

FIRST FOCUS

AI software that detects
natural disasters from aerial
imagery to identify and
prioritize areas for emergency
response

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2004 Indian Ocean Tsunami
2005 Kashmir earthquake
2005 Hurricane Katrina
2008 Sichuan
Earthquake/Landslide, China
2008 Cyclone Nargis, Myanmar
2010 Haiti Earthquake
2010 Pakistan floods
2011 Tōhoku Tsunami, Japan
2013 Uttarakhand floods, India
2013 Typhoon Haiyan, Philippines
2017 Hurricane Maria, Puerto Rico
2018 Camp Fire, Paradise CA
2021 Mayfield Tornado, KY
2022 Pakistan floods
2023 Turkey–Syria Earthquakes
2023 Morocco Earthquake
2023 Maui (Lahaina) fire, Hawaii
2024 Noto Peninsula earthquake
2024 Hurricane Helene
2025 Myanmar earthquake



HOURS

VALUE PROPOSITION

- Ranks areas by severity so responders go to highest-need spots first
- Identify blocked roads and possible heli landing zones for easier accessibility
- Works across earthquakes, floods, wildfires, cyclones, and landslides from one pipeline



DISASTER MODEL

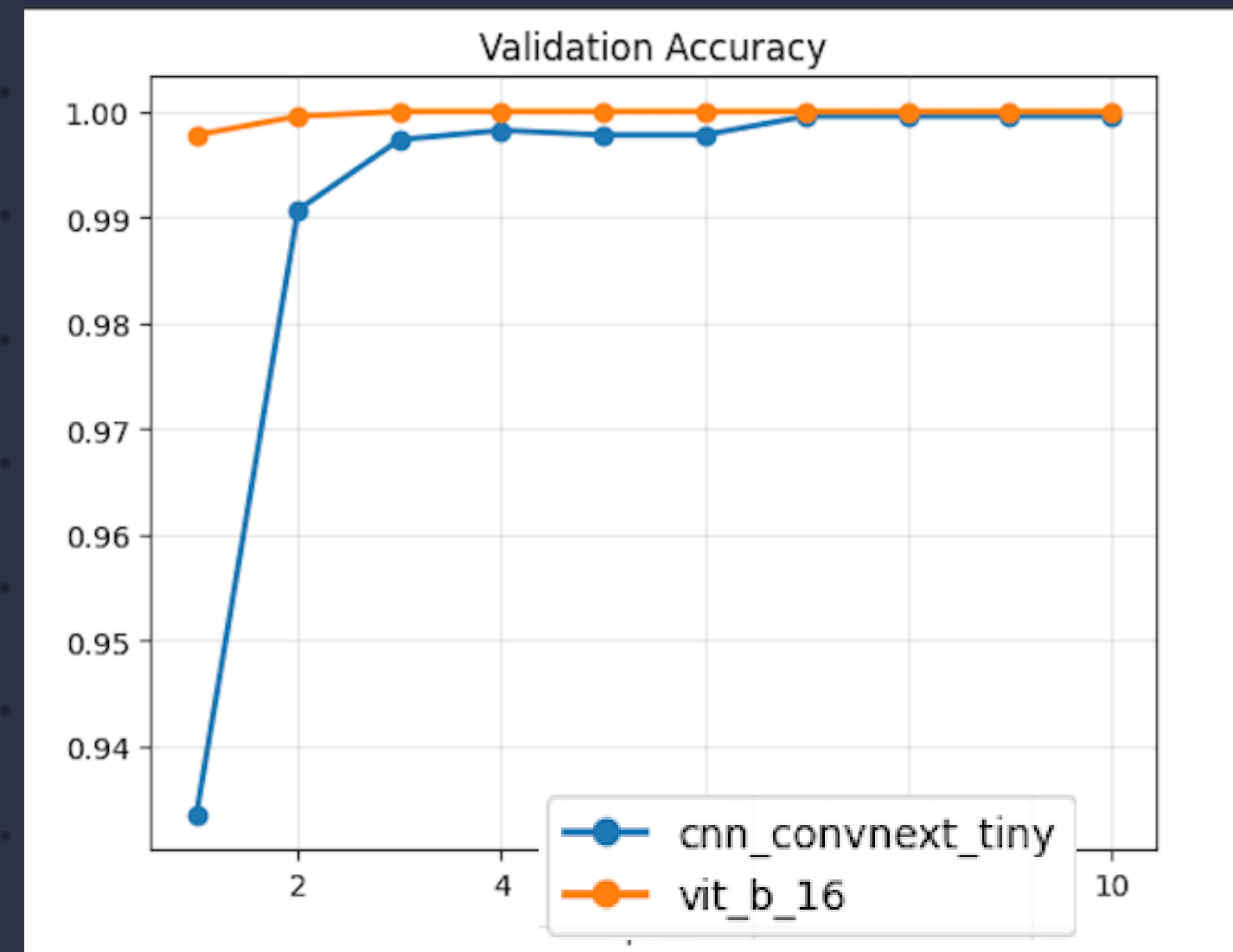
Input

Aerial Image

Output

Disaster Probability

ViT-b-16 vs CNN (ConvNeXt-Tiny).



