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PREDICTIVE ANALYTICS IN DISASTER RISK MANAGEMENT: INTEGRATING SATELLITE IMAGERY AND AI FOR ENHANCED TPA INSURANCE SOLUTIONS

Abstract

Integrating aerospace technology into disaster risk management represents a paradigm shift for Third-Party Administrators (TPAs) in the insurance industry, transitioning from traditional claims processing to proactive risk prediction and mitigation. This strategy leverages the latest advancements in satellite imagery and AI analytics, enabling a highly accurate, predictive approach to natural disaster management.

Satellite technology has evolved to provide earth observations with unprecedented resolution and frequency, offering sub-meter imagery on a daily basis. When combined with advanced AI and machine learning algorithms, such as the combination of Random Forest, Extreme Gradient Boosting, and K Nearest Neighbor models utilized in the study of Bangladesh's flood susceptibility, an accuracy rate of 86.7% in predicting flood-prone areas was achieved. This methodology exemplifies the potential of aerospace technologies to revolutionize predictive capabilities in disaster management, particularly for flood, wildfire, and hurricane predictions—critical for regions like Mexico with high susceptibility to these disasters.

The proposal calls for a consortium comprising TPAs, satellite data providers, and AI technology firms, dedicated to developing and refining predictive models for natural disasters. This collaboration aims to integrate real-time data analytics into TPA operations, allowing for the dynamic adjustment of insurance products in response to emerging risks. Such advancements not only optimize premium structures but also significantly reduce potential claims expenses.

Moreover, this initiative offers clients actionable intelligence for disaster preparedness, minimizing the impact of catastrophic events on insured assets. Implementing IoT sensors in conjunction with satellite data enhances model accuracy, providing essential ground truth that further refines predictive analytics.

Advocating for technological innovation in risk management, this approach not only enhances TPAs' operational efficiency but also plays a crucial role in fostering more resilient communities in the face of climate change and the increasing frequency of natural disasters. This abstract proposes a forward-thinking framework that positions TPAs as leaders in leveraging aerospace technology for comprehensive risk management, marking a significant contribution to the field and society.