The Alan Turing Institute

RESCUE GLOBAL

Lloyd's Register Foundation

UK SPACE AGENCY

ZOONIVERSE

Engineering and Physical Sciences Research Council

See the full story and others like it at **turing.ac.uk/impact**

Impact story

A machine learning revolution in disaster response

When natural disasters strike, emergency responders need all the intelligence they can get, fast. Turing researchers have combined crowd-sourcing, machine learning and neural networks to rapidly reveal what's happening on the ground.

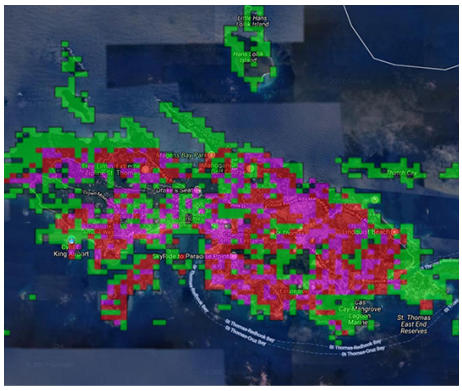
- Responding to natural disasters is complex, with limited knowledge of what's happening on the ground.
- Turing Fellow Steve Reece, a Group Leader of the Turing's Data-centric Engineering programme, is addressing this urgent problem.
- With partners Zooniverse and Rescue Global, Reece's team developed the Planetary Response Network (PRN) – a mix of crowd-sourcing and machine learning to supply rapid wide-area situational awareness to rescue organisations.
- The PRN shows online volunteers 'before' and 'after' satellite images and they mark detrimental changes.
- Machine learning is deployed to identify which data are the most accurate, and damage 'heatmaps' are created, showing where emergency resources are needed.
- After deadly hurricanes Irma and Maria in the Caribbean, 7500 people made 300,000 classifications in satellite images in just three days. The resulting heatmaps aided the United Nations, FEMA and over 60 NGOs with relief efforts.
- The system has now been augmented with neural network technology, which learns from humans how to label images automatically, saving precious time.

Impact

- Takes the best of human capability and rapidly multiplies its power and impact through machine learning, saving lives.
- Virtually anything that humans can usefully discover from imagery or sound can ultimately be automated by the system.
- PRN deployed when Hurricane Dorian battered the Bahamas in September 2019.

"We can use the trained neural net to label the images of entire regions – even entire countries – automatically."

Steve Reece, Turing Fellow



Heatmap showing building damage in the US Virgin Islands from Hurricane Maria.