NPSC5000 (Assessment Task 2)

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Topic: The use of artificial intelligence in predicting and mitigating natural disasters.
Article: "Applications of artificial intelligence for disaster management" (Sun et al., 2020)

Introduction

Natural hazards can massively impact and bring about significant socioeconomic losses that can devastate any society (Hoeppe 2016). Such challenges are faced by response management, which requires state-of-the-art technology to find solutions and mitigate potential losses. Data is growing exponentially with improvements in information communication technologies such as social media and remote sensing (Eguchi et al. 2008; Boccardoand Tonolo 2014). This can be used by artificial intelligence as it can process vast volumes of data at a time to find practical and reliable information that can aid in decision-making for prevention, preparedness, response, and recovery from any expected natural hazard. (Velev et al., 2018). The paper thoroughly analyzes the most recent research on using AI in disaster management, including successful applications and the drawbacks of existing AI technology. It also sheds light on the challenges of implementing AI in this field. This includes ethical and privacy concerns during the collection and processing of data that can be resolved to allow humans to make the most out of AI applications during natural hazards.

Analysis:

The article comprises various claims, but the majority are set under the umbrella claim that AI can contribute to every stage of the disaster management cycle, which may involve prevention, preparedness, response, and recovery from natural hazards.

In order to provide evidence to back this claim, they have divided the life cycle of natural hazards into 4 phases and respectively given evidence from the viewpoint of AI. The first one is prevention which AI can analyze through satellite imagery to spot potential danger in any area. An example was given through how the snow avalanche predictions were made using logistic regression (LR) from satellite data (Gauthier et al., 2017). Other uses of machine learning algorithms were mentioned in applying Landsat imagery to detect and map forest fires and landslides. As a warrant, the authors discussed how AI could give early warnings and help authorities take proactive measures to minimize the impacts of destruction.

The second phase is called "preparedness," in which a thorough discussion shows how predictive analytics and real-time situational awareness systems can be used to forecast any unforeseen events comprising imminent hurricane trajectories and storms (Ghosh and Krishnamurti, 2018). Their warrant is the availability of real-time data, including social media, news articles, and other data sources that AI processes to find valuable insights.

Thirdly, the response to any hazard can also be linked to AI for improved efficiency and effective management. For this phase, a timely decision can be the difference between life and death; hence, supervised models and deep learning algorithms are applied. The evidence includes using computer vision methods called live maps to generate and present disaster-affected areas using real-time data (Lucieer et al. 2014). Their warrant is the contrasts made with pre-event and post-event maps, which could allow prioritizing efforts for the response.

The last phase of recovery requires multiple stakeholders, including the government, to assess the damage and make decisions for rehabilitation and reconstruction. This can be done using

established regression associations between economic indicators and spatial differences in light intensity. The warrant shows how this will give important information about how the economy recovers quantitatively by comparing nighttime light data at various times using supervised models to find possible ways to stimulate economic growth.

Conclusion

In conclusion, this article has thoroughly discussed a total of 26 AI technologies in 17 application areas through which the management in a disaster situation can be improved. The paper has elaborated that most AI methods focus more on the post-event than the pre-event which helps society to recover quickly. However, with further study and application, AI can be used in the initial phases of the hazard life cycle to predict these events earlier to avoid massive losses. The authors also show concern about depending too much on AI, as there may always be data discrepancies that can question its results' accuracy and reliability. There may also be ethical and privacy issues during the collection and use of data. The untouched aspect of AI is to make it cost-effective and more potent so that more sources of information can be incorporated to produce highly dependable results.

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