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October 2025

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Submissions

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Submission Summary

Conference Name

The 2nd International Symposium on Green Technologies and Applications

Paper ID

139

Paper Title

Comparative Evaluation of Spatial Indexing Methods Applied to the Georeferenced Characterization of Agricultural Units and Productivity in Peru during the year 2024

Abstract

The efficient analysis of large volumes of georeferenced data is essential for modern agro-statistical management. This study compares the efficiency of four spatial indexing methods—R-Tree, Quad-Tree, KD-Tree, and Grid—applied to the microdata of the National Agricultural Survey (ENA 2024) of Peru. Coordinates and productive variables (area, production, and losses) were integrated into a spatial database processed in R using the libraries (‘t’ t’ st), (‘t’ t’ terra), (‘t’ t’ spatstat), and (‘t’ t’ FNN).

The results show significant contrasts in performance: the Grid method achieved the lowest query times (4–6 ms) and greater stability in heterogeneous regions; KD-Tree was superior in neighborhood queries (100 QPS), while R-Tree excelled in complex geometries at the cost of higher memory consumption (61.8 MB). These findings confirm that partitioning structures offer substantial advantages for the dynamic analysis of large volumes of agricultural data, providing a replicable basis for the modernization of statistical systems and agrarian territorial management.

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Last Modified

19/10/2025, 23:18:31

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Submission Files

Evaluación Comparativa de Métodos de Indexación Espacial Aplicados a la Caracterización Georreferenciada .pdf (526.3 Kb, 19/10/2025, 23:17:17)

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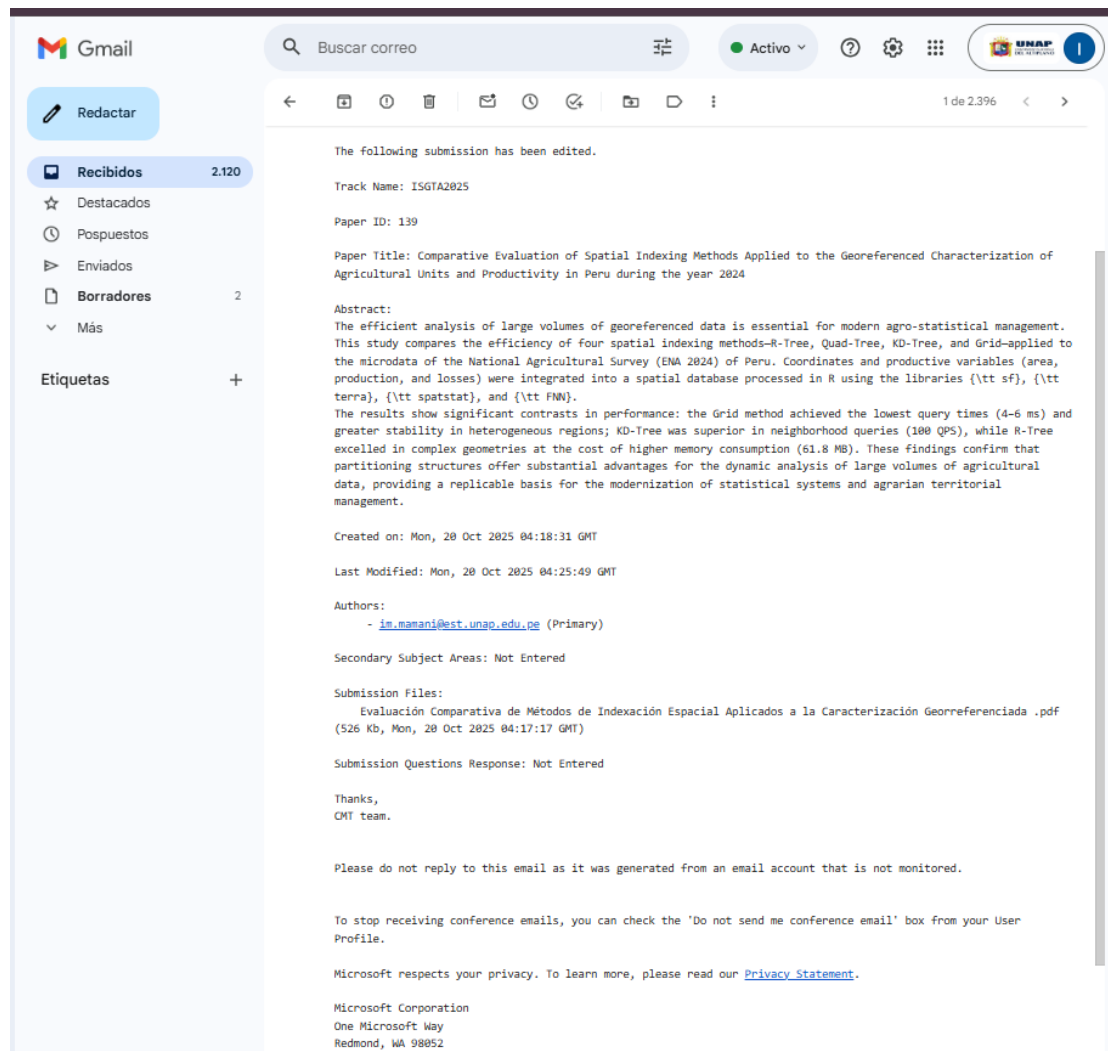


Figure 1: Enter Caption