DISASTER MODEL

13207 normal images
1827 disaster images

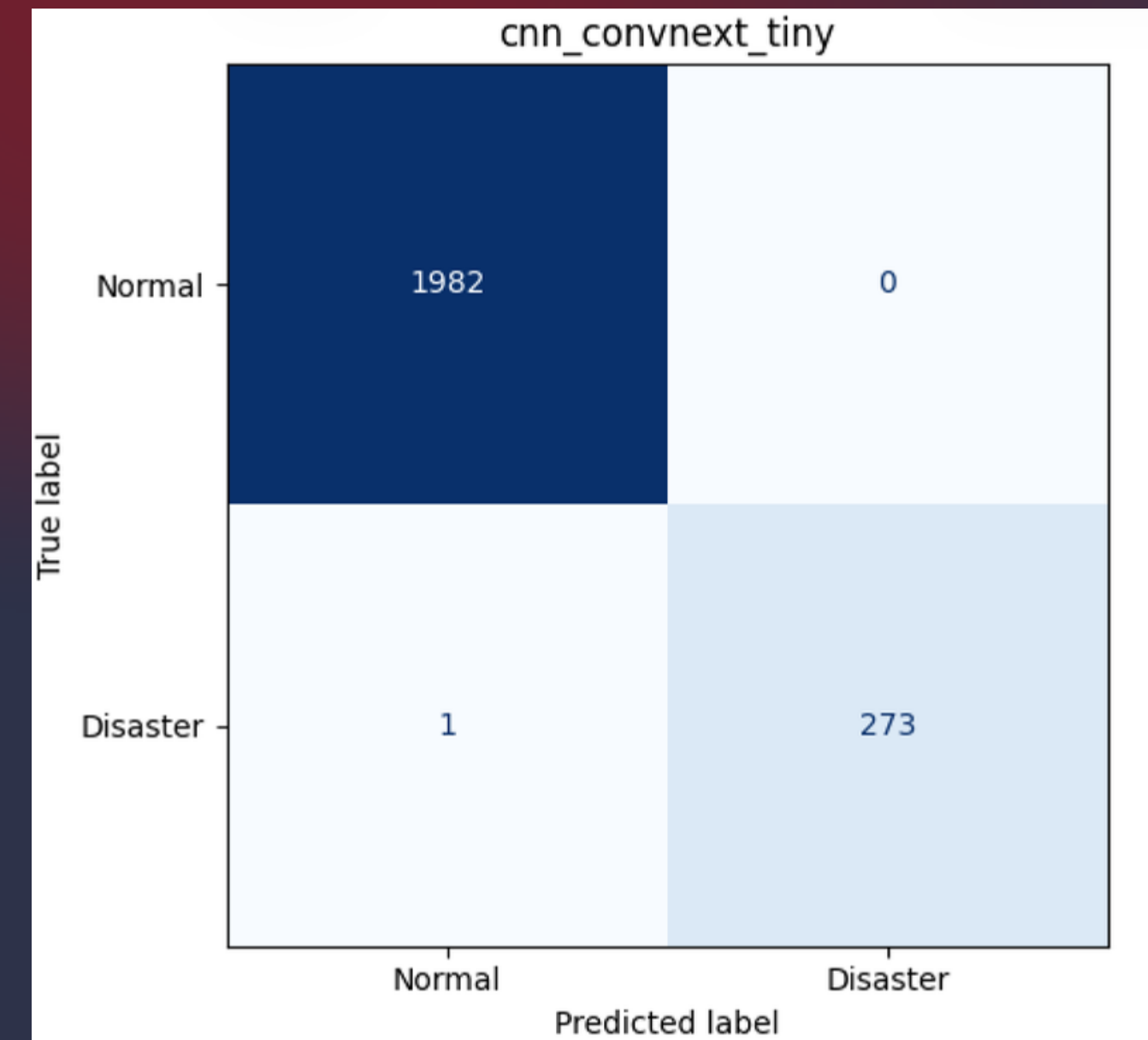
70% towards training

15% towards validation

15% towards testing

10 epochs

