Joint Legislative Committee on Emergency Management
Senate Committee on Governmental Organization
Assembly Committee on Emergency Management

Joint Informational Hearing

How California is Leveraging AI for Effective Emergency Preparedness and Response

Monday, August 5, 2024
1021 O Street, Room 1100
2:30pm or Upon Adjournment of the Assembly and Senate Floor Sessions

AGENDA

Opening Comments

- Assemblymember Freddie Rodriguez, Chair, Assembly Committee on Emergency Management
- Senator Bill Dodd, Chair, Senate Committee on Governmental Organization
- Senator Monique Limón, Vice Chair, Joint Committee on Emergency Management

Panel One: Perspectives on the use of AI in emergency management and disaster response

- Kelly Hubbard, Director, Office of Emergency Management, Santa Barbara County
- Michael Crews, Chief Information Officer, California Governor's Office of Emergency Services (Cal OES)
- Phillip SeLegue, Staff Chief of Intelligence, California Department of Forestry and Fire Protection (CAL FIRE)

Panel Two: Current efforts to integrate AI in emergency response and disaster mitigation

- Dr. Bistra Dilkina, Co-Director, Center for AI in Society, University of Southern California
- Brian D'Agostino, Vice President of Wildfire & Climate Science, San Diego Gas & Electric
- Ahmad Wani, Chief Executive Officer, One Concern
- Reymund Dumlao, Director, State & Local Government and Education Cloud Sales – West Region, Google Cloud

Introduction:

California faces complex and severe disaster conditions due to its unique geography and fluctuating weather patterns, exacerbated by climate change. With recent dramatic advances in the capabilities of artificial intelligence (AI) systems, today's hearing will focus on the extent to which AI can improve California's disaster planning, response, and mitigation activities enabling more effective and efficient decision-making, saving lives and property. As a global leader in AI - boasting 35 of the world's top 50 AI companies - California is in a unique position to leverage that advantage to better prepare for and respond to emergencies. Much of the discussion will center around the capacity for public agencies in the emergency management sector to leverage AI or adopt AI-based technologies to further their missions while helping first responders and communities anticipate, efficiently respond to, and quickly recover from disasters.

Artificial Intelligence:

Artificial Intelligence is generally referred to as computerized systems that work and react in ways commonly thought to require intelligence—and encompasses a range of technologies, methodologies, and application areas, such as deep learning, natural language processing, facial recognition, and robotics. The concept of AI has existed for decades, the term first being coined in the 1950s, followed by alternating periods of much development and lulls in activity and progress known as AI winters and summers. The early 2020s have produced significant advancements, capturing the attention of the globe.

The Legislature is currently considering a number of bills regarding AI which define the technology as "an engineered or machine-based system that varies in its level of autonomy and that can, for explicit or implicit objectives, infer from the input it receives how to generate outputs that can influence physical or virtual environments."

A notable area of recent advancement includes generative AI (GenAI), which refers to machine learning (ML) models developed through training on large volumes of data in order to generate novel content. Technological advancements in the underlying models since 2017, combined with the open availability of these tools to the public in late 2022, have led to widespread use.

The underlying models for GenAI tools have been described as "general-purpose AI," meaning they can be adapted to a wide range of downstream tasks. Such advancements, and the wide variety of applications for AI technologies, have renewed debates over appropriate uses and guardrails, including in the areas of health care, education, and national security.

AI technologies, including GenAI tools, have many potential benefits, such as accelerating and providing insights into data processing, augmenting human decision making, and optimizing performance for complex systems and tasks. GenAI tools, for example, are increasingly capable

of performing a broad range of tasks, such as text analysis, image generation, and speech recognition.

However, AI systems may perpetuate or amplify biases in the datasets on which they are trained; may not yet be able to fully explain their decision making; and often depend on such vast amounts of data and other resources that they are not widely accessible for research, development, and commercialization beyond a handful of technology companies.

Federal Laws and Pending Legislation:

Numerous federal laws on AI have been enacted over the past few Congresses, either as standalone legislation or as AI focused provisions in broader acts. These include the expansive National Artificial Intelligence Initiative Act of 2020 (Division E of P.L. 116-283), which included the establishment of an American AI Initiative and direction for AI research, development, and evaluation activities at federal science agencies.

