Microsoft

AgriVision

Core AI with Azure ML Studio

- Anshika Jain
- Philippa Burgess
- Amit Kumar
- Raghuraj Pratap Yadav

ML for Satellite Imagery Analysis: Kerala Case Study

2018 Kerala floods in India highlight ability to leverage ML in low tech-infrastructure environments

- **Death toll**: 435 lives lost due to flooding in an area of 15,005 sq miles (similar to CT and NJ combined).
- **Farmland affected**: Over 26,106 hectares (~100 sq miles) impacted in a densely populated area (2332 people per sq mile).
- **High risk**: Nearly half of Kerala's 35 million people faced threats to livelihood and food supply.
- **Economic loss**: Ripple effects extended to India's 1.4 billion people, with losses estimated at $95 million USD.
- **Climate impact**: Increasing frequency and severity of weather-related events globally.

Actionable Insights for Government and Industry with Azure Cloud and AI/ML

Enhancing Disaster Resilience, Emergency Response, and Recovery

- **Satellite imagery analysis** for monitoring agriculture, urban areas, and the environment.
- **Predictive response** to natural disasters with accurate, timely data.
- **Effective resource allocation** for disaster preparedness, response, and recovery.
- **Data-driven policy-making** for sustainable development.
- **Economic impact assessment** for better planning and recovery.