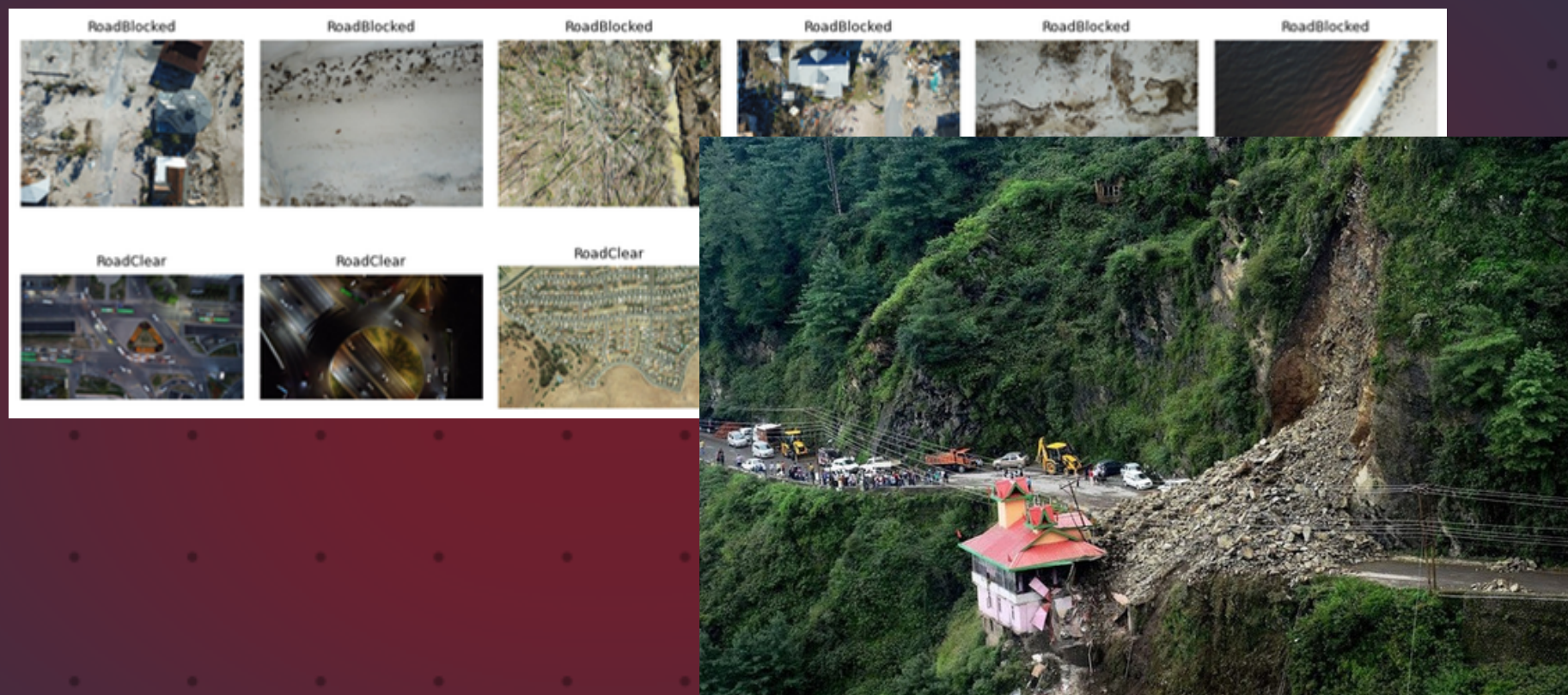
batch size = 64



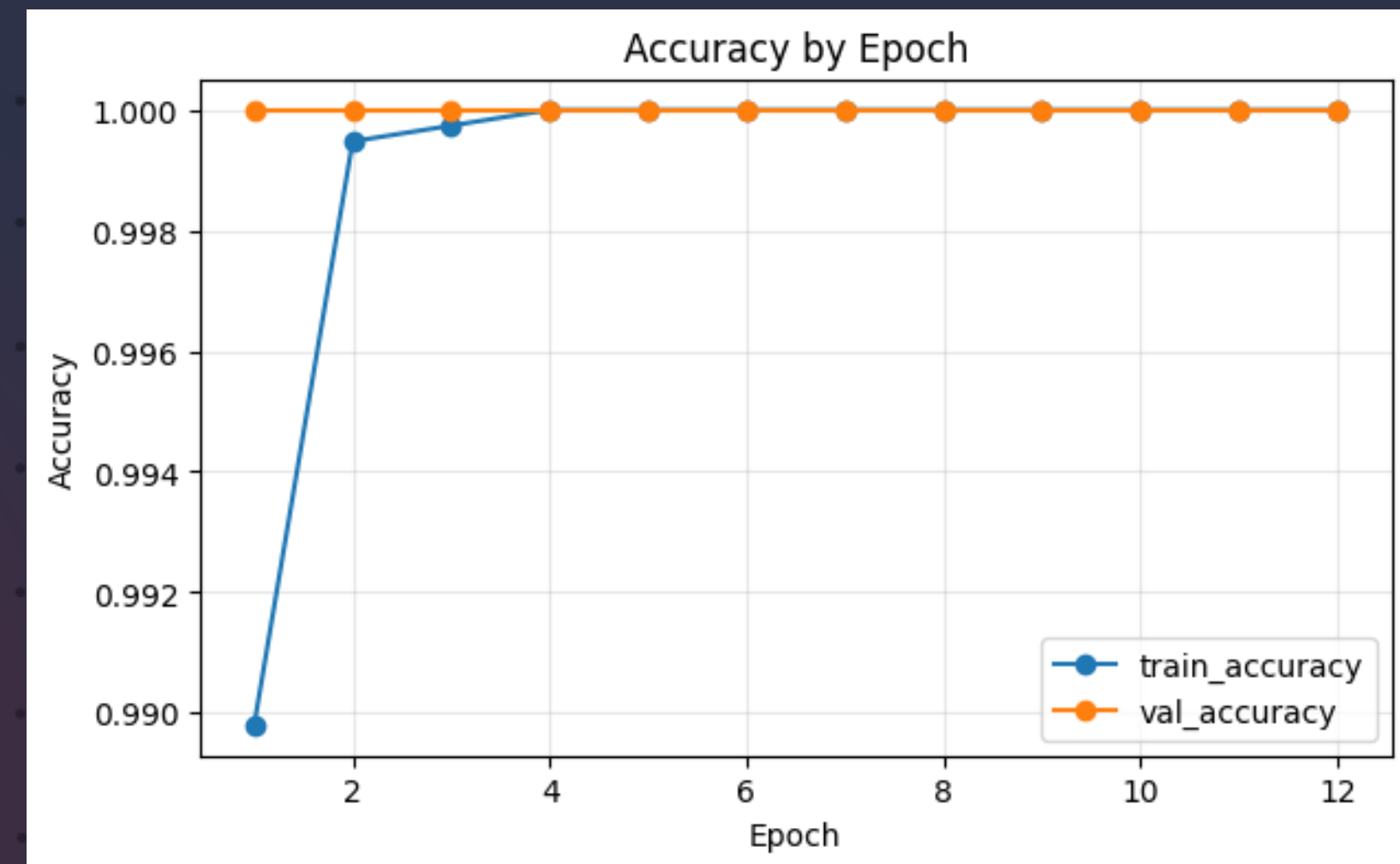
Accuracy: 0.999557, Weighted Accuracy: 0.997882, Precision: 1, Recall: 0.99635, F1: 0.998172

