ECOCHAIN: HARNESSING DATA SCIENCE TO MINIMIZE CARBON FOOTPRINT IN SUPPLY CHAINS

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ABSTRACT

This study introduces a sophisticated ***data-driven*** system tailored for optimizing carbon emissions within industrial operations, with a specific emphasis on supply chain management. Leveraging ***advanced machine learning methodologies—*** namely ***decision trees and random forests***—the system meticulously evaluates CO2 equivalent (CO2e) contributions originating from various production components. Key functionalities encompass ***meticulous data pre-processing*** to calculate precise CO2e values, ***robust assessment of feature importance*** to pinpoint pivotal contributors, and the ***formulation of actionable recommendations.***

The adopted machine learning algorithms offer distinct advantages***: decision trees*** excel in elucidating complex relationships among production variables, while ***random forests*** enhance predictive accuracy by aggregating multiple decision trees**.** These attributes enable the system to deliver nuanced insights into carbon emissions dynamics within supply chains.

Recommendations stemming from the analysis advocate for ***strategic measures,*** thereby empowering organizations in the supply chain domain, this system aims to foster substantial ***reductions in environmental impact*** while ***bolstering operational resilience*** and ***adherence to sustainability goals.***