The Transformative Potential of AI (and ML)

Indira Mallela

Artificial Intelligence (AI) and Machine Learning (ML) technologies offer capabilities that revolutionize manufacturing, healthcare, finance, transportation, retail, etc.

01

Floods are the most common natural disaster worldwide. A flood is defined as an overflow of water that submerges land that is usually dry.

02

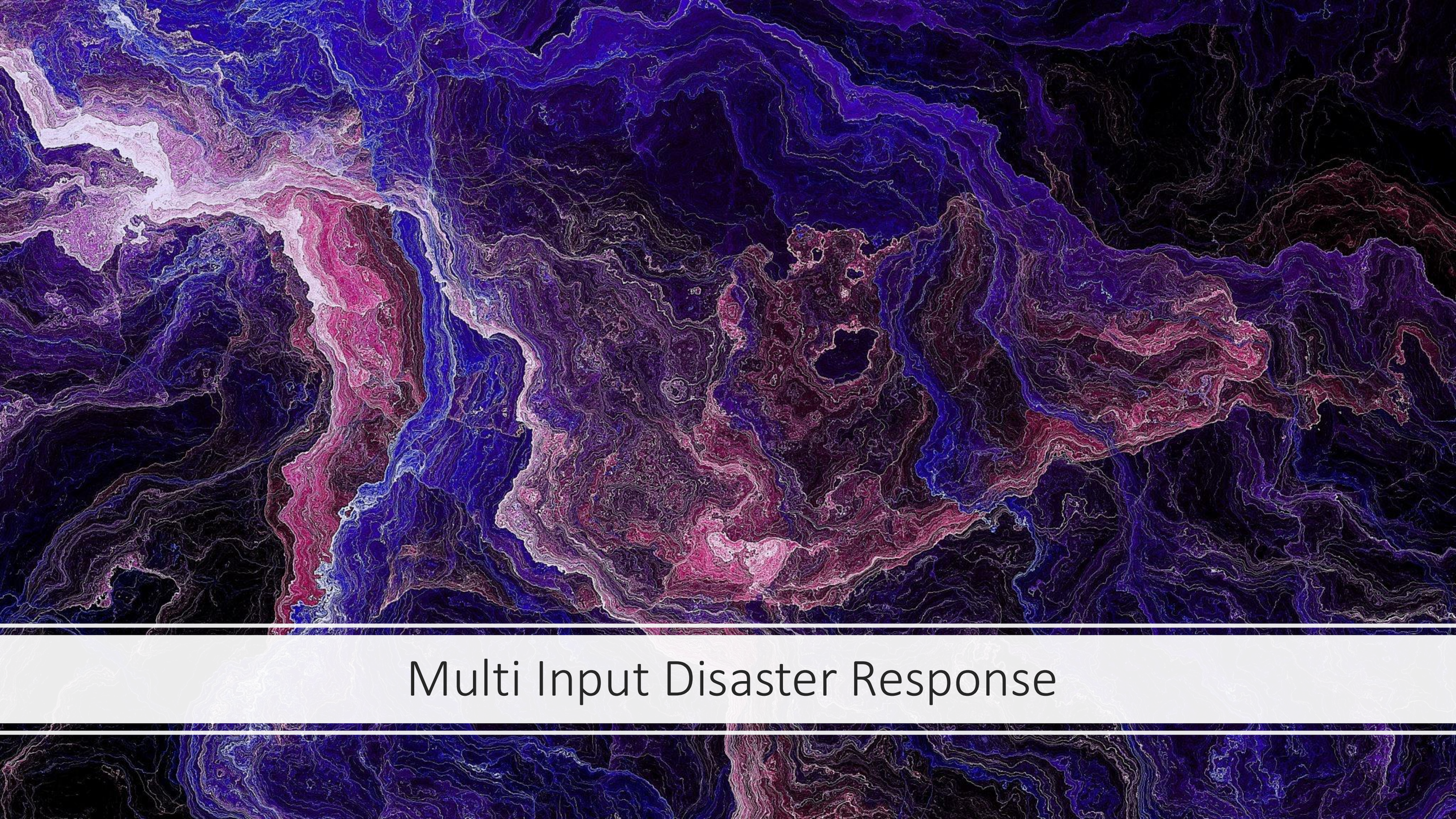
In 2023, Bangladesh, Vietnam, and Myanmar, were the countries most exposed to flood risk.

03

Globally, 12% of municipal solid waste (MSW) is made up of plastics

04

Floods accounted for 16 percent of weather-, climate-, and water-related deaths recorded between 1970 and 2021



Multi Input Disaster Response

Enhancing Disaster Response with AI/ML

Predictive Analytics (ML)

Forecast disaster impacts and proactively deploy aid and relief efforts.

Computer Vision

Rapidly identify affected areas, damaged damaged infrastructure, and mobilize resources.

Natural Language Processing

Analyze social media and other data sources to understand and respond to urgent needs. needs.

Results for **Dhaka, Bangladesh** · Choose area

Flood alert

Above normal flood alert

Khaliajuri Upazila, Danu River

Flood situation near Danu River

From Bangladesh Water Development Board · Learn more · Last updated 22 mins ago

Flooding is expected to be similar by this morning

By this morning, Danu River is expected to be the same as yesterday evening. Use caution if going near the riverfront.