ROAD ACCESS MODEL

- Scans uploaded aerial image for road conditions
- Classifies image patches as Clear Road or Blocked Road
- Outputs probability that road is inaccessible



ResNet50 CNN model



ROAD ACCESS MODEL

1870 good images
3595 broken images

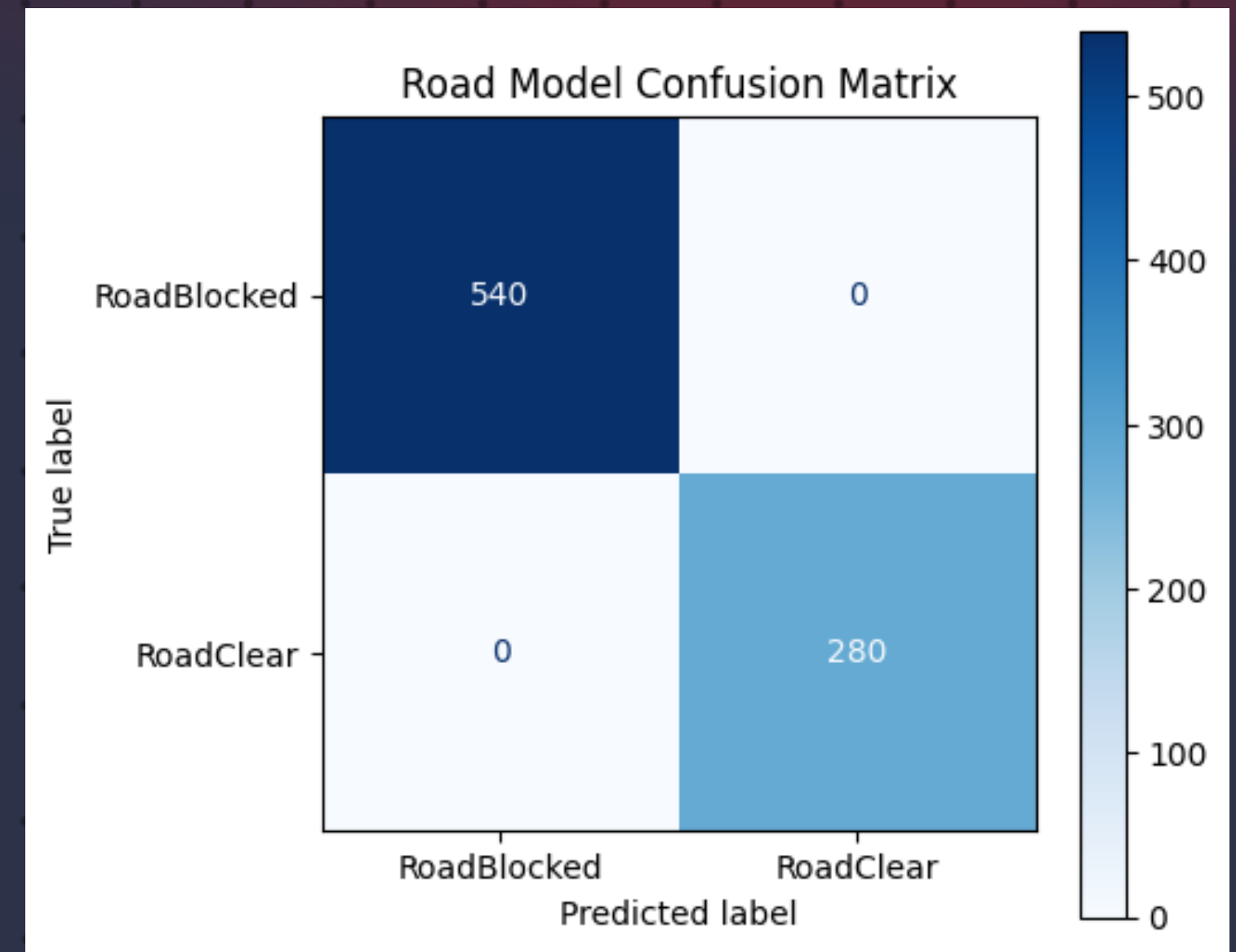
70% towards training

15% towards validation

15% towards testing

12 epochs

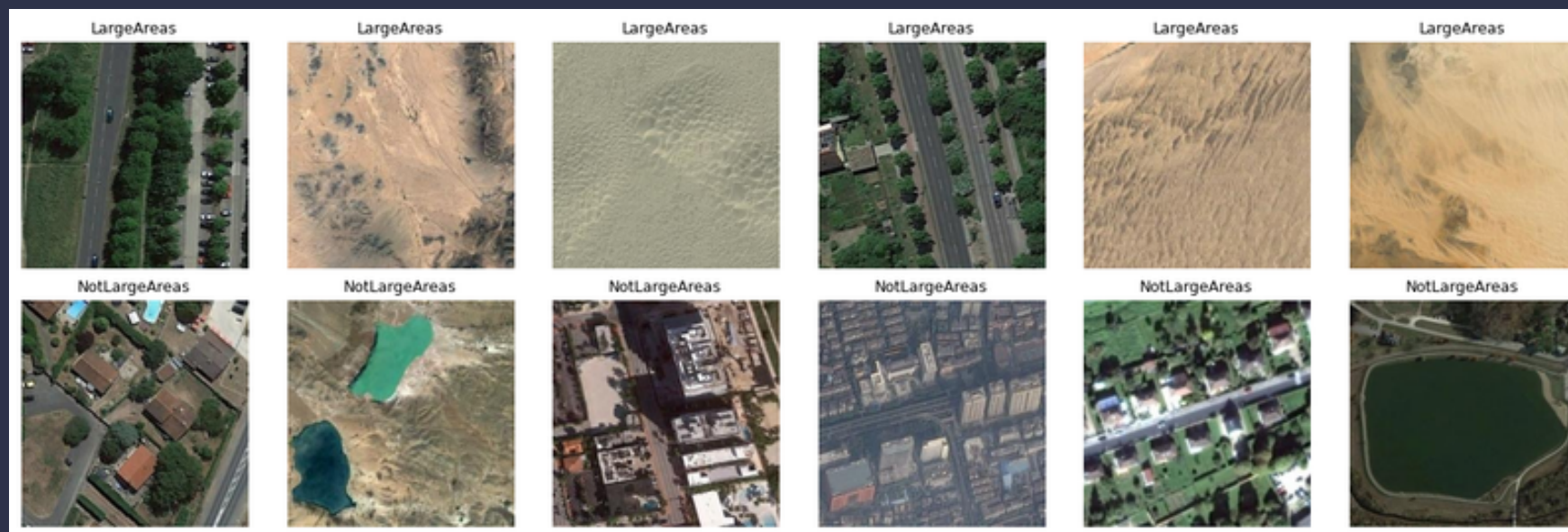
batch size = 32



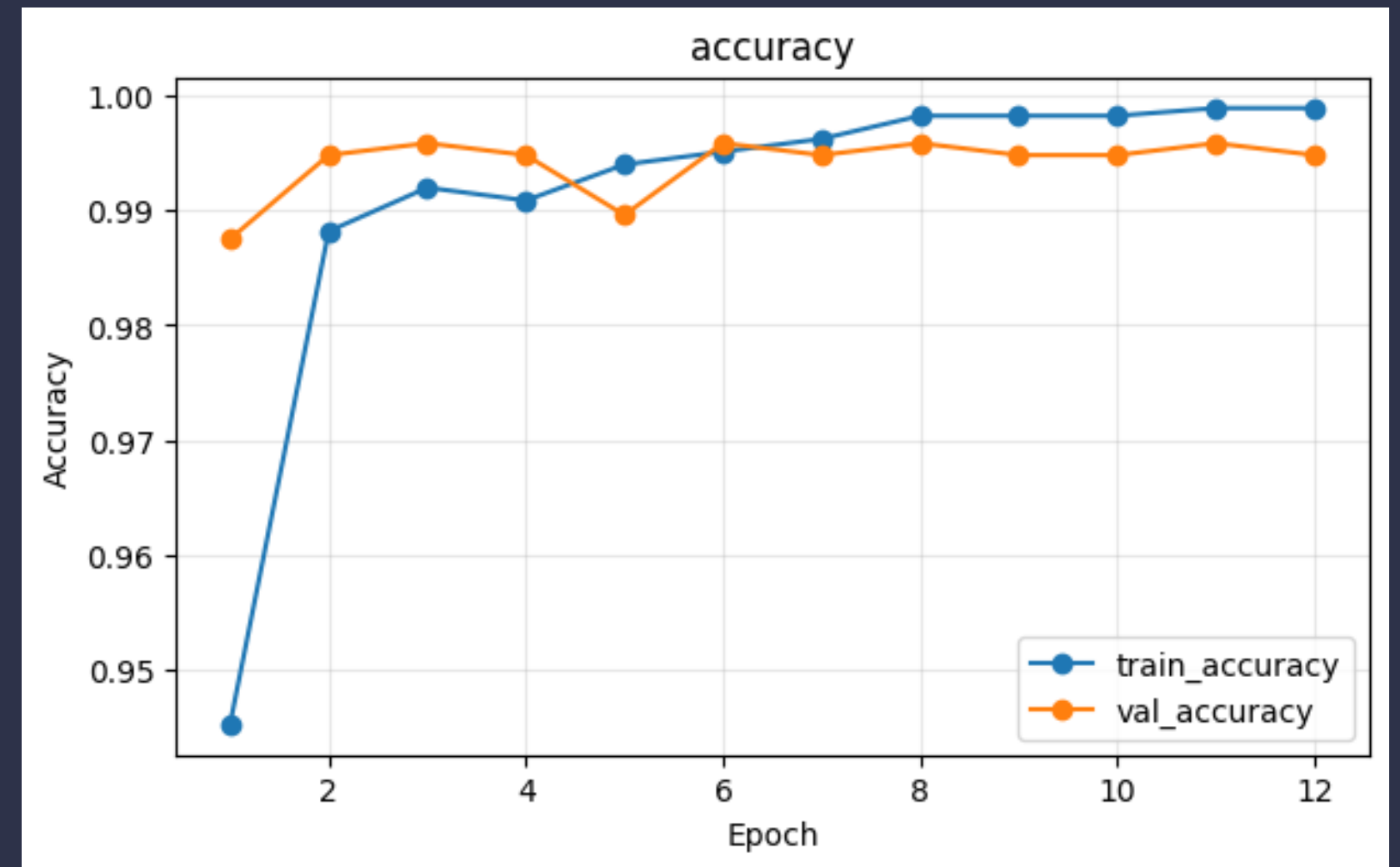
Accuracy: 1.0 Precision: 1.0 Recall: 1.0 F1: 1.0