Additional acts have directed certain agencies to undertake activities to guide AI programs and policies across the federal government (e.g., the AI in Government Act of 2020, P.L. 116-260; and the Advancing American AI Act, Subtitle B of P.L. 117-263). In the 117th Congress, at least 75 bills were introduced that either focused on AI and ML or had AI/ML-focused provisions. Six of those were enacted.

In the 118th Congress, over 40 bills have been introduced that either focus on AI/ML or contain AI/ML-focused provisions, and none have been enacted. Collectively, bills in the 118th Congress address a range of topics, including federal government oversight of AI; training for federal employees; disclosure of AI use; export controls; use specific prohibitions; and support for the use of AI in particular sectors, such as cybersecurity, weather modeling, wildfire detection, precision agriculture, and airport safety.

President Biden's Executive Order 14110: Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence:

Executive Order 14110 tasks the Department of Homeland Security (DHS) with the following critical responsibilities:

- Manage AI in critical infrastructure and cyberspace;
- Promote the adoption of AI safety standards globally;
- Reduce the potential risk of AI's use to facilitate weapons of mass destruction attacks;
- Combat AI-related intellectual property theft; and,
- Ensure the nation attracts talent to develop responsible AI in the United States.

Governor Newsom's Executive Order N-12-23:

Last year, Governor Newsom signed Executive Order N-12-23, addressing the potential benefits and harms faced by the government as it pertains to generative AI. Item number two of the order addresses emergency management specifically:

"No later than **March 2024**, the California Cybersecurity Integration Center and the California State Threat Assessment Center, both established within the Governor's Office of Emergency Services, and inclusive of the California Department of Technology, the California Military Department, and the California Highway Patrol, shall perform a joint **risk analysis of potential threats to and vulnerabilities of California's critical energy infrastructure by the use of GenAI, including those which could lead to mass casualty events and environmental emergencies**, and develop, in consultation with external experts as appropriate from civil society, academia, and industry, **a strategy to assess similar potential threats to other critical infrastructure**. Once this analysis is completed, these agencies shall provide a classified briefing to the Governor and, where appropriate and without divulging classified information, make public recommendations for further administrative actions and/or collaboration with the Legislature to guard against these potential threats and vulnerabilities. These recommendations shall address how to ensure systems are regularly tested and monitored to detect and avoid unintended behavior, and how to ensure they remain under effective human control. At a cadence deemed appropriate by the Governor's Office of Emergency Services, the analysis and public recommendations should be updated to reflect changes to the technology, its applications, and risk management processes and learnings."

That report has been drafted, and the internal briefing for the Governor is currently being prepared. The publicly available portions of the report will follow soon after.

Additionally, the executive order tasks state agencies with partnering with private technology companies to come up with GenAI tools for public services. In spring of this year, California became one of the first states to roll out guidelines on when and how state agencies could buy such tools. The state is currently partnering with a handful of companies to create GenAI tools using technologies developed by tech giants such as Microsoft-backed OpenAI and Google- and Amazon-backed Anthropic that would ultimately help the state provide better services to the public.

The full text of the EO is available here.

Existing Uses of AI in Emergency Management

State Uses:

ALERT System of Cameras for Wildfire Detection

A collaboration between CAL FIRE and UC San Diego, the ALERTCalifornia program, provides state-of-the-art technology that supports data-driven decisions to prepare for, respond to, and recover from natural disasters, particularly wildfires.

ALERTCalifornia utilizes AI along with high-resolution cameras, for instance, to improve wildfire detection. The program now has 1,807 high-resolution cameras that provide continuous, 360 degree monitoring allowing AI to alert emergency services of potential fires, sometimes before 911 calls are made. Data from these cameras help mitigate the impact of wildfires on people and property and bolster research into how to best prepare and respond to wildfire threats, both before, during and after serious burn events.

The project also provides the public real-time footage of active incidents on the fire.ca.gov/Incidents page. In addition to cameras, the program collects important data to aid in both immediate firefighting efforts and longer-term environmental research, utilizing tools like Light Detection and Ranging (LiDAR) for detailed data gathering.

