NextWave Data Science Challenge 2020

Welcome!

This year, up to 10,000 university students will use data science approaches to help bushfire authorities streamline fire mapping.

You're in good company

Thank you for volunteering to compete in this private version of the challenge with 100+ other passionate people. Your participation will help to shape the participant experience for university students. We look forward to receiving your valuable contributions. We are seeking feedback, content (e.g. getting started tips) and/or code to help refine the challenge and ensure a high-quality experience.

Team up

We hope you enjoy this opportunity to make friends and learn new skills. You are welcome to form a team with other participants and collaborate on the challenge.

On your marks, get set, go!

The Challenge opens on the EY Data Science Platform starting **5 October 2020** and closes on **25 November 2020**.

Check out this document for an overview of the key details of the 2020 Bushfire Challenge and steps you can take now to get started.

Warmest regards,

The Data Science Challenge team

This document contains a description of the 2020 Challenge and links to the resources you'll need to take part.

There are two related challenges available for you to complete. Both challenges are designed to help streamline the process of bushfire mapping for bushfire authorities.

Challenge 1

Fire-edge mapping from airborne imagery
(opens 5 OCT)

Challenge 2

Fire-edge mapping from satellite imagery
(opens 12 OCT)

Winners of the 2019 NextWave Data Science Challenge in New York City with Beatriz Sanz Saiz (Global Data & Analytics Leader, EY) and Carmine Di Sibio (CEO, EY).

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Getting started

Before you begin digging into the data, there are a few steps you need to take.

1. **Sign up** for the [EY Data Science Platform](#). This is where you'll submit your results. You can join teams on the platform too.

2. **Setup your technology**: You'll need a data science environment where you can explore data sets, experiment with analytics and build your solution to the challenge. Follow this guide to [deploy your Azure environment](#).

3. **Ask for help** in the [Troubleshooting](#) MS Teams channel if you get stuck with technology issues.

4. **Learn** about bushfire mapping and ask bushfire related questions in the [Bushfire Science channel](#) on MS Teams.

Please note: MS Teams channels are accessible by individuals from EY, Geoscience Australia, the Country Fire Authority, Swinburne University and other collaborating organisations.

Steps	Topics	What we'll provide	What you'll do	What you'll achieve
0.1	Bushfire mapping and how you can help	‣ Information about bushfire management and mapping ‣ Link to the EY Data Science Platform ‣ Access to the MS Teams collaboration platform	Learn about the current approach to fire-edge mapping and the opportunity to help streamline the system. Log in to the EY Data Science platform and form a team if desired.	An understanding of your opportunity to help improve bushfire management using Data Science
0.2	Deploying your Data Science environment	‣ A guide to deploying your environment in Azure.	Set up an environment in Azure and open Jupyter notebooks.	Access to a suitable compute environment
0.3	Competing and winning	‣ An explanation of the leaderboard used to score your submissions.	Learn how your results will be assessed on a leaderboard.	An opportunity to have fun, learn new skills and maybe even win a place in the finals!

Challenge 1

Fire edge mapping from airborne imagery

During bushfire season, bushfire managers require timely, accurate information about the location and rate of spread of active fires.

To collect this information, aircraft carrying infrared cameras fly over and record the intensity and location of fires. The camera scans the fire in lines to construct an image. This image is known as an 'infrared linescan'.

The infrared detector can 'see' the fire in great detail, providing a much better view of the fire than the human eye.