HEL LANDING AREA MODEL

- Searches patches for open landing areas (stadiums, parking lots, fields) in the case of blocked roads
- Classify patch as Large Area or Not Large Area
- Draws bounding boxes around likely landing locations



Resnet50 CNN Model



HEL LANDING AREA MODEL

3200 large
3200 not large

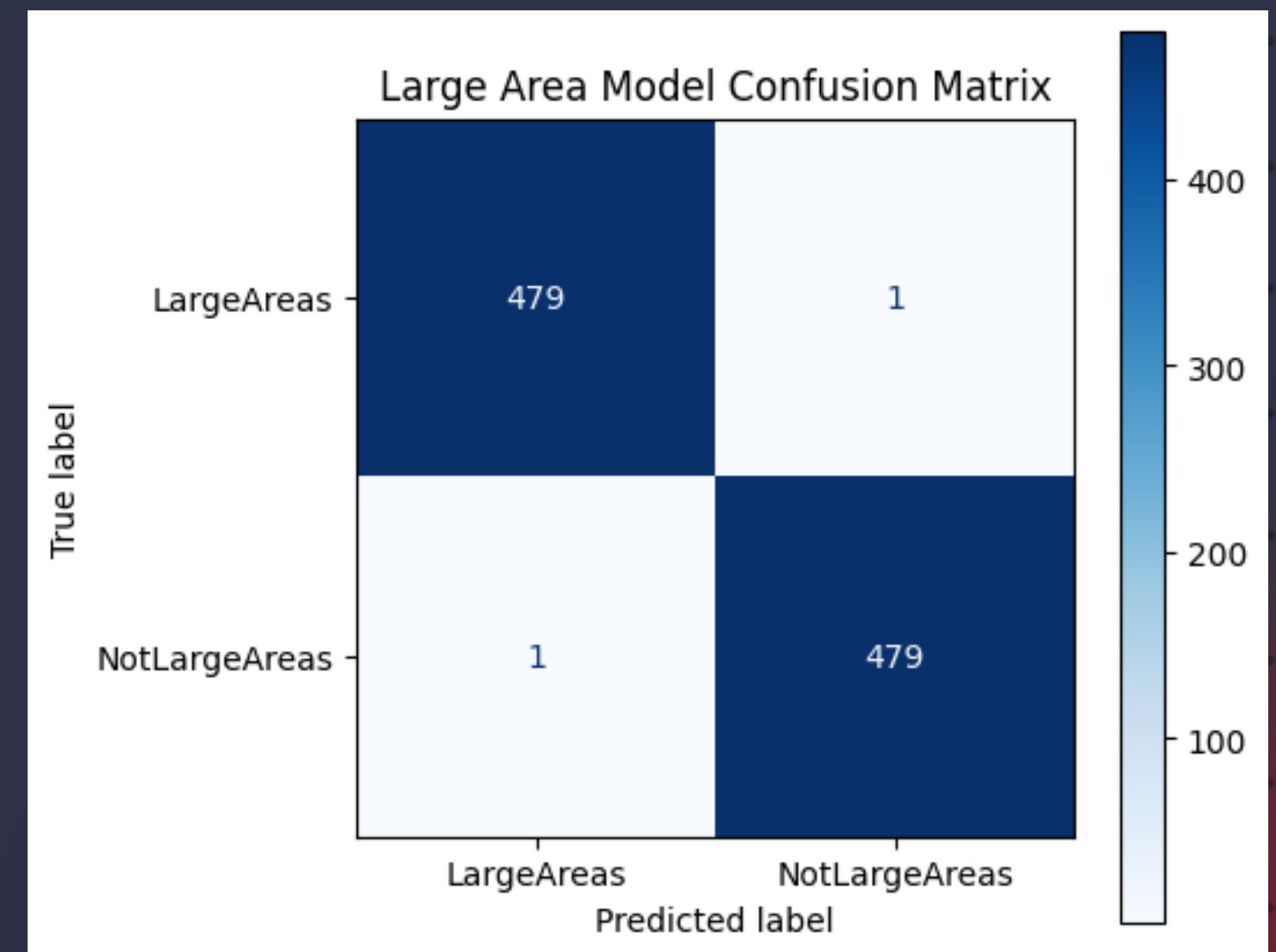
70% towards training

15% towards validation

15% towards testing

12 epochs

batch size = 32



Accuracy: 0.9979, Precision: 0.9979, Recall: 0.9979, F1: 0.9979

USER FLOW

User uploads aerial image and enters population per grid



Split uploaded image into 12 grids



Ranks emergency priority across the 12 sections



Scan for roads and warn if road access may be blocked

Scan for possible helicopter landing zones

Urgency score = Image score * 0.65 + population * 0.35
Darker red color indicates higher urgency.
Outputs explanations for rankings as well as urgency scores.