See more in Flood Hub →

Affected area

BUSINESS ANALYTICS COMPANY

APEX NGO WITH A DEDICATED HELPLINE PORTAL

MULTIPLE LOCAL NGOS

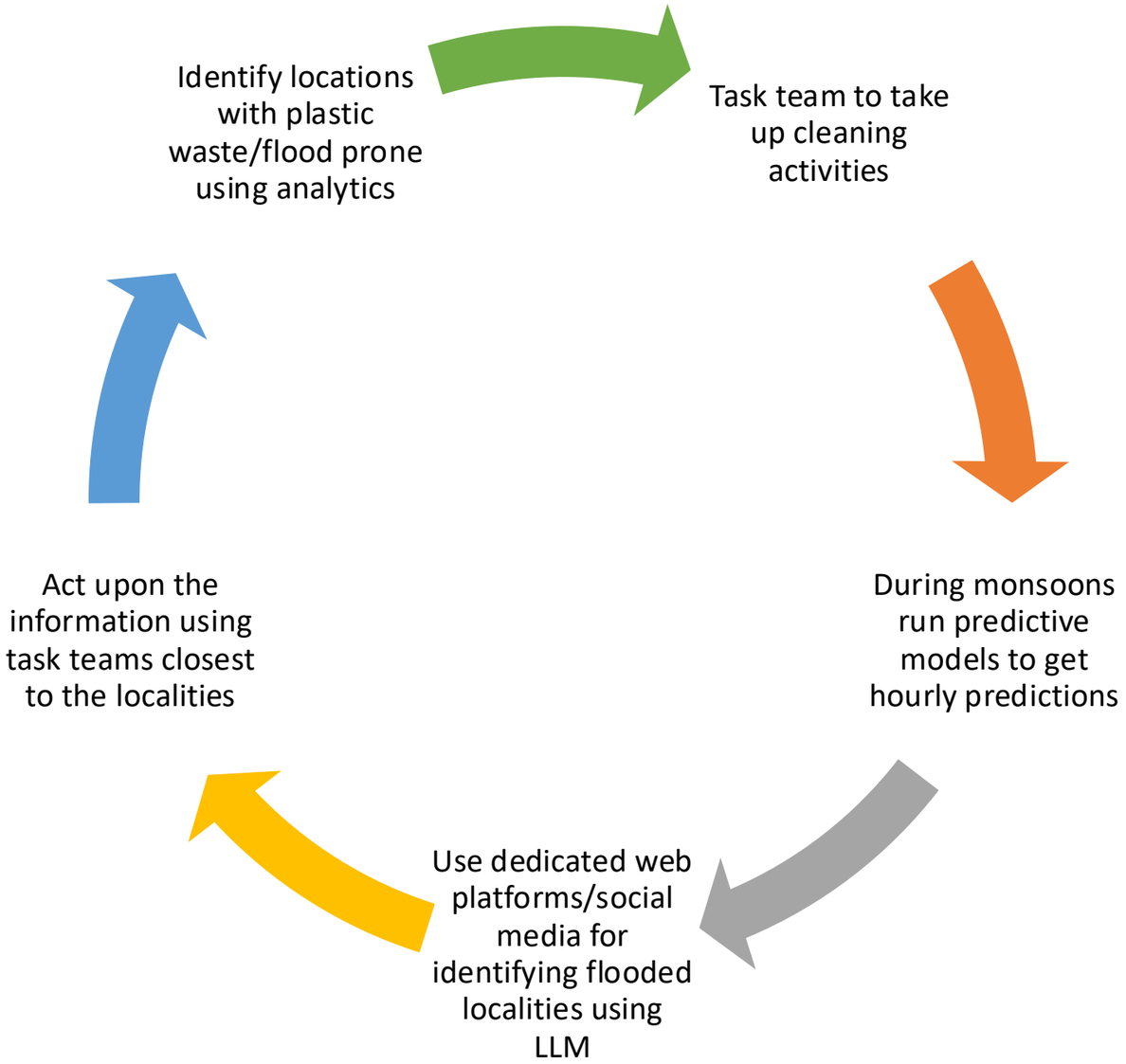
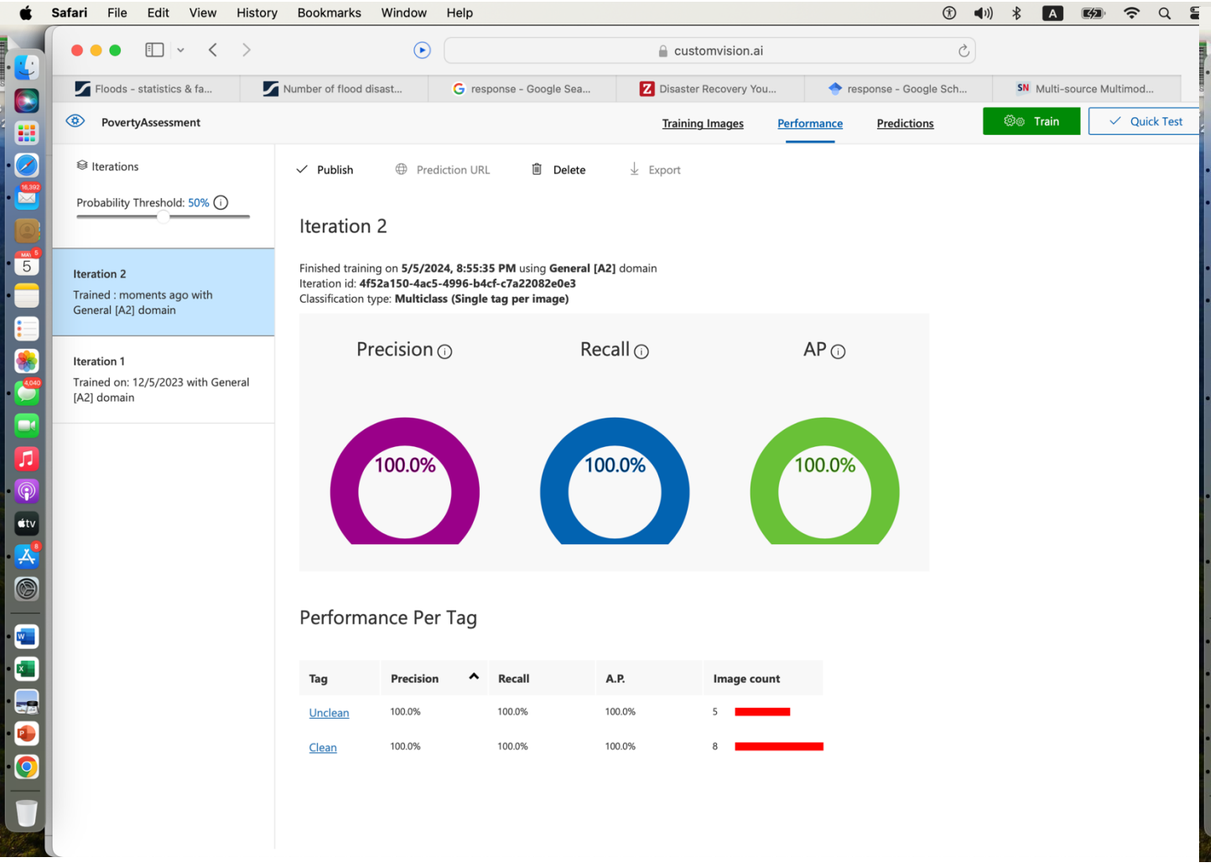
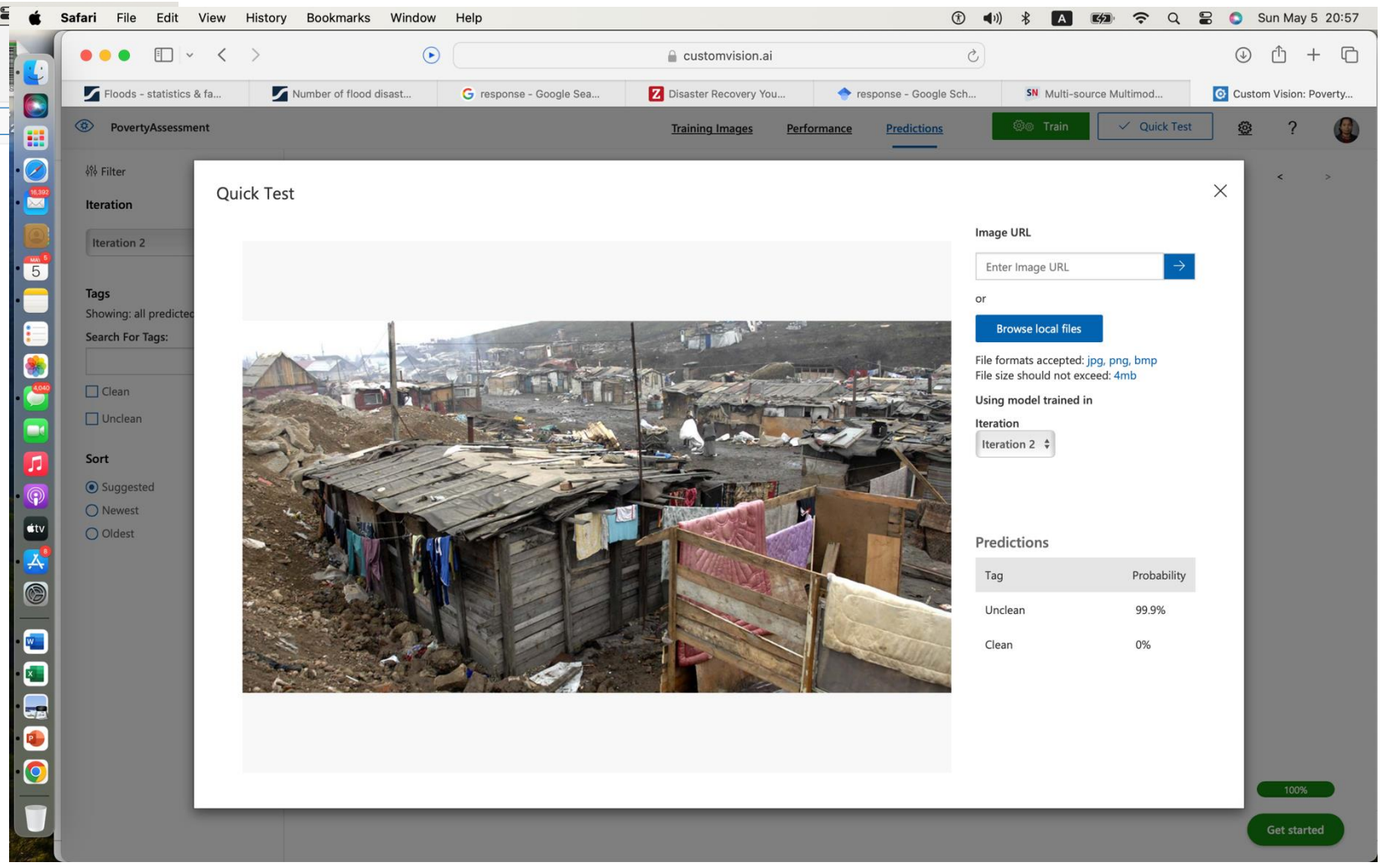