The project was recently recognized by Time Magazine as one of the "Best Inventions of 2023." Early detection is the most valuable benefit of the AI tool, but the data gathered for the project is also helping decision-makers at all stages of fire response

Link in drive to CalFire one-pager

CAL FIRE's Office of Wildfire Technology Research and Development

The Office of Wildfire Technology Research and Development serves as the central organizing hub for the state government's identification of emerging wildfire technologies. The office's goal is to drive meaningful advancements and tap innovation from the public and private sectors. The office is focused on driving innovation and in constant search of the best and most effective technologies available in the ongoing battle against wildfire.

Specifically, AI can improve wildfire suppression by detecting fires early, as discussed above, predicting their occurrence, guiding firefighting efforts, and aiding in post-fire analysis and restoration. AI can analyze satellite imagery, weather and environmental data, and provide real-time mapping and tracking of a fire's progress. In addition, AI-powered drones can survey the area and offer information to firefighters on the ground.

California State Threat Assessment Center

The State Assessment Center (STAC) serves as California's information sharing clearinghouse of strategic threat analysis and situational awareness reporting to statewide leadership and the public safety community in support of efforts to prevent, prepare for, mitigate and response to all crimes and all hazards impacting California citizens and critical infrastructure, while preserving civil liberties, individual privacy, and constitutional rights.

The STAC is California's primary fusion center, as designated by the Governor, and is operated by the California Highway Patrol (CHP), Cal OES, and the California Department of Justice (DOJ). The STAC was opened as a direct result of the events of 9/11 with the goal of helping to fix issues with information sharing across the nation, and serves as the state-level partner to regional and urban fusion centers in Sacrament, San Francisco, Los Angeles, Orange County, and San Diego which are locally organized and directed.

City of Los Angeles

The City of Los Angeles is currently working with researchers at the University of Southern California Center for AI in Society to optimize the placement of seismic-resilient pipes so that, in the event of an earthquake, water can continue to be provided to critical customers, such as hospitals and evacuation centers, and always within reach of a fire hydrant for firefighting efforts. In addition, the researchers are looking at how cities can make strategic and targeted investments efficiently and effectively in order to maximize the disaster resiliency of key transportation infrastructure, such as roads, if flooding were to reduce connectivity and access. Their efforts seek to optimize resource allocation and network design while minimizing the number of potentially isolated people, reducing evacuation or response times, improving robustness and efficiency of path routing, and ensuring no region goes unserved.

San Diego Gas & Electric (SDG&E)

SDG&E is the first utility in the country to develop a dedicated Fire Science & Climate Adaptation Department. The Department generates weather predictions twice a day, a seven-day fire potential index product, and fuel data specific to the local environment. SDG&E collaborates with the San Diego Supercomputer Center's WIFIRE Lab at the University of California San Diego campus to enable open use of this data, with appropriate policy and access restrictions in place. As a part of this effort, students and AI researchers in the WIFIRE Lab work on case studies involving the use of data in utility wildfire mitigation, tree hazard analysis and prediction, weather/fuel/lightning-related risk modeling, and grid infrastructure failure modeling.

The program seeks to prepare a workforce trained to deal with the evolving needs associated with wildland fire management and power utilities. SDG&E provides the data to foster continued research and development in fire science & climate adaptation, evaluate the impacts of climate change and improve climate resiliency to protect critical infrastructure in wildfire-prone areas. The program also aims to utilize AI technology to fortify the power grid infrastructure against wildfire and other hazard events and to develop collaborative open data approaches that address climate-related weather events, mitigation strategies and communication between utilities and emergency management partners.

https://wifire.ucsd.edu/collaboration

Federal Use of AI in Emergency Management:

DHS AI Roadmap

On March 18, 2024, DHS released its first AI Roadmap, which outlines its AI initiatives and the technology's potential across the homeland security enterprise. The AI plan directs DHS's efforts to fully realize AI's potential to protect the American people and our homeland, while steadfastly protecting privacy, civil rights, and civil liberties.

As part of the roadmap, DHS announced three innovative pilot projects that will deploy AI in specific mission areas. Homeland Security Investigations (HSI) will test AI to enhance investigative processes focused on detecting fentanyl and increasing efficiency of investigations related to combating child sexual exploitation. The Federal Emergency Management Agency (FEMA) will deploy AI to help communities plan for and develop hazard mitigation plans to build resilience and minimize risks. And, United States Citizenship and Immigration Services (USCIS) will use AI to improve immigration officer training.