Scores and Rankings

rank	grid	row	col	population	population_score	disaster_score	urgency_score
1	6	2	2	5	1	0.9819	0.9882
2	5	2	1	5	1	0.9095	0.9412
3	7	2	3	4	0.8	0.9925	0.9252
4	1	1	1	3	0.6	0.9827	0.8488
5	2	1	2	3	0.6	0.9616	0.835
6	3	1	3	4	0.8	0.8512	0.8333
7	4	1	4	4	0.8	0.7976	0.7984
8	10	3	2	3	0.6	0.8275	0.7479
9	8	2	4	4	0.8	0.6962	0.7325
10	11	3	3	4	0.8	0.6497	0.7023
11	9	3	1	5	1	0.4664	0.6531
12	12	3	4	4	0.8	0.4341	0.5622



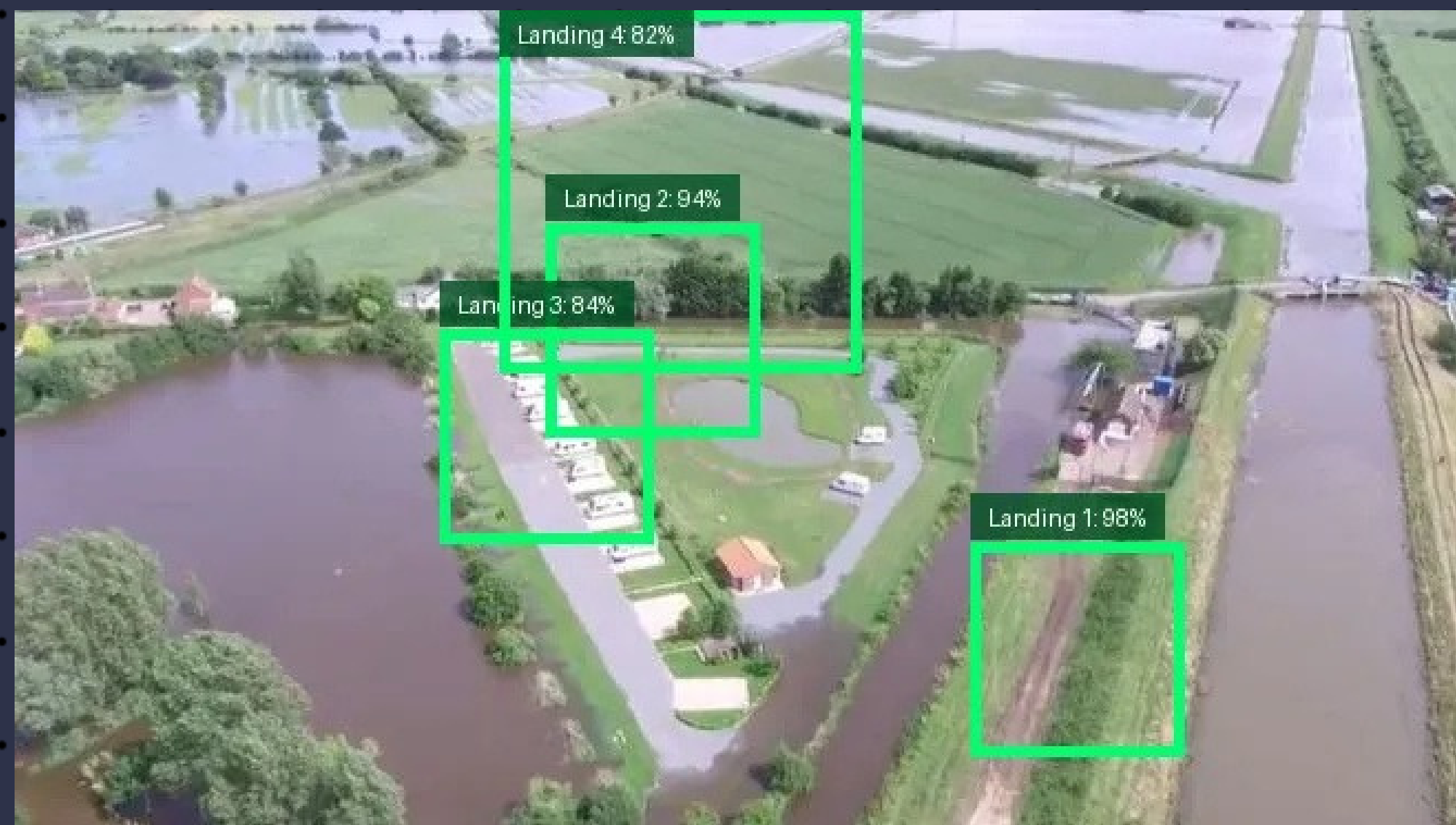
Grid Visualization

Road warnings

Watch out! There is a **94.6%** chance the area is inaccessible due to blocked roads. Here are 4 possible helicopter landing locations or staging areas.



