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Title: Machine Learning for Assessing Soil Liquefaction Risk in Seismic Zones

1. **Project Idea:**

The project aims to utilize machine learning techniques to classify whether soil will be affected by liquefaction after an earthquake.

2. **Relevance to Sustainable Development Goals (SDGs):**

Liquefaction, a process in which soil loses its strength and behaves like a liquid, is a secondary effect of earthquake shaking. It can cause structural settlement, sinking, or floating, posing a significant threat to people's lives and causing substantial financial losses. Given the damage to infrastructure caused by liquefaction, which threatens lives and causes economic losses, it is imperative to conduct more research to mitigate its disastrous consequences.

This project is directly relevant to SDG 11 (Sustainable Cities and Communities) as it contributes to creating safer and more resilient urban environments. By utilizing machine learning techniques to predict soil liquefaction susceptibility after earthquakes, this research aims to mitigate the risks associated with liquefaction, thus contributing to disaster risk reduction and creating more sustainable and resilient cities and communities.

3. Literature Examples:

[1] M. Ahmad, X. W. Tang, J. N. Qiu, F. Ahmad, and W. J. Gu, "Application of machine learning algorithms for the evaluation of seismic soil liquefaction potential," *Front. Struct. Civ. Eng.*, vol. 15, no. 2, pp. 490–505, 2021. https://doi.org/10.1007/s11709-020-0669-5

[2] A. M. Hanna, D. Ural, and G. Saygili, "Neural network model for liquefaction potential in soil deposits using Turkey and Taiwan earthquake data," *Soil Dyn. Earthq. Eng.*, vol. 27, no. 6, pp. 521–540, 2007. https://doi.org/10.1016/j.soildyn.2006.11.001

4. Describe Your Data:

The data for this project will be sourced from literature and consist of CSV files containing seismic data, soil composition data, and historical liquefaction occurrence data. These CSV files will be obtained from relevant research papers and geological surveys. The data will require preprocessing steps, including data cleaning and feature engineering, to prepare it for machine learning analysis.

5. Approach (Machine Learning or Deep Learning):

For this project, classification algorithms and artificial neural networks (ANNs) will be implemented to predict whether the soil is susceptible to liquefaction. Utilizing both traditional machine learning algorithms and deep learning models will allow for a comprehensive analysis of the data and a comparison of the performance of different techniques.