Identify locations with plastic waste/flood prone using analytics
Task team to take up cleaning activities
During monsoons run predictive models to get hourly predictions
Use dedicated web platforms/social media for identifying flooded localities using LLM
Act upon the information using task teams closest to the localities

Image Classification

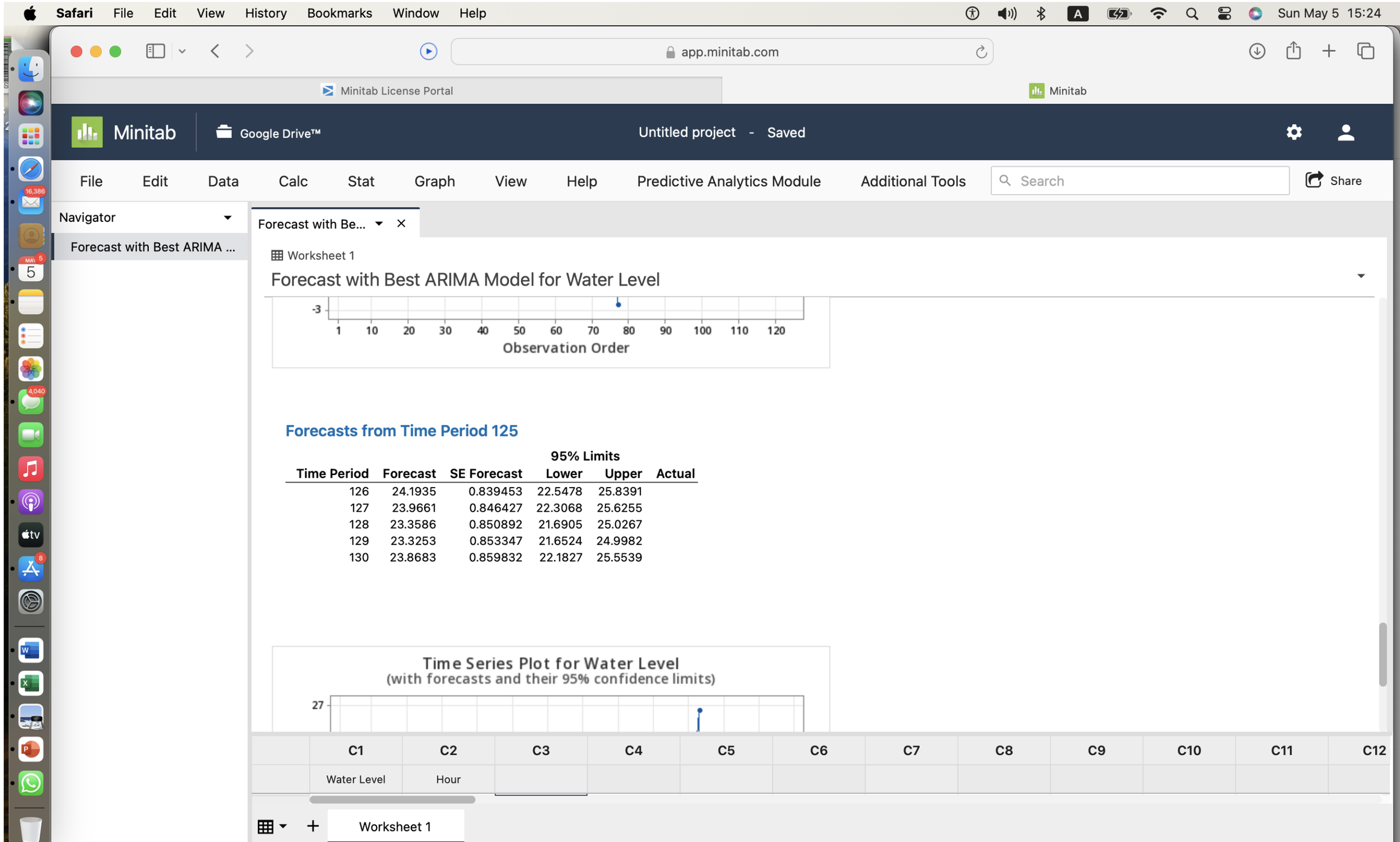
[Custom Vision]

Satellite imagery to understand plastic waste



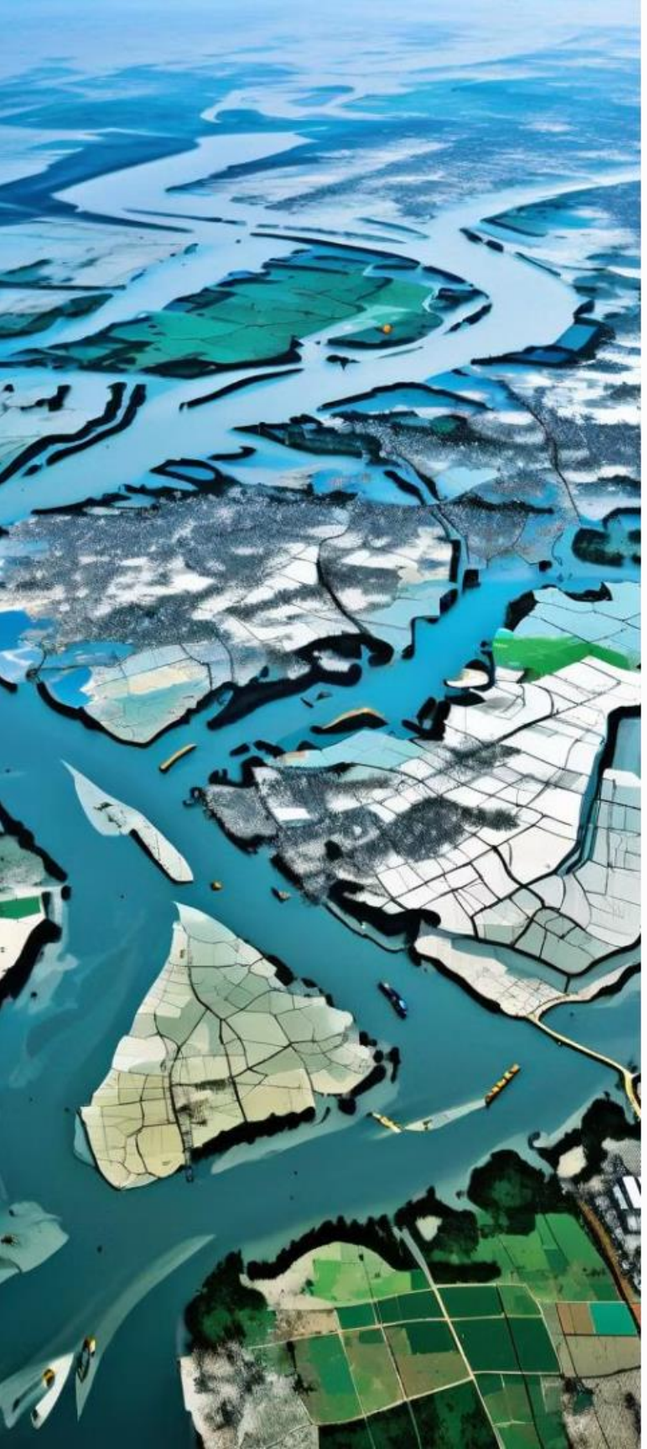


Predictive Analytics



Harnessing Satellite Imagery and Social/Web Media Analysis for Flood Monitoring and Response

In this proposed paper, I present a novel approach that combines the power of machine learning algorithms, satellite imagery analysis, natural language processing using large language models to address the pressing issue of water floods in Bangladesh. By leveraging a multifaceted data analysis framework, we aim to provide disaster response teams with insights that improve preparedness, assess severity and extent of flooding, enabling them to prioritize their efforts and reduce turnaround time



Satellite Imagery Analysis: Detecting Water Water Clogs

1

Satellite Data Acquisition

We begin by acquiring high-resolution satellite imagery covering the geographical region of Bangladesh with the inputs received through dedicated disaster response web portal and social media sites. These satellite data provide a bird's-eye view of the landscape, allowing us to accurately identify and track the flooded areas.

