Shield Overview Summary
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Shield is a tracking application that leverages AI, machine learning, and species distribution modeling to predict and prevent zoonotic disease outbreaks. It uses satellite imagery, ecological data, and wildlife tracking to provide real-time risk maps, helping public health officials, researchers, and policymakers take preventive action. The rise of zoonotic diseases due to climate change, deforestation, and globalization underscores the urgency of this system.

Purpose & Goals

Shield aims to predict and mitigate zoonotic disease outbreaks caused by human-animal interactions, mainly due to deforestation and climate change. It alerts epidemiologists and policymakers about high-risk zones, enhancing preparedness and response. The system will create, help manage, and minimize zoonotic risks.

Scope of Work

Shield collects data from satellite imagery, wildlife tracking, and epidemiological sources, integrating AI to predict and warn users about disease spillovers, primarily focusing in Brazil due to high rates of deforestation and data.

Requirements

This system has various functional requirements, such as real-time data collection, spillover risk assessment, a way to update the AI model, and export reports. These requirements will allow for a trustworthy system that can be used in research and government.

The non-functional requirements of this product include language support for English, Spanish, and Portuguese. This product also calls for responsive pages, quick alert delivery, and a large data storage capacity.

Design Goals

Shield is aimed to be available for North and South America, with language support in English, Spanish, and Portuguese. The product will be designed with the key goals of accuracy, responsiveness, ease of use, scalability, security, and clear visuals. This will allow for a solid foundation for a well-made product.

Current System Design

The main components of our system design include a data collection module, an AI risk analysis engine, a GIS risk mapping interface, an alert and notifications system, a user portal, and a report generator. The data collection module will get data from various APIs that other components will use. The AI risk analysis engine will process the data using trained machine learning models to calculate the risk of zoonotic spillover. The GIS risk mapping interface will visualize high-risk areas. The alert and notification system will send automated alerts to users when the risk reaches a certain threshold. The user portal will give users the option to view maps, download reports, and manage alerts. The report generator will compile data into downloadable reports.

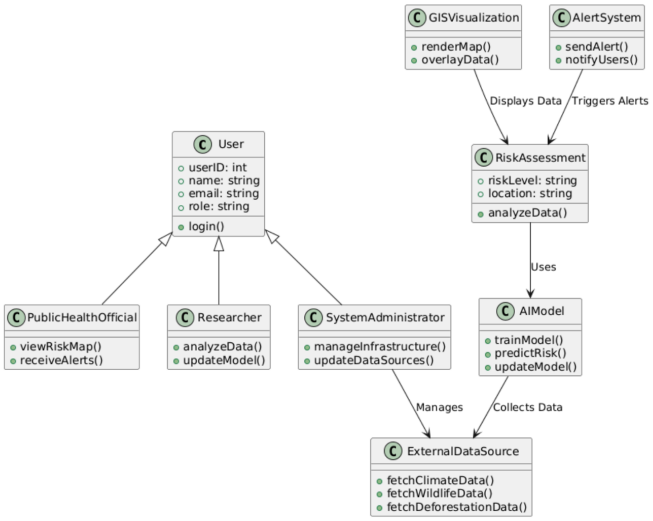
Issues

This product will introduce a variety of problems that vary heavily. For example, there will be an immediate effect on jobs due to the efficiency and effectiveness of the product. Veterinarians and public health officials will be in jeopardy since, if the product works as it is meant to, diseases will be caught earlier, which will lead to fewer animals needing to be treated. Additionally, fewer health officials will be needed to keep an eye on things since our product will be making alerts in emergency situations. If the product were to be adopted, it would also have the potential to give out false positives. A false positive would result in wasted energy and, additionally, lead to real alerts being ignored. There is also the problem that comes with machine learning and using powerful GPUs and server rooms to train models from data.

One of the expected environments for our product includes forests, specifically the Amazon Rainforest. Our product requires a constant internet connection, which is not readily available in a dense forest area. 10% of known species and plants are in the Amazon Rainforest, which is a very important place that a user would want to access our product.

Design Diagrams

UML Diagram



Use Case Diagram