Other DHS AI Uses

- To keep fentanyl and other dangerous drugs out of the country. The U.S. Customs and Border Protection (CBP) uses an ML model to identify potentially suspicious patterns in vehicle-crossing histories. CBP recently used the model to flag a car for secondary review, which yielded the discovery of over 75 kgs of drugs hidden in the automobile.
- To aid law enforcement officers in investigating heinous crimes. In 2023, the U.S. Immigration and Customs Enforcement Homeland Security Investigations Operation Renewed Hope identified more than 300 previously unknown victims of sexual exploitation thanks in part to an ML model that enhanced older images to provide investigators with new leads.
- To enable FEMA to more efficiently assess damage to homes, buildings, and other properties after a disaster. This approach allows FEMA inspectors the ability to look at

some impacted structure damage remotely instead of conducting inspections exclusively in-person, leading to swifter delivery of disaster assistance to survivors.

- To make travel safer and easier. By introducing customer-facing technologies such as Touchless Check-In at airports, the Transportation Security Administration (TSA) provides travelers an optional way to navigate TSA security processes, check bags, and board their flights by taking just a photograph. These and other efforts are already saving time at security checkpoints and reducing physical touchpoints.

Planning Assistance for Resilient Communities

FEMA will launch a GenAI pilot to create efficiencies for the hazard mitigation planning process for local governments, including underserved communities. Hazard mitigation plans are not only a foundational step that communities can take to build their resilience but can be lengthy to produce and challenging for communities that lack resources to do so. The pilot will specifically support State, Local, Tribal, and Territorial governments' understanding of how to craft a plan that identifies risks and mitigation strategies as well as generate draft plan elements—from publicly-available, well-researched sources — that governments could customize to meet their needs. This pilot could lead to more communities having the ability to submit grant applications for funding to become more resilient and reduce disaster risks.

National Geospatial-Intelligence Agency Products

Produced by the National Geospatial-Intelligence Agency (NGA), GeoQ is an open source tool developed as a solution for collating disparate geo-data to support worldwide disaster relief and recovery efforts into one workflow. GeoQ allows anyone with a web browser and an understanding of geospatial tools like Google Earth and other mapping (?) ESRI ARC (not sure what this is) products to support a project. GeoQ uses a crowd-sourcing model, allowing analysts to add information to the operational picture in real-time. Contributors also can see who else is working on the project within their web browser, increasing situational awareness and information sharing. GeoQ's built-in business analytics provide disaster managers like FEMA the self-service ability to track response timelines, gaps in coverage and manpower requirements. The tool also incorporates non-traditional sources like social media to develop a more robust and accurate operational picture.

Today, GeoQ appears to have been incorporated into a newer NGA product called GEOINT.

https://www.nga.mil/news/GeoQ_team_creating_new_tracks_in_geospatial_suppor.html
https://www.nga.mil/news/Episode_29_(6_15_2018)_Civil_applications_of_intel.html

Other uses

Two papers describe a wide array of uses AI is or can be used to augment disaster preparedness and response activities. In Bari et al.'s 2023 publication entitled **"Potential Use of Artificial Intelligence (AI) in Disaster Risk and Emergency Health Management: A Critical Appraisal on Environmental Health"**, they describe:

1) Ways AI has been used to augment the production of situational awareness mapping:
    a) Automatically detect and map floods using satellite imagery
    b) Programming self-piloting drones to speed up surveying and search and rescue efforts
    c) Quickly process large, burdensome remote sensing datasets to augment the traditional GIS and other mapping tools used by emergency responders

2) Ways AI has been used to forecast outcomes for better preparedness:
    a) Monitoring and forecasting floods by analyzing weather conditions, river levels, soil moisture, and other relevant information to predict the prognosis of a flood event and provide emergency responses early to authorities and residents
    b) Predicting power cuts during hurricanes in the US coastlines.
    c) Predicting resource need based on early severity data, allowing for earlier requests for food aid and better distribution of food aid

3) Ways AI has been used to aid disaster survivors:
    a) AI tools have assessed the mental health of earthquake survivors in Japan

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10712270/#bibr45-11786302231217808

In Sun, Bocchini, and Davison's 2020 paper entitled **"Applications of Artificial Intelligence for Disaster Management"**, they lay out the stages of disaster management, described in the figure on the right, and then discuss points in each stage where AI can productively intervene to improve outcomes. In total they discuss 26 AI methods and 17 application areas.

