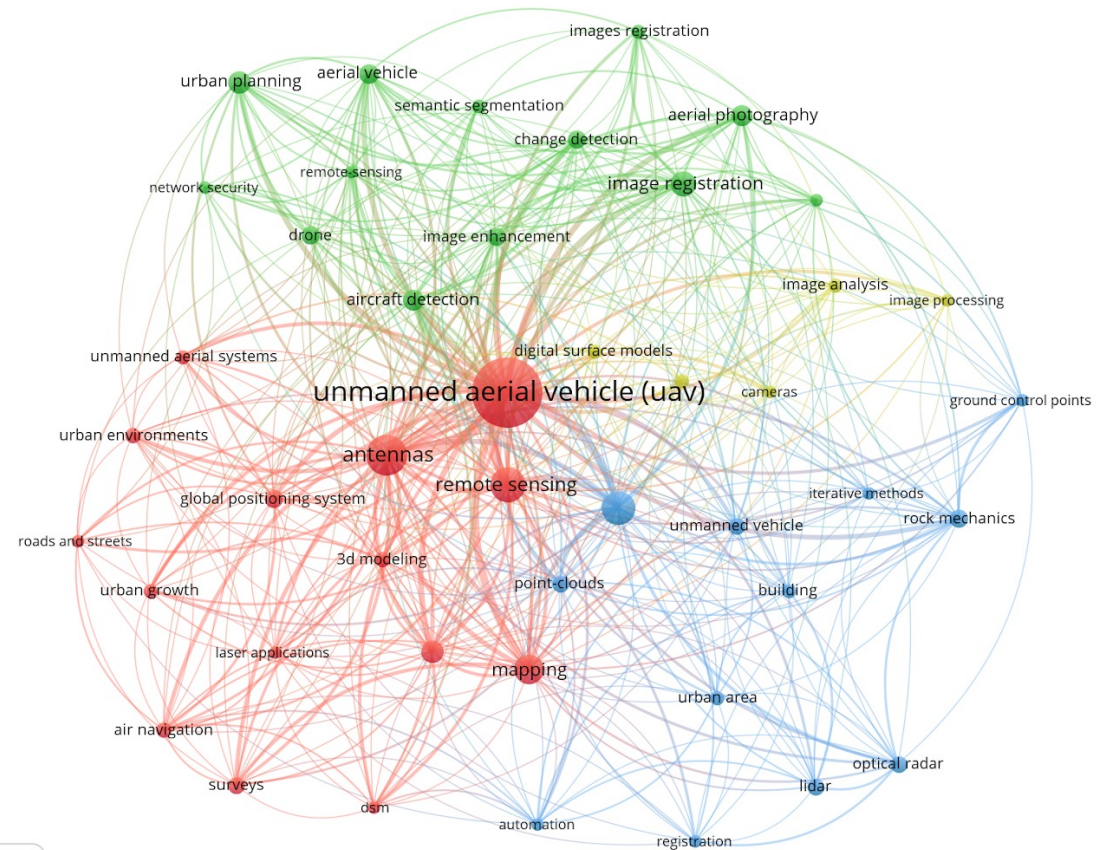

Figure 03: All keywords map

RESULTS – Qualitative analysis

Of the 140 publications, 22 emphasized cadastre, and their abstracts were reviewed. *Thirteen publications were most prominent regarding this theme*, and they are concentrated between 2016 and 2024. A brief qualitative analysis was carried out, highlighting these studies:

- Chandrarathne (2016)* is one of the first works aiming to compare cadastral surveys done with high-resolution UAV images and those done with a total station, produced in Sri Lanka;
- Koeva et al. (2017)** present a case study, mapping a large area of Sub-Saharan Africa with the objective of recognizing land rights using innovative geospatial technologies.

*Chandrarathne, G. W. (2016). Comparative study on Cadastral Surveying using Total Station and High Resolution UAV Image (HRUAVI). Diyatalawa: Institute of Surveying and Mapping.
**Koeva, M. et al. (2017). Towards innovative geospatial tools for fit-for-purpose land rights mapping. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLII-2/W7, 37–43.

CONCLUSION

- The publication period of the works reflects a timeframe coinciding with the popularization of low-cost UAVs, which increased access to this technology;
- The analysis of keywords and articles reveals a trend towards point cloud cadastre and the automation of processes through Artificial Intelligence and Machine Learning.

The UAVs have established themselves as tools for the modernization of territorial cadastres. Future directions point towards a more dynamic, three-dimensional, and automated cadastre, in which UAVs, integrated with other geospatial technologies, will play an important role in promoting efficient urban management.

ACKNOWLEDGMENTS

Universidade Federal de Santa Catarina - UFSC

Coordenação de Aperfeiçoamento de Pessoa de Nível Superior - CAPES

UNIVERSIDADE FEDERAL DE SANTA CATARINA

TUDelft

patrocinadores

execução

FEESC

GOTT

PPGTG UFSC

LabFSG

INCRA

MINISTÉRIO DA GESTÃO E DA INOVAÇÃO EM SERVIÇOS PÚBLICOS

GOVERNO DO BRASIL DO LADO DO POVO BRASILEIRO

mútua Caixa de Assistência dos Profissionais do Crea

PREFEITURA DE FLORIANÓPOLIS

esri

CNPq

Topocart

geopixel INTELIGÊNCIA MUNICIPAL

SINDUSCON GRANDE FLORIANÓPOLIS

MAPPER GIS INGENIERIA SAS

KASAY INGENIERÍA S.A.S. Soluciones Geolocalizadas

conexões para inovar