Before the image can be used it needs to be converted into a map. Fire mapping officers convert infrared linescan images into maps by hand-drawing polygons around the edges of the fire using geospatial software. This takes time and creates a delay between image acquisition and informed decision-making.
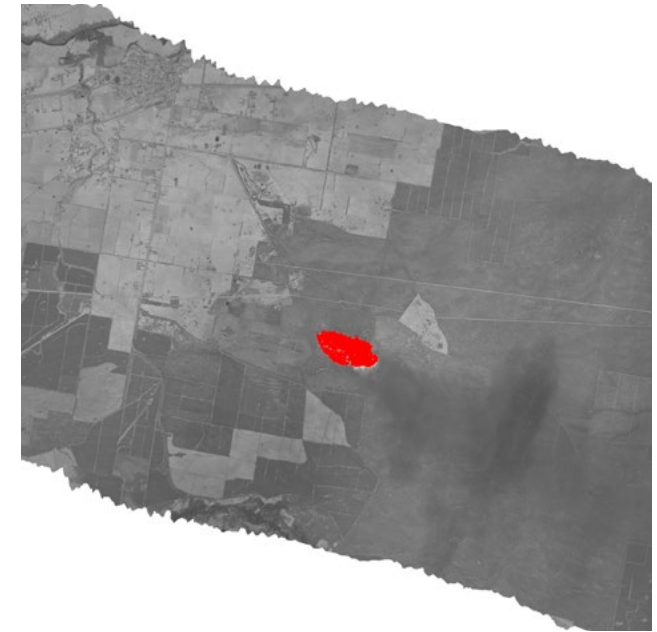
YOUR CHALLENGE

Your challenge is to create a system that automatically detects fire-edges in infrared linescan images.

To help you, mapping officers at Victoria's Country Fire Authority (CFA) have shared some fire-edge polygons from the 2018/19 fire season.

You can use the polygons provided by the CFA as calibration and validation data to build your system.

We will test your system by giving you a set of coordinates and asking you to tell us which coordinates are on fire, and which are not on fire.

Steps	Topics	What we'll provide*	What you'll do	What you'll achieve
1.1	Accessing infrared linescan images	‣ A guide to using Jupyter and python libraries to query infrared linescan images for selected geographic regions.	Load selected infrared linescan images following an example Jupyter notebook.	Capability to visualise infrared linescan images
1.2	Detecting fire-edges in infrared linescan images	‣ Suggestions for getting started with analysing linescan images to detect fire-edges.	Build a system to detect fire-edges in infrared linescan images.	Capability to detect fire-edges in infrared linescan images
1.3	Submitting results	‣ A guide to making a submission on the EY Data Science platform.	Submit results from your fire-edge detection system. Refine your model over time to achieve higher scores.	A place on the leaderboard

*Visit the EY Data Science Platform to download these resources

Challenge 2

Fire edge mapping from satellite imagery

Airborne infrared linescan images are currently considered one of the best sources of information about fire intensity and location. However, there are times when it is not possible to acquire infrared linescan imagery.

This may be because there are not enough aircraft available to map all actively burning fires. It may be because weather conditions are poor, and it is not safe to deploy an aircraft.

An alternative source of images for fire mapping are satellites. The availability and resolution of satellite imagery has increased substantially in recent years. This makes it possible to monitor bushfires from space.

Satellite imagery is not always available, and won't replace airborne imagery soon, but is a valuable complement.

Please note: this challenge opens on 12 October 2020. The resources mentioned on this page will not be available until the challenge opens.

YOUR CHALLENGE

Your challenge is to create a system that automatically detects fire-edges in satellite images.

There are many sources of satellite data available, so we have curated a set of useful satellite imagery for you. However, you may use other sources of satellite imagery if you like.

You can use the polygons provided by the CFA as calibration and validation data to build your system.

We will test your system by giving you a set of coordinates and asking you to tell us which coordinates are on fire, and which are not on fire.

Steps	Topics	What we'll provide*	What you'll do	What you'll achieve
2.1	Accessing satellite images	‣ A guide to using Jupyter and python libraries to query the Open Data Cube (ODC) and return satellite images for selected geographic regions.	Load selected satellite images following an example Jupyter notebook.	Capability to visualise satellite images
2.2	Detecting fire-edges in satellite images	‣ Suggestions for getting started with analysing satellite images to detect fire-edges.	Build a system to detect fire-edges in satellite images.	Capability to detect fire-edges in satellite images
2.3	Submitting results	‣ A guide to making a submission on the EY Data Science platform.	Submit results from your fire-edge detection system. Refine your model over time to achieve higher scores.	A place on the leaderboard

*Visit the EY Data Science Platform to download these resources

Good luck and have fun!

Thank you to our collaborators for making this challenge possible.