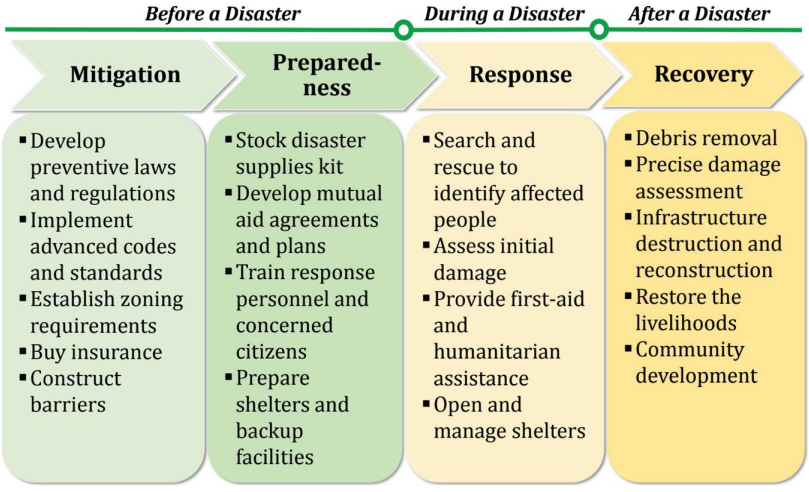

Fig. 1 Four phases of disaster management.

Some relevant use-case examples (that weren't already listed above) include:

Predictions for Preparedness:

1) Prior to a disaster event, utility companies can use AI-based tools to estimate 320 likely damage locations and service outage duration and get prepared beforehand. For example, Hydro One, a large utility company in Ontario, Canada, has successfully used such real-time predictive analyses in April 2018 and then positioned crews in key areas and effectively restored the power service within four days, significantly reducing the restoration time
2) AI methods for analyzing crowd dynamics can help with predicting traffic patterns and organizing an evacuation, such as when it's a good idea to have traffic going on the wrong-way side of the road
3) There are extensive studies applying different AI methods to developing susceptibility maps for different types of hazards. For instance, snow avalanche predictions have been made using logistic regression (LR), support vector machine (SVM), and neural networks. Landslide susceptibility can be assessed by SVM, LR, random forest (RF), and neural networks. These AI methods have also been used for mapping forest fire susceptibility, predicting fire size, and forecasting precipitation.
4) AI techniques have been applied to estimate possible impacts and assess vulnerability. For instance, possible structural damage under natural hazard(s) can be predicted by using fragility curves, which were traditionally built from statistical analyses of historical and simulation data and now can be estimated using AI methods. Infrastructure service disruptions due to hazards can be predicted based on historical data. AI can also use data from physical sensors and social sensing, the vulnerability of structures and communities.
5) UrbanFlood in Europe does early flood warnings; AI component detects abnormal dike behavior

Situational Awareness:

1. A computerized reporting system called Toretter in Japan was able to triangulate and report an earthquake's location using tweets faster than the government's own seismic authority.
2. Mapping for search and rescue, organizing supplies and distribution, understanding short term housing needs, using data from unmanned vehicles, social media, and satellites
3. Based on the location information of the nearby communication networks, mobile phone data have also been used to estimate population movements and track population displacement in the immediate aftermath of disasters
4. Social media platforms are powerful communication tools for individuals and local communities to seek help and for governments and organizations to disseminate disaster relief information. Social media data embed time and geo-location information as well as

disaster-related information, serving as good information sources for building disaster information systems.

