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System for location and reservation of parking spaces in the city of Huancayo through a mobile application

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SYSTEM FOR LOCATION AND RESERVATION OF PARKING SPACES IN THE CITY OF HUANCAYO THROUGH A MOBILE APPLICATION

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Abstract. The study is based on developing a technological model based on Machine Learning (ML) through a mobile application for searching and reserving parking in real time. It begins by identifying the methodology for implementing the model from the user's perspective in relation to the parking service provided by the host. Then, a prototype of the technological model is created using the Figma prototype design tool. Statistical tests are designed to evaluate the technological model using python code to demonstrate the results, with indicators such as "Parking search time" and "User satisfaction" from 42 users. Data on these indicators were collected before and after the implementation of the technological model. The results show a significant difference in search times and user satisfaction between the technological model and the traditional method of searching for parking. It is concluded that the technological model offers advantages in reducing search time and improving user experience, which simplifies urban life and helps mitigate traffic congestion problems. Promoting development through innovation and the adoption of emerging technologies in the search for parking, with an improvement in urban mobility and in the quality of life of citizens.

1. Introduction

According to the National Institute of Statistics and Informatics (INEI), the results of the Census in Peru, at the national level during the year 2007 amounted to approximately 28 million inhabitants located in urban areas, and for the year 2017 a population growth was perceived to a total of 31 million [1], based on this information it is clear that the population density of urban areas in Peru is continuously increasing, this mainly due to the urbanization process experienced in the country, according to statistics from the World Bank, 79% of the Peruvian territory is urban area [2], however it is necessary to highlight that this phenomenon has been a concern for the sustainability and quality of life of Peruvians [3] since it has caused problems such as increased pollution, environmental degradation, lack of access to basic services and urban congestion [4], the latter is of utmost importance for this research.

Traffic in Peru is one of the most worrying problems, for example, Lima is the second city with the highest traffic in the world, costing S/2 billion in productivity losses for each Peruvian [5], this is due to different factors, including the prolonged search for parking spaces, according to studies, 40% of vehicle jams happen for this reason in urbanized cities [6], also according to the INEI, vehicle traffic in Peru increases an average of 1.9% annually [7], this increase in the demand for vehicles causes the most used parking spaces to become saturated, in the face of this a traditional approach would propose adding more parking spaces, however there are other more functional solutions such as the fact of the predictions of available parking spaces through machine learning (ML) [8], by the latter it is understood as the capacity that IT systems present to recognize patterns based on algorithms and to be able to subsequently execute the desired tasks [9], this implies that the problem in question can be addressed from a technological approach in conjunction with capabilities, such as ML, to perform the tasks of searching for available parking spaces in real time and informing the driver of this [10], also for easy and convenient access, the driver can access the parking space service through a mobile application, in this way, there would be significant improvements such as the use of inactive or non-recurring parking lots, reduction of vehicular congestion and a higher quality of life for Peruvians.

Huancayo is a city that has become increasingly urban, and with demand for vehicles, therefore, for a better management of available parking spaces, it is necessary to effectively integrate a technology solution that shows the user the parking spaces according to the direction they are going, in addition to being able to carry out payment operations for the parking service directly, in this way the client is given a comprehensive and efficient solution to alleviate to some extent the problems of vehicular congestion in Peru. For this, the present research proposes an innovative approach, with the capacity to implement advanced technologies and real-time data analysis, to improve the management of existing parking lots in the city of Huancayo by optimizing the availability of spaces,