Identified Possible Landing Areas







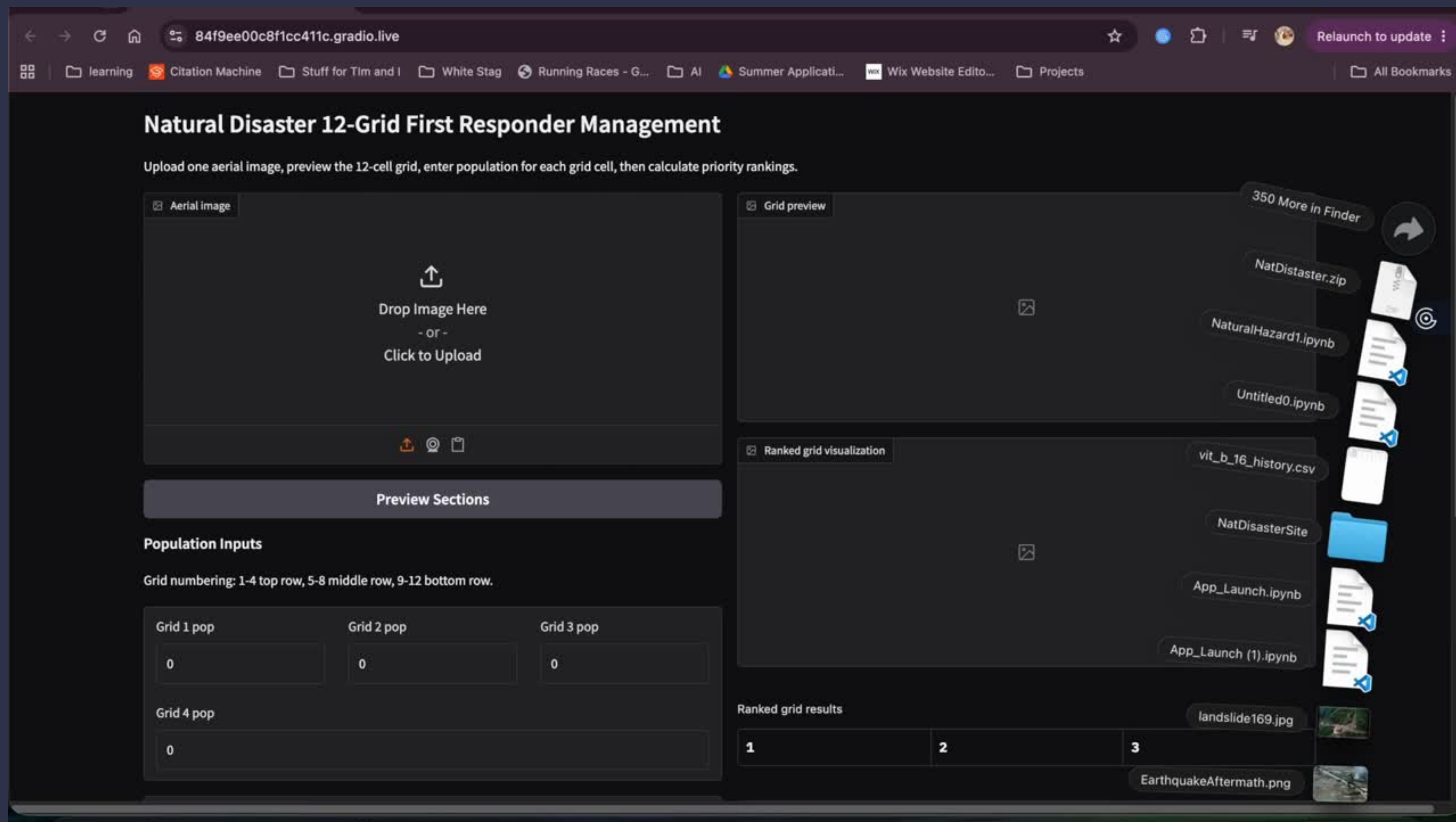
Preview Sections

Population Inputs

Grid numbering: 1-4 top row, 5-8 middle row, 9-12 bottom row.

Grid 1 pop	Grid 2 pop	Grid 3 pop	Grid 4 pop
3	3	4	4
Grid 5 pop	Grid 6 pop	Grid 7 pop	Grid 8 pop
5	5	4	4
Grid 9 pop	Grid 10 pop	Grid 11 pop	Grid 12 pop
5	3	4	4

Calculate Rankings



MARKET ANALYSIS

- Populations exposed to natural disasters are increasing
- Recurring need
- Infrastructure growth leads to more need for timeliness



Regional and national emergency management agencies, humanitarian orgs, possible insurance

COMPETITIVE ADVANTAGE

- Damage-assessment datasets and models mostly focus on structural damage labeling
- xBD/xView2-style building damage classification
- Not limited to only one natural disaster

NASA's ARIA program

produces earthquake
damage maps, but too slow

USGS's Earthquake Disaster Assistance

PROOF OF CONCEPT

“For more rural areas with a lot of people off grid ... and with less incorporated roads, it would be useful in that rural setting”

“It would be useful to be able to make real time map adjustments for the occupants and residents in the area”

“I can see this helping out some day and I hope this kind of system eventually gets incorporated”



FUTURE STEPS

- Partner with a regional emergency response team or fire department to test against a real or simulated disaster scenario
- Consider historical patterns in terms of similar natural disasters to the area
- Create offline capability

THANK YOU

Canva

Natural Disaster 12-Grid First Responder Management

Load one aerial image, preview the 12-cell grid, enter population for each grid cell, then calculate priority rankings.

Aerial image

Drop Image Here

- OR -

Click to Upload

Preview Sections

Calculation Inputs

Numbering: 1-4 top row, 5-8 middle row, 9-12 bottom row.

Grid 1 pop	Grid 2 pop	Grid 3 pop	Grid 4 pop
Grid 5 pop	Grid 6 pop	Grid 7 pop	Grid 8 pop
Grid 9 pop	Grid 10 pop	Grid 11 pop	Grid 12 pop

Calculate Rankings

Grid preview

Ranked grid visualization

Ranked grid results

Possible helicopter landing areas