Remote Damage Assessment:

1. Analysis of satellite images using ‘computer vision’ models has been used to generate infrastructure inventory and extent-of-impact maps. With AI tools, such analysis can be done quickly and repeatedly, essentially producing “live” maps of disaster situations. By comparing maps and images pre-event and post-event, AI can extract feature discrepancies to remotely assess damage of structures and infrastructure
2. By harnessing “crowds” of over 1000 experts from 82 countries, for example, the Humanitarian OpenStreetMap Team generated devastation maps of the affected areas in the Philippines shortly after typhoon Haiyan, enabling rapid damage assessment and efficient response efforts

Response Coordination:

1. In disaster response, disaster management agencies need to rapidly classify information from calls and share urgent needs of the public to relevant agencies and utility companies. Machine listening can help to automatically recognize voices to identify key words with a high priority and rapidly process voice data from different regions or languages
2. Disaster information systems with shared access across agencies and organizations can help reduce the communication bottleneck that often hampers emergency response in dynamically changing circumstances. Such tools include collaborative geographic information systems, shared information management platforms and decision tools. Disaster information systems like MADIS, Sahana, SPIDER, CrowdHelp, and DMCsim use supervised learning models and deep learning to extract information from various sources like social media and aerial or satellite imagery and automatically populate and update their dashboards.
3. Using AI to help with emergency communications, like having a computer receive a call and use keywords to prioritize what’s urgent, or get information from non-English speakers and translate

Information for Recovery Efforts:

1. AI methods can help estimate disaster losses and repair costs. In particular, supervised models, such as regression and neural networks, have been used to rapidly process imagery for detecting structural damage, identifying repair needs, and estimating repair cost. Such models have also been used to analyze historical dispersion data of disaster recovery funds for budget allocations, and process insurance claims in less time.
2. Data mining can help to identify potential fraud and rumors as well as track trends of information flow. For example, insurance companies and law enforcement agencies can

use machine learning to quickly examine the truthfulness of a claim for a flooded house by making a before-and-after comparison of high-resolution satellite images

Full paper is linked here or here: https://drive.google.com/file/d/1AFBYmvF11B96jcDbnlQUc8lW1C7Q9NDq/view.

Private Sector Products that use AI for EM purposes:

US-Based

SensePlace3: This project was funded by the US Department of Homeland Security (DHS) and the US Army Engineer Research and Development Center (ERDC), Geospatial Research Laboratory. The goal was to analyze place-time-attribute information found in Twitter tweets and make sense of places from millions of tweets. SensePlace3 touts itself to be one of the first to describe using tweets and their location data for situational awareness during emergencies. It also led to important discussions in the research and emergency response communities of the ethics of location-based data in crisis situations. https://brightworldlabs.com/senseplace3-analyzing-place-time-attribute-information-in-big-social-media-data/

One Concern: Based in San Francisco, One Concern is a small firm dedicated to helping business clients identify vulnerabilities driven by climate risk and extreme weather, and make better decisions, such as precision mitigation. According to their website, One Concern offers an array of resilience statistics and metrics, enhancing curated datasets. This comes in the form of two products, Domino AI and Domino Co-Pilot. Metrics provided through the One Concern Domino AI API empower users to understand, plan, price, mitigate, or transfer business interruption and downtime risks for prospective and owned assets. Insurers can access Business Interruption risk scores for various perils and critical infrastructure disruptions like power outages or impediments to ingress/egress. Financial Service clients can gain detailed company-specific and location-based resilience scores. The Co-pilot product is designed to help leaders build resilience and make better business operations decisions amid climate volatility and extreme weather. https://oneconcern.com/en/products/

Google: using AI to combat floods, wildfires and extreme heat: Google is working to build more solutions - like their AI-based predictions and forecasting - to provide actionable information to help individuals stay safe and communities to plan ahead. These tools and technologies are helping communities around the world address the effects of climate change. How Google AI helps combat wildfires, floods, and extreme heat (blog.google)

OMDA: based in Norway. Omda Emergency offers a complete suite of systems that streamline workflows and resource allocation under extreme time pressure. This unique software portfolio ensures a safe and robust emergency response by supporting emergency call center operators,

dispatchers, first responders and casualty clinic staff. It also enables seamless sharing of critical patient information to emergency room doctors. https://omda.com/solutions/emergency/

Potential Future Uses of AI for EM

Power outage prediction model

Researchers in Baltimore and Texas have developed an AI powered model which predicts power outages during hurricane events. Hurricanes regularly cause widespread and prolonged power outages along the U.S. coastline. Efficient and effective emergency response planning within power utilities, other utilities dependent on electric power, private companies, and local, state, and federal government agencies benefit from accurate estimates of the extent and spatial distribution of power outages in advance of an approaching hurricane. A paper describing this in more detail is available here.