2

Image Processing and Segmentation

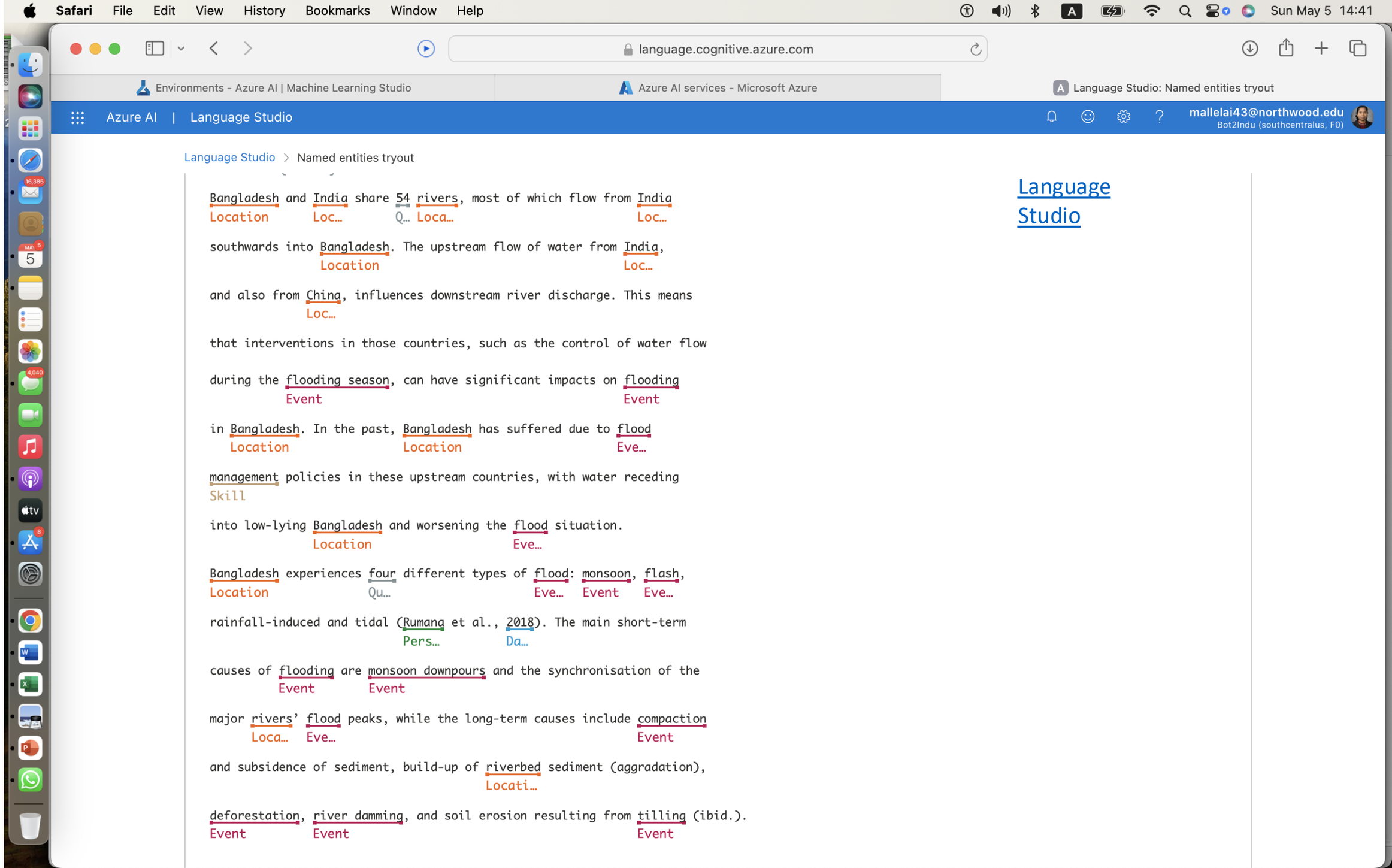
We employ advanced convolutional neural networks (CNNs) to analyze the satellite images, segmenting the scenes and detecting the presence of water bodies. This step is crucial in identifying areas affected by water clogs and potential and real-time flood situation

