

What are the precautions that can be taken before, during or after the earthquakes with the help of the AI in Turkey?

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1. ABSTRACT

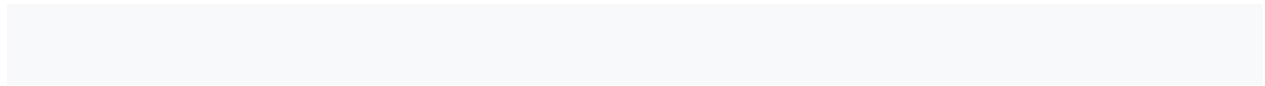
During the past hundred years the world has experienced many catastrophic earthquakes. These earthquakes have been in developed and developing countries and they have impacted urban as well as rural communities.

A devastating earthquake of 7.8 on the Richter scale hit Southern Turkey in the early hours of 6 February, with its epicenter in the Pazarcık district of Kahramanmaraş province. The earthquake affected the neighboring provinces of Adıyaman, Hatay, Kahramanmaraş, Kilis, Osmaniye, Gaziantep, Malatya, Şanlıurfa, Diyarbakır, Elazığ and Adana where about 14 million people reside including about 1,8 million Syrian refugees. A second major earthquake hit the region after 9 hours with 7.5 magnitude causing further severe damage and destruction of damaged buildings.

Aftershocks continue after the Kahramanmaraş earthquakes. On 20 February, a 6.4 earthquake in Hatay, the epicenter of which was in Defne district, and a 5.6 magnitude earthquake centered in Malatya on 27 February also caused the collapse of many damaged buildings and adding to the death toll.

According to the latest statement of AFAD (Disaster and Emergency Management Presidency), 45,089 people lost their lives. 115,000 people were injured.

Could these losses have been prevented or reduced using artificial intelligence? In this research, we will discuss about this topic.



2. Introduction

Earthquake is a natural disaster caused by the movement of tectonic plates of earth due to the release of its substantial internal energy. A major earthquake with a magnitude greater than five can inflict massive death tolls and huge infrastructural damages costing billions of dollars. However, if the occurrences of an earthquake can be predicted, the magnitude of destruction can be minimized.

The advancement of technology in recent times has brought about a new level of precision in predicting natural disasters, including earthquakes.

AI, in particular, has shown to be a powerful tool in mitigating the impacts of earthquakes. With its ability to process and analyze vast amounts of data in real-time, AI can help detect potential earthquake hazards and provide crucial information to decision makers.

3. Materials and Methods

3.1 Predictive Analytics

One of the primary ways that AI can help reduce earthquake damage is through the use of predictive analytics. Predictive analytics involves analyzing data to identify patterns and make predictions about future events.

In the case of earthquakes, predictive analytics can be used to analyze historical seismic data, geological data, and other relevant information to predict the probability and intensity of an earthquake in a given area. This information can then be used to inform decisions about building codes, evacuation plans, and emergency response.

3.2 Early Warning

One of the most significant contributions of AI to earthquake prevention is in the development of early warning systems. These systems use advanced algorithms to process seismic data and provide early warning alerts to communities in the event of an impending earthquake. For example, in Mexico, a public early warning system known as the Mexican Seismic Alert System uses AI algorithms to detect and analyze seismic activity, providing real-time warnings to the public. The system has been successful in providing warnings to the population, helping reduce the death toll and economic damage caused by earthquakes.

3.3 After-Earthquake Analysis

Another way AI can reduce earthquake damage is through the use of drones and other unmanned aerial vehicles (UAVs). Drones equipped with high-resolution cameras and other sensors can be used to quickly assess damage to buildings and infrastructure in the aftermath of an earthquake. This information can be used to prioritize rescue and recovery efforts and ensure resources are directed to areas of greatest need.

Artificial intelligence algorithms can also be used to analyze satellite images to determine which areas of the city were damaged by the earthquake. This information can be used to direct emergency response teams to areas that require immediate attention, such as collapsed buildings and other high-risk areas.

3.4 Simulations

In addition to earthquake prediction and response, AI can also be used to simulate earthquakes and test the effectiveness of different earthquake preparedness and response strategies. Simulations can be used to test the effectiveness of evacuation plans, emergency response protocols, and building codes.

4. Discussion

Which methods can be used in Turkey?

4.1 Before Earthquake

They can use predictive analytics in Turkey but geoscientists are already warned the government against earthquakes so the matter is if government take actions or not. They can prevent casualties by building strong, earthquake resistant structures and use AI for simulations by using different magnitudes of earthquakes.

4.2 During Earthquake

In Japan, since most of the earthquakes are at the sea, there is enough time to take action after an earthquake. The earthquake happens at the sea, AI warns the city and they can take action before earthquake hits the city. But in Turkey, earthquakes happen directly below the ground so this method won't work in Turkey so they need new methods. For example, there could be a new system similar to airbags in cars. If AI detects the shock is above the calculated safe limit, there could be a system that similar to how airbags working and this can decrease the impact of the debris between the collapsed floors in every buildings and this can prevent deaths from crushing under the debris.

4.3 After Earthquake

They can use photogrammetry and remote sensing for damage assessment analysis after an earthquake. With unmanned aerial vehicles and satellites, they can take action more efficiently.

5. Conclusion

AI has shown to be a powerful tool in preventing earthquakes. With its ability to process and analyze vast amounts of data in real-time, AI can help detect potential earthquake hazards, provide early warning signals, and assist in disaster response planning. The use of AI in earthquake prevention has the potential to save lives and reduce economic damage.. As technology continues to advance, we can expect to see further innovations in the use of AI in earthquake prevention. Turkey needs to use this new technologies to prevent damages from the future earthquakes.

6. References

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