Rescue worker carries infant

Boat rescue

Navy rescues residents

Image Source: Economic Times

Microsoft Azure with Open Source Satellite Data

Microsoft Azure

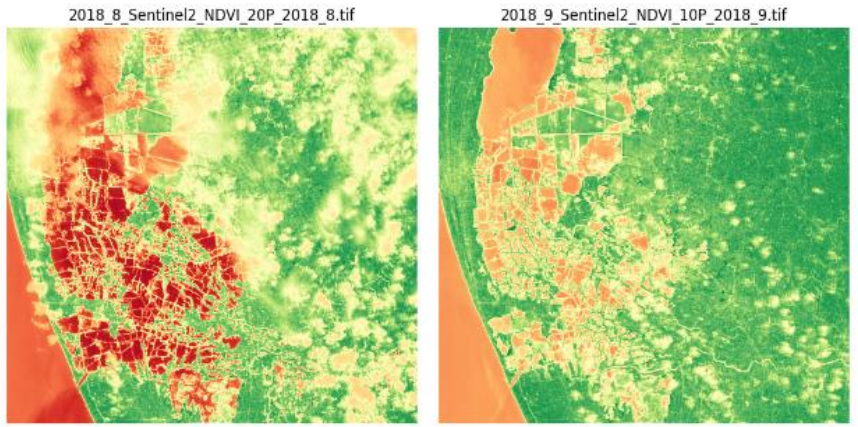
Microsoft Azure Blob Storage

Azure Machine Learning

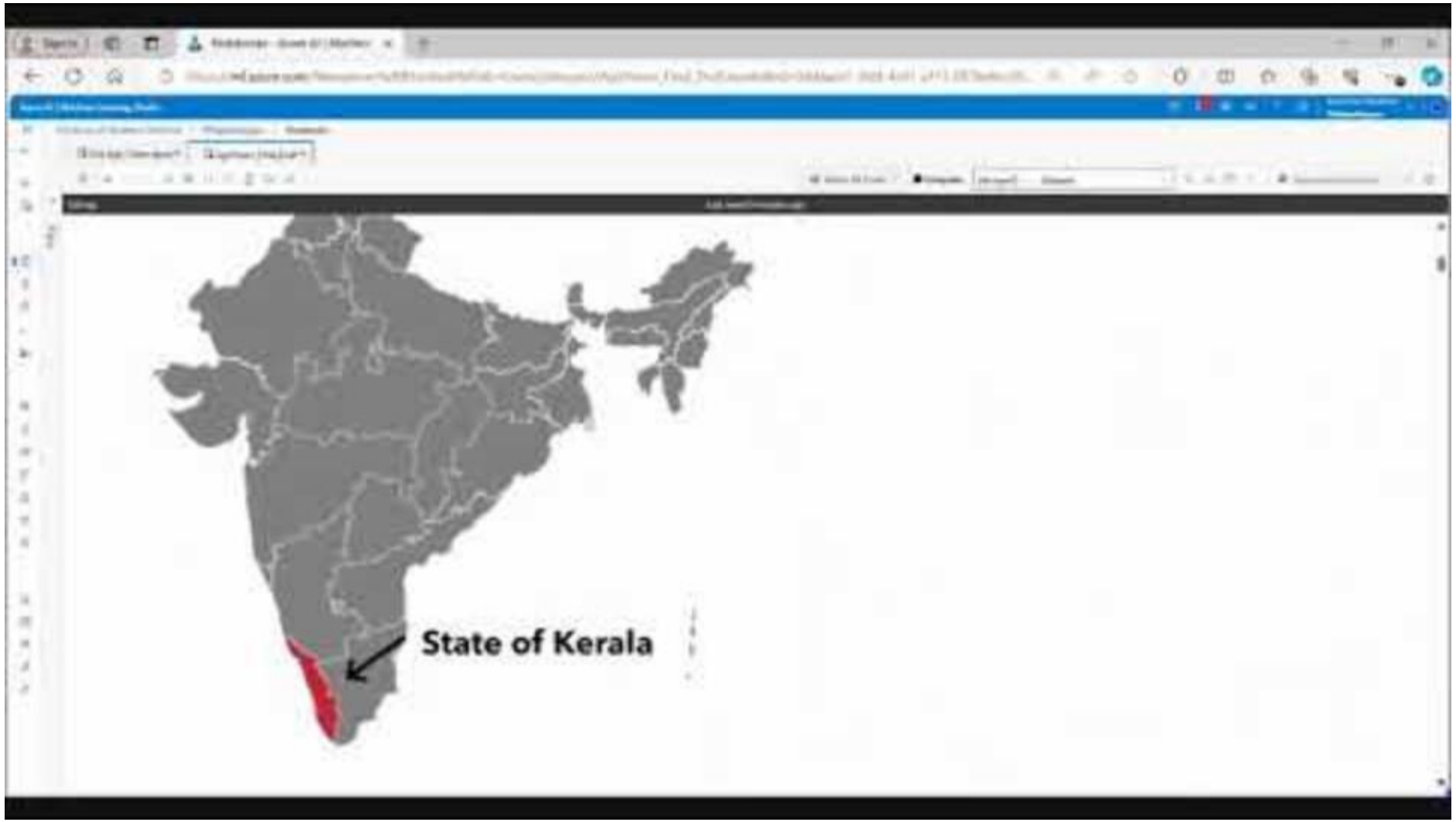
Copilot

OpenAI

```
35
36  for i, image_url in enumerate(post_event_images):
37      if i < len(axes) - 1:
38          plot_ndvi_image_from_url(image_url, axes[i])
39
40  # Function to read NDVI image
41  def read_ndvi_image(image_path):
42      try:
43          with rasterio.open(image_path) as src:
44              ndvi = src.read(1)
45          return ndvi
46      except Exception as e:
47          print(f"Error reading {image_path}: {e}")
48          return None
49
50  # Read the first pre-event and post-event NDVI images
51  pre_event_ndvi = read_ndvi_image(pre_event_images[0])
52  post_event_ndvi = read_ndvi_image(post_event_images[0])
53
54  # Check if images were loaded successfully
55  if pre_event_ndvi is not None and post_event_ndvi is not None:
56      # Calculate NDVI loss
57      ndvi_loss = pre_event_ndvi - post_event_ndvi
58
59      # Plotting NDVI loss
60      im = axes[-1].imshow(ndvi_loss, cmap='coolwarm')
61      axes[-1].set_title('NDVI Loss: Pre-Event vs Post-Event')
62      axes[-1].axis('off')
63      fig.colorbar(im, ax=axes[-1])
64  else:
65      print("Failed to load one or both of the NDVI images.")
66
67  plt.tight_layout()
68  plt.show()
69
70
71
72
73
```



Demo: Azure Storage & Azure ML Studio Notebook



Key Takeaways and Recommended Action

Empowering Global Disaster Management and Human Security with Azure AI

Leverage Azure ML for Impact Analysis:
- Enable local authorities to utilize Azure ML for disaster impact analysis.

Integrate Insights into Policy and Planning:
- Equip stakeholders with accessible technology for disaster preparedness and response.

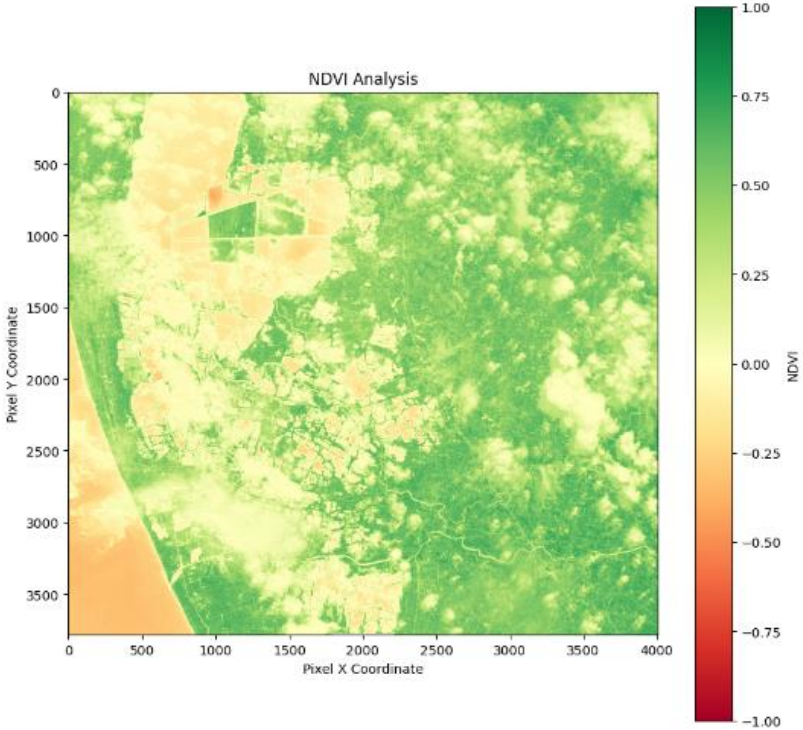
Enhance Efficiency and Cost-Effectiveness:
- Streamline data processing to reduce costs and deliver actionable insights.

Support Vulnerable Populations:
- Promote scalable, low-cost disaster preparedness methods for underserved communities.

Achieve Long-Term Benefits:
- Ensure sustainable disaster management for protecting lives and agriculture.

Stop/Start:
- Transition from traditional methods to advanced analytics and remote sensing.

Self-Sufficiency, Efficiency, and Cost Reduction:
- Empower authorities to simplify workflows and reduce IT infrastructure needs.



Agrivision result with Azure ML change detection calculating Sentinel-2 satellite imagery of study area to determine scale and duration of 2018 Kerala flood impact