3

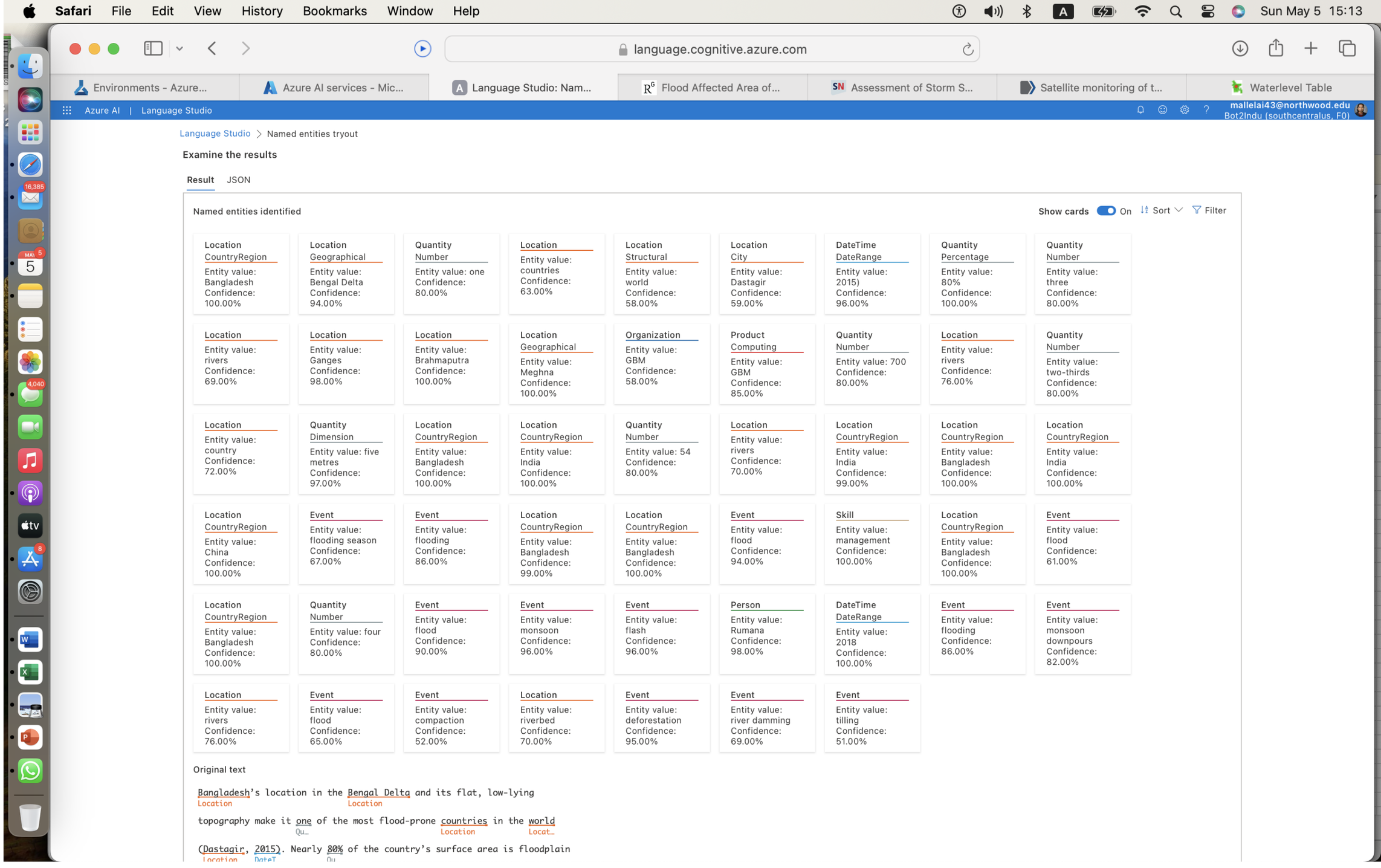
Flood Mapping and Severity Assessment

By processing the satellite imagery and identifying the extent and depth of water bodies, we can create detailed flood maps that highlight the severity and impact of the flooding. This information is vital for disaster response teams to prioritize their efforts and allocate resources effectively.

Natural Language Processing



Entity Extraction



Social Media Sentiment Analysis: Amplifying the Voice of Communities

Collecting Social Media Data

In parallel with the satellite imagery analysis, we gather relevant social media data, focusing on posts and tweets related to flooding events in Bangladesh. This additional data source provides valuable insights into the real-time experiences and sentiments of the affected communities.

