

# Turkey's Earthquakes: Damage Prediction and Feature Significance Using a Multivariate Analysis

By: Alex Lin

Dear esteemed judges,

I am honored to have received the 2025 Professional Engineers of the California Government James E. Roberts Award for my submission to the 75th Annual Los Angeles County Science Fair. The discussions and connections that I have made through this project have opened my eyes to the possible contributions to the ever-developing world of engineering.

Accurate damage prediction is crucial for disaster preparedness and response strategies, particularly given the frequent earthquakes in Turkey. Utilizing datasets on earthquake data, infrastructural quality metrics, and contemporary socioeconomic factors, we tested various machine-learning architectures to forecast death tolls and fatalities per affected population. Our findings indicate that the Random Forest model provides the most reliable predictions. The model highlights earthquake magnitude and building stability as the primary determinants of damage. This research contributes to the reduction of fatalities in future seismic events in Turkey.

Thank you so much for your recognition of my work. Receiving this award has inspired me to continue to pursue innovative approaches, with the goals of solving and enhancing the applications of engineering around the world.

-Alex Lin, Walnut High School