

# DSC-89 Georeferencing historical aerial images

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This project aims to use data science techniques to automatically georeference historical aerial imagery. We are working with Welsh Government using their extensive catalogue of aerial images for Wales. Successful georeferencing of images would create a time-series of aerial images.

## Team members

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## The need

The Welsh Government have an archive of around 400,000 aerial images for Wales that date back to the 1940's. These provide a valuable record historical changes in land use and land cover.

However, the data have limited information about their location. This makes using them, to compare with each other or contemporary topography, a cumbersome and expensive manual task. As modern aerial imagery is automatically registered when captured, the skills to undertake this task manually are being lost as those with the requisite knowledge are retiring.

This project will use techniques from image matching and spatial data science to locate and align imagery to a common reference system. The imagery would then be made openly available through the <http://lle.gov.wales> geoportal.

The project is deemed by the Welsh Government to be a 'generational' project as to geo-register each image manually themselves would take around 60 years with a full-time member of staff. Alternatively, at third party rates of £15 per image, the full archive would cost around £6,000,000 to geo-locate. Neither of these options could be resourced by the Welsh Government.

## Impact

Geo-referenced historical imagery provides a valuable resource to the public as a record of how landscapes in Wales have changed. The current resource is also used extensively, for example in research into deforestation, green space, coastal erosion, common land shrinkage and for various legal purposes, including evidence in land title disputes, and even murder inquiries.

Historical imagery archives exists across the public and third sectors e.g. <https://ncap.org.uk/search?view=map> with similar problems in terms of registration. Developed methods would help in the production of resources with cross-cutting impact e.g., for managing environmental change, management of cultural assets, registration of land, as well as also managing risks around loss of manual skills of photo interpretation and registration.

## Data science

Automatic registration of imagery is an active area of research in a number of fields (e.g. image processing, GI science) and whilst approaches exist it remains an open problem. The size of the archive and area over which it will be mapped makes this a challenging problem which requires data science and engineering approaches to tackle.

The Campus has a level of expertise in using imagery e.g. in the Urban Forest and Residential Greenspace projects. This project can build on and further develop this capability.

## Stakeholders

- Welsh Government - the portal is a priority for Ministers and the Chief Digital Officer.
- Welsh Government Geography & Technology Team

## Code and outputs

Methods and a pipeline for image registration, and rectification of historical aerial imagery.

## Related and existing work

- <http://lle.gov.wales>
- <https://ncap.org.uk/search?view=map>
- <http://citiesatnight.org/>

## Delivery

- [x] **March 2019** Meeting with Welsh Government to discuss the project
- [x] **May 2019** Sample data obtained and discovery phase started

- [x] **June 2019** Discovery phase paused
- [x] **October 2019** Update meeting with Welsh Government to obtain more sample data
- [] **November 2019** Meeting with Welsh Government to discuss User Stories and obtain new data

### **Further information**

Please contact [datasciencecampus@ons.gov.uk](mailto:datasciencecampus@ons.gov.uk) for more information.

### **Updates**

- No updates yet.