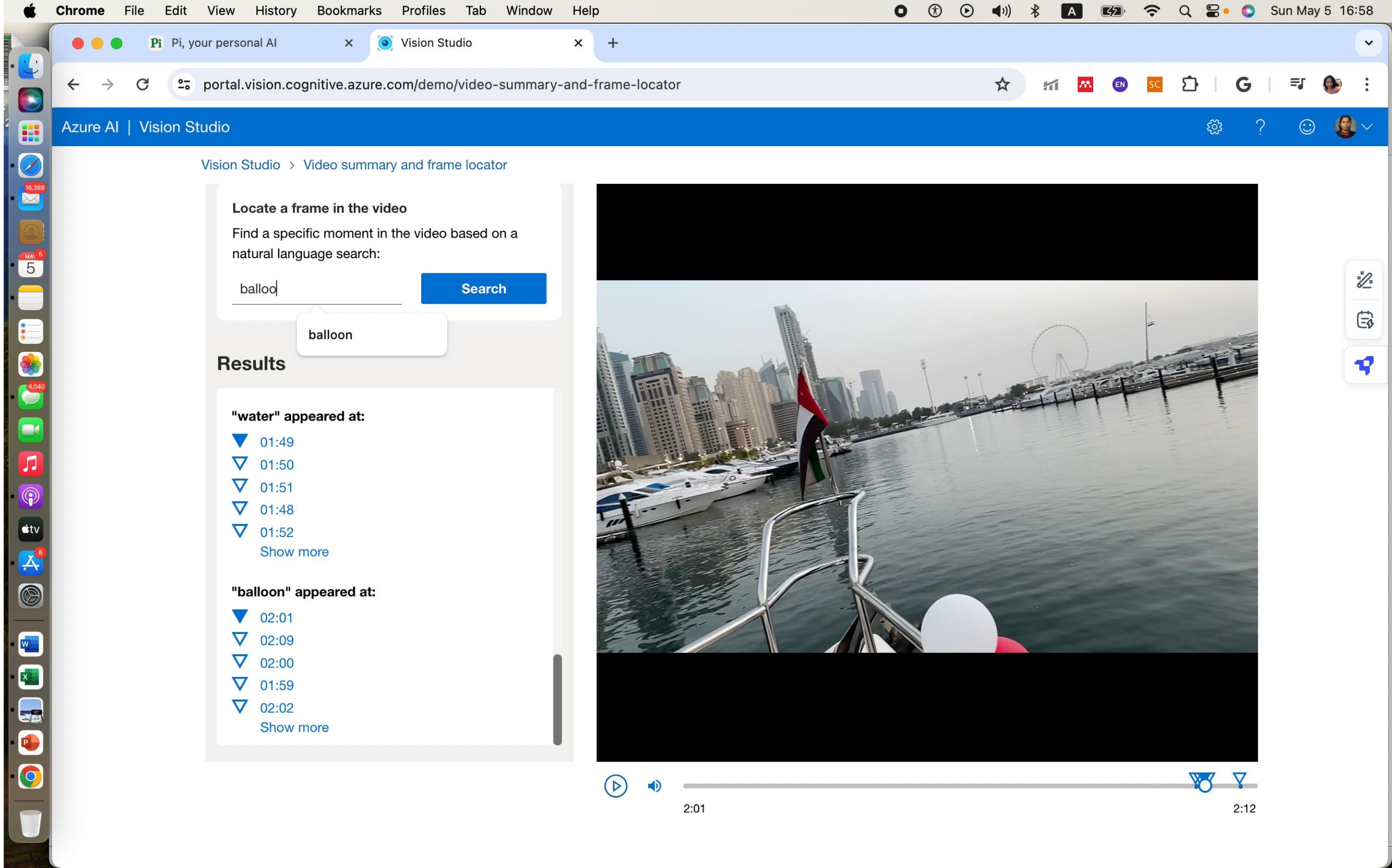
Sentiment Classification

Using advanced natural language processing techniques and large language models, we analyze the sentiment expressed in the social media posts. This allows us to identify areas where people are expressing distress, concern, or requests for assistance, further informing our prioritization of disaster response efforts.

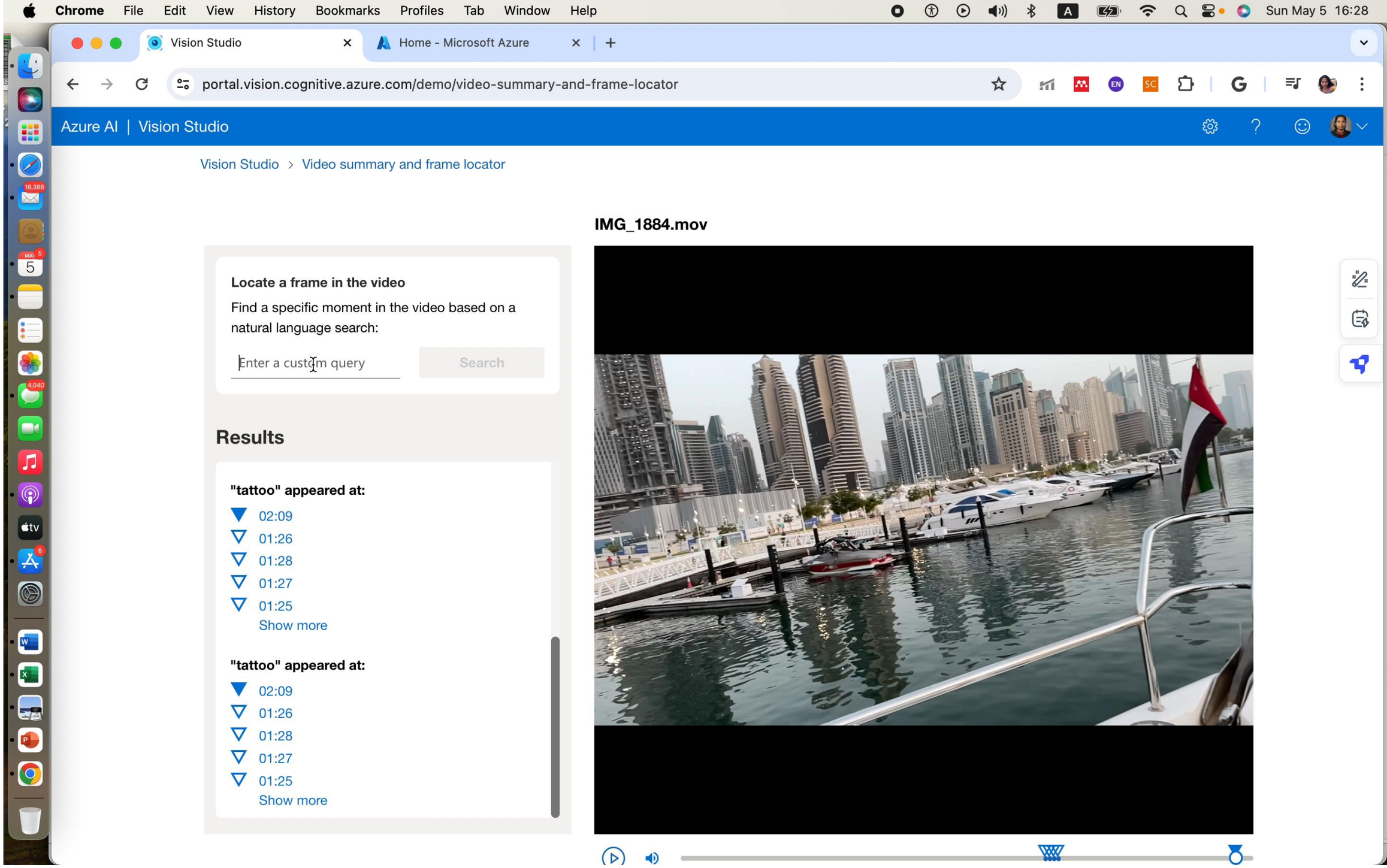
Integrating Satellite and Social Data

By combining the insights from satellite imagery analysis and social media sentiment analysis, we create a comprehensive map that highlights the most severely affected areas, taking into account both the physical extent of the floods and the expressed needs and concerns of the local communities.

Object Detection



Object Detection



Prioritizing Disaster Response: A Holistic Approach

1

Flood Severity Mapping

The satellite imagery analysis provides us with a detailed understanding of the extent and depth of the water bodies, enabling us to create a comprehensive flood severity map for Bangladesh.

2

Social Media Sentiment Analysis

By leveraging social media data, we can identify the areas where people are expressing the most distress and urgent need for assistance, further informing our disaster response prioritization.

