**Predicting and Clustering Urban Waste Generation: A Key to Sustainable Waste Management**

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The growing populations and consumption patterns in cities worldwide are increasing urban waste generation, posing a significant challenge for sustainable city planning and environmental management. The goal of this project is to leverage machine learning techniques to forecast the quantity of waste generated by urban areas, and categorize urban areas based on waste generation patterns.

The project directly aligns with several United Nations Sustainable Development Goals (SDGs), contributing to global efforts for a more sustainable and resilient future. These SDGs include:

1. SDG 11: Sustainable Cities and Communities:

By optimizing waste management strategies, the project supports the creation of more sustainable and resilient urban environments (Target 11.6).

1. SDG 15: Life on Land:

The project aids in reducing the environmental impact on land by promoting sustainable waste management practices, mitigating the negative effects of waste on ecosystems and biodiversity (Targets 15.3 and 15.9).

Several studies predicted and clustered the waste generation in urban cities using Machine Learning (ML) techniques. For example, Guleryuz (2020) explored the use of clustering algorithms in evaluating waste generation and management strategies in Istanbul. Meza et. al (2019) proposed an analysis of three different ML techniques to forecast the generation of urban solid waste in the city of Bogota in Colombia. He used Decision trees, Support vector machines, and Artificial Neural Networks.

The datasets will be extracted from Guleryuz’s article. The waste generated by 39 districts of Istanbul in the year 2019. The variable include the domestic waste amount, population, municipal budget, medical waste amount and mechanical sweeping area. (*Note: I am searching for alternative datasets.*)

Linear Regression and K-Mean Clustering Analysis, alongside the deep learning algorithm Artificial Neural Networks, are strategically chosen for the project. Linear Regression provides simplicity with satisfactory results, suitable for predicting numerical outcomes. Artificial Neural Networks, a deep learning algorithm, has been included to handle the inherent complexity of urban waste generation datasets. The results obtained from the regression analysis and Artificial Neural Networks will be systematically compared to provide a comprehensive assessment. K-Mean Clustering identifies hidden structures, contributing insights for effective waste management. This comprehensive approach aligns with the project's goal of achieving sustainable waste management practices in urban areas.