The
**Alan Turing**
**Institute**

# Peak District National Park Authority
# Replacing human interpretation of land cover in the Peak District with a deep convolutional neural network

**TINDSG-006**

**#deeplearning #datastudygroup**

## About the Organisation

[The Peak District National Park](#) was the first of Britain's 15 national parks and is enjoyed by millions of people every year, looking for both adventure and a breathing space to escape. It is one of the busiest national parks in the world due its proximity to four major cities of the UK and its 38,000 residents. We recognise the importance of our national park and our job is to speak up and care for the Peak District National Park for all to enjoy forever.

No element of the national park landscape is untouched by past or present human activity. However, new technologies, climate change, more people and changing lifestyles mean that our potential to change the environment and the appearance of the landscape is far greater now than in any previous generation.

Currently however, there is no standard way of monitoring these changes to the landscape and this makes it difficult to target our efforts. We need to be able to measure the changes that are already occurring, as well as the effect of the improvements we make.

## Role Description and Responsibilities

This research involves the investigation and development of image classification using deep-learning for land cover assessment across the Peak District National Park.

Historically, the Monitoring Landscape Change in the National Parks project (Bird et al, 2000; Taylor et al, 2000) was the last complete census of the land cover in the National Parks (approximately 14,000 km2) using medium scale aerial photography (1:20,000 - 1:25,000) flown in the early 1970s by Ordnance Survey and the late 1980s by ADAS. However, this was a massive undertaking of resource, taking almost 3 years for highly trained experts to complete the land cover census for the UK's National Parks. Therefore, we need a repeatable, accurate and above all cost effective way of measuring land cover change across this large dynamic and varied landscape.

The Peak District National Park together with Cranfield University have started to explore ways to address this problem through automatic classification of land-cover and land-cover change. The main problems to overcome are the variation in the appearance of the same land-cover types across different images. Using sample data collected so far, and the latest high resolution aerial photography you will refine, train and test automated classification methods that are suitable for deploying automated classification at a landscape scale.

You will be working on this challenge full time with support and supervision where required.

Your responsibilities will include:

- Solving challenging business problems using advanced machine learning methods such as Deep Learning and quantitative analytics.
- Cleaning, aggregating and interpreting data in preparation for analysis.
- Extract information from aerial photography and satellite imagery.
- Explore the latest technology approaches as applied to this problem and contribute new methodological approaches where possible.
- Use open-source software tools and Python for image classification.

## Expected Outcomes

- Development of, and implementation of a state-of-the-art model for assessing landcover in the context of replacing human visual interpretation.
- Production of an academic paper which documents the methods developed, results, discussion and recommendations.

The internship will also be instrumental in the preparation of a Data Study Group challenge that will follow on and expand the intern's work with the organisation. The intern will have the opportunity to represent the organization during the Data Study Group.

## Supervision and Mentorship

You will be working with and supervised by the Peak District National Park and Cranfield University. National Park staff are experts in managing the landscape and can offer context and wider knowledge about the project through meetings and fieldtrips when required. You will also be directly supervised by Lectures in Remote Sensing from Cranfield University's Centre for Environmental and Agricultural Informatics, accessing their expertise and experience in this field.

## Ideal Intern

The ideal candidate should have:
- An interest in physics, earth observation or image analysis
- Practical experience of coding in Python.
- Knowledge of machine learning modelling techniques and neural networks
- You should be experienced in using specialized machine learning tools e.g. Tensorflow, pytorch, sci-kit learn, etc.
- Must demonstrate capacity for reading, understanding and implementing new techniques in the field of machine learning as they emerge.
- Strong verbal/written communication & data presentation skills are recommended.

## Internship Logistics

**Start Date**: September 2022
**Duration**: 6 Months
**Location**: Fully remote working, with potential for meetings at the Peak District National Park and Cranfield University
**IT**: You will be expected to use your own PC, software will be open source
**Remuneration**: £30,000 p/a pro rata

**Benefits:**

We offer a range of staff benefits including flexi-time, a great pension with employer contribution of 19.57%, 25 days holiday plus bank holidays and free parking at most of our offices. Please see our Total Reward Brochure to see what we offer.

**Flexible Working:**

A range of flexible working options would be considered.

**Equality, Diversity and Inclusion:**

The Peak District National Park Authority is committed to equal opportunities. We aspire to have a diverse and inclusive workplace and strongly encourage applicants from a wide range of backgrounds to apply and join us.

If you would like to discuss this, please contact David Alexander | Senior Data and Research Analyst on; david.alexander@peakdistrict.gov.uk