

Antaeus: Disaster Response & Crisis Management Platform

1. The Problem Statement

Morocco faces significant challenges related to natural disasters that require improved detection and response systems:

- **Earthquakes:** Morocco's location in a seismically active region, as evidenced by the 2023 Al Haouz earthquake and recent seismic activity.
- **Floods:** Flash flooding in mountainous regions and urban areas occurs annually
- **Droughts:** Increasing climate variability affecting water resources and agriculture
- **Coordination Gaps:** Insufficient coordination between emergency responders and affected communities
- **Information Access:** Limited real-time information for both responders and citizens during emergencies
- **Resource Management:** Inefficient allocation of vital resources during crisis situations
- **Geographic Challenges:** Difficult terrain in mountain villages and remote areas complicating emergency access

These challenges disproportionately affect vulnerable communities in rural and remote regions, cause economic disruption, and extend recovery periods following disasters.

2. The Idea

Antaeus is a disaster response and crisis management platform that combines satellite imagery analysis with on-the-ground reporting to create a comprehensive emergency management system.

2.1 Core Concept

- A platform that automatically detects disasters through satellite imagery analysis
- Combines AI-detected events with user-reported incidents
- Presents unified information through interactive maps and alerts
- Facilitates coordination between emergency responders and affected individuals

2.2 Key Innovations

- **Computer Vision for Disaster Detection:** Automated processing of satellite imagery to identify and classify disasters
- **Dual-Source Validation:** Cross-verification between satellite-detected events and ground reports
- **Batch Processing Pipeline:** Regular analysis of satellite data to detect changes indicating disasters
- **Accessible Reporting System:** Multiple channels for citizens to report emergencies

2.3 Sub-Domain Alignment: Disaster Response & Crisis Management

- Centralizes disaster identification and response coordination
- Reduces detection time for emergencies in remote areas
- Creates a unified platform for emergency information and resource management

3. Objectives

3.1 Primary Objectives

1. Improve Disaster Detection and Monitoring

- Utilize computer vision to identify disasters from satellite imagery
- Reduce the time between disaster occurrence and official response
- Create an automatic notification system for emerging threats

2. Enhance Emergency Response Coordination

- Connect emergency services through a unified platform
- Improve resource allocation based on real-time data
- Facilitate communication between responders and affected communities

3. Optimize Resource Management

- Track and allocate emergency supplies efficiently
- Reduce duplication of effort and resource wastage
- Prioritize aid based on severity and population density

4. Increase Community Preparedness and Resilience

- Provide early warnings based on satellite detection
- Offer clear evacuation routes and safety information
- Build community knowledge about disaster preparedness

4. Impact Analysis

4.1 Impact on Moroccan Communities

The solution will significantly improve disaster response across Morocco by:

- **Disaster Detection:** Identifying events through satellite imagery analysis
- **Damage Assessment:** Evaluating destruction based on buildings and population data
- **Emergency Support:** Providing critical insights for faster, coordinated response
- **Resource Optimization:** Ensuring aid reaches the most affected areas
- **Community Empowerment:** Delivering actionable information to citizens during crises

4.2 Potential for Scalability

The platform's architecture allows for:

- **Geographic Expansion:** Expanding to high disaster-risk countries
- **Integration Capabilities:** Connecting with other emergency systems
- **Technological Enhancement:** Incorporating new satellite data sources as they become available

5. Business Model & Sustainability

5.1 Revenue Streams

- **Government Contracts:** Service agreements with Moroccan Ministry of Interior
- **International Development Funding:** Partnerships with organizations like UNDP and World Bank
- **Training Services:** Fee-based specialized training for emergency professionals
- **Technology Licensing:** White-labeled solutions for other regions

5.2 Operational Sustainability

- **Local Talent Development:** Training Moroccan developers to maintain the system
- **Public-Private Partnerships:** Collaboration with satellite providers and telecom companies
- **Community Involvement:** Local volunteers for ground-truthing satellite detections
- **Phased Implementation:** Gradual rollout to manage costs and demonstrate value

5.3 Key Partnerships

- **Government:** Integration with Moroccan emergency services
- **Satellite Data Providers:** Access to frequent imagery updates
- **Telecommunications:** Collaboration for connectivity and alert distribution
- **Academic Institutions:** Research partnerships for improved disaster detection algorithms

5.4 Cost Structure

- Satellite imagery acquisition and processing
- AI model development and maintenance
- Cloud infrastructure and database management
- Technical support and community outreach
- Continuous improvement and research

6. System Design & Architecture

6.1 Technical Architecture

Data Collection & Processing:

- **Satellite Imagery:** Integration with satellite providers for regular updates and disaster detection.
- **Computer Vision:** Automated analysis and event detection, with confidence scoring and manual validation.

Data Storage:

- **DynamoDB:** NoSQL database for flexible, scalable storage and real-time querying.
- **Cloud Storage:** Cloud-based storage for large datasets and backups.

Frontend:

- **Next.js & React:** Framework for building fast, component-based UI with Tailwind CSS for styling.
- **Mapbox:** Interactive maps for displaying disaster zones and safe routes.

Backend:

- **Python Django:** Web framework for backend API management and handling user requests.
- **API Gateway:** Manages API requests and authentication.
- **Microservices architecture:** Decoupled services for scalability.

Notifications & Communication:

- **Multi-Channel Alerts:** push notifications for real-time updates. (SMS email in the futur)
- **Voice Processing:** AI-based language processing for voice reports.

6.2 Key Functionalities

1. Interactive Emergency Map

- View nearby shelters, danger zones, evacuation routes, and real-time disaster updates.
- Access resource distribution points and medical facilities.
- Display damage assessment and estimated affected population in real-time.

2. AI-Powered Chat Assistant

- Get personalized guidance during emergencies in your preferred language.
- Ask about evacuation procedures, shelter locations, and report emergencies.

3. Voice Emergency Reporting

- Record audio descriptions of emergencies; AI extracts key details (location, emergency type, severity).

4. Real-time Alerts and Notifications

- Receive critical alerts, evacuation orders, and updates on disaster developments.

5. Resource Requests

- Request emergency supplies (water, food, medical supplies) and track delivery status.

6. Command Center Dashboard

- Overview of active incidents, deployed teams, and resource allocation.