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A Web-based Rabies Data Analytics Dashboard: Forecasting the Trends of Dog and Human Rabies Cases with Vaccine Cost-Optimization

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Abstract

This study introduced a rabies data analytics dashboard module for the Davao City Veterinarian's Office. The dashboard aims to enhance rabies management, leveraging predictive analysis and data visualization for canine and human rabies prevalence, vaccination requirements, and a translatable rabies control recommendation system for local government units. The development of the dashboard covers the software development life cycle, including the requirements and design phase, modules for forecasting rabies cases, and vaccination needs. The system utilizes Laravel, Python, and MySQL, with mathematical models including Long Short-Term Memory, a human rabies model, and goal programming, and underwent usability tests for its effectiveness. The rabies analytics dashboard incorporated key elements such as a landing page, user manual, forecasting table, recommendation tab, and rabies trends and forecasts. The dashboard was built using Laravel and Bootstrap for a user-friendly interface. Power BI generated visual reports for actual and forecasted rabies data. Models like LSTM for dog rabies predictions, a human rabies model for human rabies prediction, and a goal programming model for estimating vaccination needs were integrated using Python and SQL, enhancing automation and accurate trend analysis. User testing, involving members from both the Davao CVO and RabDash DC, produced a System Usability Scale (SUS) score of 77.92 out of 100, indicating a high level of usability and user satisfaction. The positive feedback underscores the dashboard's effectiveness in managing rabies cases and informing vaccination efforts. It is recommended to make the prediction of dog and human rabies cases at the barangay level to help the Davao CVO make location-specific decisions in controlling rabies cases, or the researcher can also concentrate the predictions on the barangays with the greatest number of rabies cases historically.