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Mapping hedgerow gaps and fostering positive environmental behaviours through a combination of citizen scientists and artificial intelligence

Katie Parsons and Josh Wolstenholme

Energy and Environment Institute, University of Hull, Hull, United Kingdom of Great Britain – England, Scotland, Wales
(J.Wolstenholme-2018@hull.ac.uk)

To meet CO₂ reduction targets, the UK aims to plant c1.5 billion trees by 2050. Gaps within thousands of miles of hedgerows across the country are potentially suitable planting sites, but the extent of gaps and suitability for replanting are currently unknown. Maximising the potential growth of hedgerows however appears to receive relatively little attention compared with wide area tree planting. Hedgerow gaps present the opportunity for tree planting, contributing towards the annual tree-planting goals and net-zero CO₂ plan as part of Defra's 25-year objectives (HM Government, 2018), without requiring extensive land change.

Our ambitions of fostering a greener society and meeting net zero goals is heavily reliant on ensuring that children and youth are engaged with environmental concerns and have the right skills and knowledge for future careers. This project has been engaging with youth organisations to enhance their environmental and digital knowledge, whilst combining their input with state-of-the-art artificial-intelligence approaches. The open dataset created with public contributions will inform planting decisions whilst educating young people and citizens. The aligned education programme will provide resources detailing how new planting will drawdown CO₂, reduce flood risk and increase biodiversity availability, ultimately fostering the participants as agents of change in addressing the climate crisis.

Citizens will be trained in hedgerow surveying techniques, with focus on both remote sensing/geographic information systems applications (GIS) and field surveying - enabling contributions from home (during COVID) as well as encouraging outdoor activity and learning. Through a series of surveys and tasks, citizens are able to utilise a smartphone device (or similar) to contribute new data into an open survey on hedgerow characteristics, simple field experimental measurements and images/videos, all whilst utilising the GPS built into the device. The objectives of the project are two-fold: first, data collected by citizens will be used to refine an existing deep learning model trained to identify hedgerow gaps from high-resolution earth observation imagery. Second, to encourage citizens to learn about and take ownership of their local environment, contributing to the fostering of a nation of climate champions.