These predictive models combine weather and utility data. If similar thinking were applied to extreme heat or wildfire or flooding, such a model could be immensely useful to disaster planning.

All-terrain 4-legged robots

The mechanics of moving over uneven surfaces and adapting to a complicated terrain is very complex, though it can seem simple when you're the one doing it. Recent strides in AI have been effective at giving four-legged robots a 'brain' that can interpret its surroundings and figure out how to navigate over obstacles as it encounters them - and without pre-programmed directions. This type of robot could prove useful in situations where it is dangerous for human responders to enter a scene, for example searching through rubble for survivors, and can supplement human responders, for example by carrying heavy equipment for wildland firefighters. The linked 2021 paper discusses the capabilities of four legged robots in more detail.
https://www.sciencedirect.com/science/article/pii/S2090447920302501

Private Sector Use of AI

Disaster Management Firms and AI are already identifying ways to leverage AI to better fight emergencies. For example, APTIM has identified ways they intend to employ AI for their clients, including redefining spatial intelligence using GIS mapping for emergency management, streamlining the drafting of complex legal contracts and RFPs, and using new algorithms based in historical data and designated parameters to analyze grant applications, assess eligibility criteria, and predict potential funding outcomes.

Other uses

Disaster Management experts identify AI may be used for emergency management in the following ways:

- Auto-translation services for disaster victims
- Chatbots to help people get information or sorted correctly into what type of service they need
- Activating chatbots, virtual assistants, and automated systems to further streamline communication between emergency responders, government agencies, and affected populations.
- Algorithms tasked with analyzing real-time data to assess the scope of a disaster and help efficiently allocate resources
- Landslide detection
- Flood prediction and management

Potential Pitfalls and Harms of AI from an EM perspective

On the subject of pitfalls of AI in the disaster space, Open Mind BBVA writes: “Let’s probe the challenges and ethical considerations associated with the use of AI in disaster prevention. While AI has the potential to greatly improve our preparedness and response to natural disasters, it also brings forth several complex issues that need careful attention.

Data Privacy and Security

“AI relies heavily on data, and disaster prevention systems are no exception. Gathering data from various sources, including personal devices and sensors, is essential for predictive models. However, this raises concerns about data privacy and security.

- **Privacy:** When collecting data from individuals, it is crucial to ensure that their privacy is protected. AI models must be designed to anonymize and aggregate data to prevent the identification of individuals. Transparent data usage policies and informed consent are vital.

- **Security:** With the increased reliance on data for disaster prediction, there is a heightened risk of cyberattacks. Protecting the data and systems from malicious actors is a critical concern, as an attack on these systems could result in false warnings or other misinformation that could be disastrous.

Bias in AI

AI algorithms can inadvertently inherit biases from the data they are trained on. In disaster prevention, bias could result in inaccurate predictions or unfair prioritization of resources. For example, if historical data is biased towards certain demographics or regions, the AI model might not provide equal protection to all. Addressing bias in AI requires careful data selection and preprocessing, as well as ongoing monitoring and adjustment of the models. Ethical guidelines for AI development should include measures to identify and mitigate bias.

Accessibility and Equity

It's crucial to ensure that AI-driven disaster prevention tools are accessible to all, regardless of socioeconomic status or geographic location. Historically disadvantaged communities may have limited access to technology and resources, making them more vulnerable to natural disasters. Achieving equity involves not only providing access to AI tools but also addressing the underlying disparities in resources, infrastructure, and education that can exacerbate the impact of disasters on marginalized communities.

Accountability and Decision-Making

As AI systems become more integrated into disaster prevention, it becomes essential to establish clear lines of accountability. When an AI system provides predictions or recommendations, it should be transparent about how it arrived at those conclusions.

https://www.bbvaopenmind.com/en/technology/artificial-intelligence/artificial-intelligence-and-natural-disasters/