AI at the Frontlines

Balancing Risk and Resilience in AI-driven Disaster Response

The Alan Turing Institute

About

This case study was developed by The Alan Turing Institute in collaboration with the Foreign Commonwealth and Development Office, and was created to support 'The risks and opportunities of AI on humanitarian action' event held at Wilton Park (May 2024).

The case study discusses a hypothetical example of the use of AI in a specific humanitarian action, and is designed to support deliberation of key socio-technical risks and harms.

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Licensing Information

Download this case study and others on the Turing Commons GitHub repository: https://github.com/alan-turing-institute/turing-commons

Wilton Park

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Overview

A large global humanitarian organisation is exploring the use of AI to support their partner disaster response agencies. This AI system is expected to improve their response to disasters such as cyclones, and wildfires by optimising resource allocation across a range of sectors including, health, shelter, water, sanitation, hygiene and camp management, and by this support decision-making in emergency situations. The goal is to make the organisation's and its partner agencies' more agile in their efforts to mitigate the effects of disasters, and to enhance their ability to protect lives and property.

Project Description

The AI system adoption comes in the increased risk of climate change and natural hazards in the regions that they operate particularly of cyclones and wildfires. Disaster response planning has relied on historical data and human expertise, but it was identified that a more dynamic way of understanding data and employing analysis was needed to address the growing scale and frequency of disaster events. So, the global humanitarian organisation conceived this project as a partnership with a consortium of national disaster response agencies, universities, and tech organisations to develop an AI system that can assist in enhancing decision-making immediately post-disaster and in the short term response. The system will analyse historic impact information and real-time data from multiple sources, such as weather forecasts, satellite imagery and social media feeds.

The AI system will be used to optimise resource allocation during emergencies. By analysing data on available personnel, equipment, and supplies, the system can recommend the most efficient deployment of resources to areas in need. In doing so, real-time insights and recommendations will be provided to emergency managers, helping them make informed decisions quickly in high-pressure situations. To ensure the AI system remains effective and reliable the organisation's team also engages with local communities to understand their needs and concerns during and post disaster response.

Key Issues

- **Generalisability of the tool to work across different contexts**
- **Interpretability and explainability of decisions to support community and expert participation**
- **Bias, data integrity, consistency and representativeness across disaster types and geographies**
- **Data protection and governance across multiple different data sources**

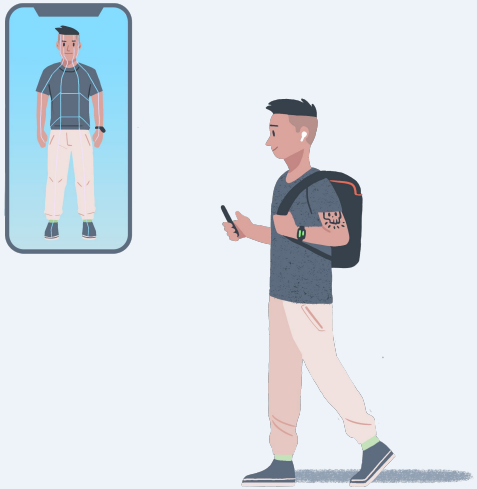
Deliberative prompts

1. **What kind of risks and harms do you think the adoption, development and use of the AI system surfaces?**
2. **How could humanitarian principles be embedded and how does this affect policy priorities like locally led action and accountability for affected populations?**
3. **What assurances and mitigations would be necessary to ensure the AI system is fairly used and who are responsible for these?**
4. **What relationships are key for this to be delivered safely and successfully?**

Technology Description

The AI system being developed will use a combination of machine learning techniques, with an emphasis on deep learning. It is designed to process and analyse data from several sources, including vulnerability data, mobile phone data, remote sensing satellites, weather observations and emergency responder reports, to help create a comprehensive picture of the situation on the ground. Alongside real-time inputs, the system will also utilise historical data from past disasters, and their required relief efforts, to optimise its outputs.

Alongside this the AI system will also perform network data analysis made in real-time, supporting decision-making in the allocation of medical supplies and personnel, including transportation to and from affected areas, number of trained personnel required to treat injuries, and the allocation of emergency supplies such as medications, search and rescue equipment, and communication devices. To ensure the AI system can handle the large amounts of data required for real-time decision-making, the consortium will use cloud computing infrastructure.



Datasheet

Category	Details
Available Data	• Weather forecasts, geospatial and satellite data • Social media feeds and other online alert and crowdsourced response data • Logistics inventories and other partner provided data on resource availability • Transportation, road condition and mobilisation plans • Vulnerability data, e.g. population & demographic data, poverty rates, housing density, location of key infrastructure

Groups, Organisations and Affected Individuals

1. **Vulnerable groups such as crises affected and/or displaced populations**
2. **Government entities including disaster risk management authorities, emergency responders and civil defence and military**
3. **The humanitarian organisations and partners (donors, local partners, tech experts)**
4. **Civil society/community-based organisations**