3

Integrated Disaster Response Prioritization

By combining the insights from both satellite imagery and social media sentiment analysis, we can create a holistic view of the flood situation, allowing disaster response teams to prioritize their efforts and allocate resources where they are needed most.

Enhancing Disaster Preparedness through Collaboration

Partnerships with Local Authorities

Fostering strong partnerships with local NGOs and disaster management agencies in Bangladesh is crucial for the successful implementation and integration of our flood monitoring and response system. This collaboration will ensure the system is tailored to the specific needs and challenges of the region.

Community Engagement and Feedback

Engaging with local communities and incorporating their feedback is essential for the long-term sustainability and effectiveness of our approach. By actively listening to the voices of those directly affected by floods, we can refine our methods and better align our efforts with the needs of the people.

Knowledge Sharing and Capacity Building

Sharing our knowledge and insights with the broader scientific community and disaster response teams can contribute to the advancement of flood monitoring and management practices, not only in Bangladesh but also in other flood-prone regions around the world.

Addressing Ethical Considerations

1

Privacy Concerns

As our approach relies on social media data, we must address privacy concerns and ensure the ethical handling of personal information. Strict data protection protocols and informed consent mechanisms are crucial to maintain the trust of the affected communities.

2

Data Availability and Bias

The quality and availability of data, both satellite imagery and social media, may vary across different regions and socioeconomic settings. We must acknowledge these potential biases and work to ensure equitable coverage and representation in our analysis.

3

Responsible AI Deployment

The deployment of our AI-powered flood monitoring and response system must be done with a strong emphasis on transparency, accountability, and ongoing evaluation to ensure the model's accuracy and fairness in serving the diverse communities of Bangladesh.

Conclusion: A Holistic Approach for Flood Resilience

Key Achievements	Future Directions
- Developed a comprehensive flood monitoring system that combines satellite imagery analysis and social media sentiment analysis - Achieved high accuracy in detecting water clogs and classifying flood severity and social media sentiment - Created a prioritized disaster response framework to help allocate resources effectively	- Expand satellite imagery coverage and processing capabilities to monitor floods in larger geographical areas - Enhance social media analysis techniques to better capture the evolving needs and concerns of affected communities - Foster cross-regional collaborations to create a globally coordinated flood resilience network

Thank you

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ourworldindata.org

carbon foot pri... | emissions - O... | Emissions by... | co2 emissions... | CO_2 emissions... | CO2 emission... | Carbon dioxid... | and Greenhou... | emissions (me...

Introduction | Key Insights | Data Explorer | Research & Writing | Charts | Endnotes | Cite This Work | Reuse This Work

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Consumption-based

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Sort by Relevance

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- [ ] Africa
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- [ ] Andorra
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× Clear selection

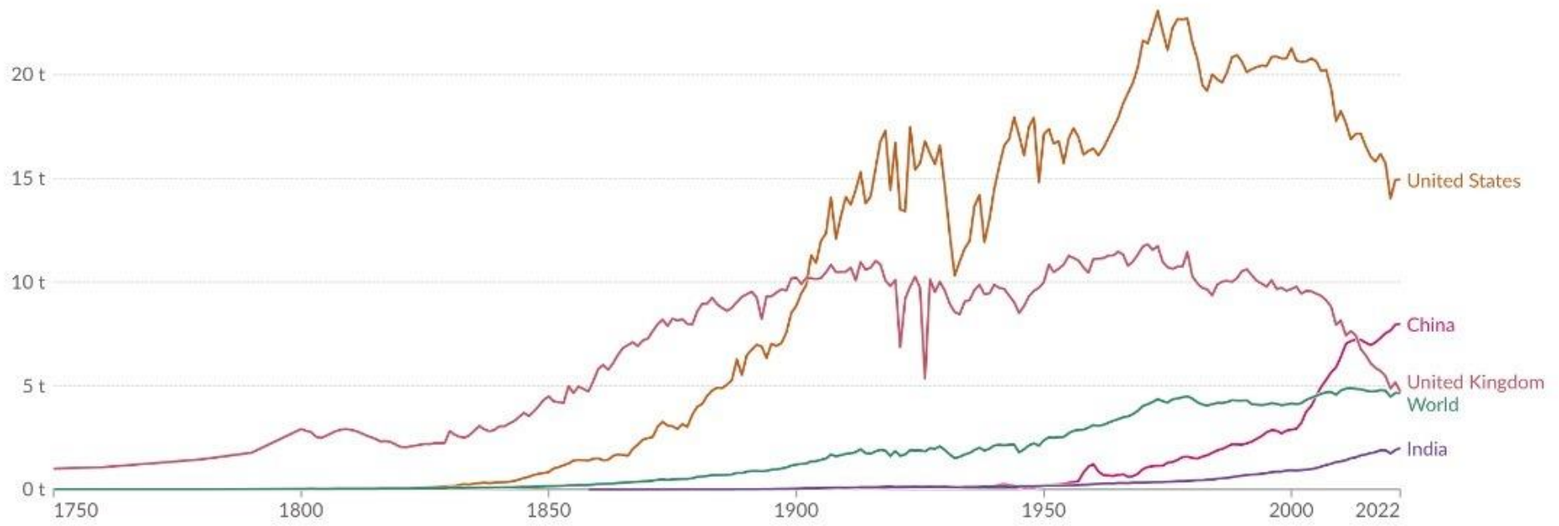
Per capita CO_2 emissions

Carbon dioxide (CO_2) emissions from fossil fuels and industry. Land-use change is not included.

Our World in Data

Table | Map | Chart

Settings



Play time-lapse 1750 2022

Data source: Global Carbon Budget (2023); Population based on various sources (2023) – Learn more about this data
OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

Related: CO_2 data: sources, methods and FAQs

So my concept is - UK achieved its peak carbon emissions around 1916 stayed same for six decades until 1973 to start reducing and now it is at 4.7. USA peaked around 1973 and gradually reduced it to 15 now. China is at 8 and India is at 2 now (in 2022).
can we build models to understand when China and India will peak and start reducing its carbon emissions? Does it make sense to you?
lemme know once you wake up.