PROJECT MEMO

Predictive Modelling and Visual Risk Intelligence Dashboard for River Plastic Waste (2015–2060)

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Overview

River plastic pollution is a threatening occurence for the world, that needs to be solved. In this project we are going to delve into a synthetic but realistic dataset, which simulates plastic waste generation, management. and river leakage risks across 3,000 river systems globally for the years 2015 and 2060. It includes variables such as population, GDP per capita, urbanization rates, waste generation, mismanagement rates, and plastic pollution entering rivers. The dataset is designed to support risk modeling, sustainability assessments, and policy scenario simulations for global river plastic pollution. It will be performed an exploratory data analysis with machine learning and deep learning applications, and a dashboard with Power BI will be built. (Source:Kaggle)

Goals

- **Analysis of historical plastic waste trends in rivers globally (2015).**
- **Prediction of the future risk of plastic waste in rivers (by 2060) using Machine Learning and Deep Learning models.**
- **Identification of high-risk countries and suggest targeted policy interventions.**
- **Developing an interactive dashboard (Tableau/Power BI) for stakeholders to visualize risk trends and predictions.**

Source: Oeson

Key Findings

1. **Historical Analysis (2015):**
    - **Nigeria, Brazil, India, China and USA are top 5 countries with most waste.**
    - **According to the correlation matrices, there is a relationship between risk index, urbanization and waste management.**
    - **Certain regions in Asia and Africa exhibited disproportionally high mismanaged plastic waste relative to river population density.**

2. **Predictive Modelling (2060 Projections):**
    - **There is in 2015 not so elaborated level of plastic in the rivers, while the risk increases in 2060.**
    - **Countries and rivers with high risk were identified. Bangladesh has an emerging threat of river plastic pollution, while Nigeria, India, Brazil and China maintain their current course of ranking in the world.**
    - **Linear Regression, Random Forest Regression and MLP Regression was introduced with ca. 90% accuracy.**

3. **Dashboard Insights (Power BI):**
    - **Comparative charts of 2015 and 2060 based on countries.**
    - **Comparison of plastic levels in 2015 and 2060 in rivers in total.**
    - **As the urbanization increase, the amount of plastic in the rivers also rise, as shown in the analysis.**

Insights and Recommendations

1. **Taking action upon the current situation and taking initiative on waste management and generating environment friendly urbanization plawns as the urbanization increases the amount of waste plastic waste in the rivers. Taking local and internationally collaborative action is specifically important for the countries with high population and population density like India and Bangladesh.**
2. **As the pollution in rivers continuously rise, the policies and the risk index change. Adapting those situations and shaping the urbanization alongside with politics to a greener one would be an important way to the solution for decreasing the pollution and taking precautions.**
3. **Assuming the GDP per capita as an indicator of development at a country, the countries with the highest GDP per capita also show high rates of urbanization and indicators of pollution risk. Therefore it should be taken in consideration, that the policies should be made according to the financial data of the country.**

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Conclusions