

Unlocking historical mine records with automated image processing

We worked with the Mining Remediation Authority (MRA) to develop bespoke image processing software to transform a labour-intensive manual process into a rapid, automated digital workflow through the Hartree National Centre for Digital Innovation.

Challenge

Across Great Britain, the legacy of former coal mining presents both a public safety challenge and a low-carbon opportunity. The risks associated with the ageing underground workings need to be managed, while maximising opportunities, such as taking advantage of mine water heat, which could contribute to net zero and deliver wider community benefit. Achieving these outcomes depends on authoritative, accessible information on the location and extent of historic workings. Much of what we know about Britain's mining legacy is held within the Mining Remediation Authority national archive of more than 120,000 historic mine plans. While these have been scanned, turning them into usable digital data is still a specialist, mostly manual task that can take several hours per plan, limiting how much can be processed.

Approach

We worked closely with MRA domain experts to develop custom image processing software tailored to the specific characteristics of historical mine plans. The tool compensates for the age and degradation of scanned images, then distinguishes different classes of linework and annotation. Building on this preprocessing, the software automatically digitises all lines and extracts all text from each image, saving the outputs in standard digital formats. These structured outputs allow the MRA to search, visualise, and analyse the full content of any plan without manual intervention. Crucially, the workflow can be applied uniformly across the entire archive, processing plans at scale and at a fraction of the time required by manual methods, with a typical run time of a few minutes per image, compared to hours of expert effort.

“By working with the Hartree Centre, we’re combining the latest technology with centuries of mining knowledge to unlock information faster, helping us and others make better decisions for communities, infrastructure and the environment”

Geraldine Wildman

Mining Remediation Authority



Credit: Adobe Stock

Benefits

By automating the digitisation of mine plans, MRA specialists are freed to focus on the high-value interpretive work, rather than spending hours on manual tracing. The quality of the automatically generated outputs is comparable to those produced by hand, but delivered considerably faster. What used to take 1 day is completed in under 12 minutes. The broader societal benefit is significant. By accelerating the conversion of historic mining records into usable digital information, this approach enables the MRA to make better use of its expertise, supporting the assessment and development of more mine water heat opportunities, helping to deliver net zero ambitions, and improving understanding of former mine workings to keep people safe and enable sustainable growth.

At a glance

- Automated digitisation of historic mine plans at scale using bespoke image-processing software
- processing time cut from 1 day to 12 minutes per plan
- Accuracy on par with expert manual tracing, freeing specialist time for higher-value work
- Supports net zero by accelerating access to mine water heat opportunities and historic workings data

The programme

The Hartree National Centre for Digital Innovation is a collaboration between the Hartree Centre and IBM which offers a safe and supportive environment for UK organisations to explore the latest digital technologies and skills, develop proofs-of-concept and apply them to industry and public sector challenges.

Who we are

The Hartree Centre was created by UK Government to help businesses and public sector organisations accelerate the adoption of high performance computing (HPC), big data analytics, artificial intelligence (AI) and quantum technologies. We play a key role in realising UK Government's Industrial Strategy by stimulating applied digital research and innovation, creating value for the organisations we work with and generating economic and societal impact for the UK. We are proud to be part of UK Research and Innovation.

What we do

- Boost productivity and innovation for industry
- Offer training and skills development
- Provide insights into future technologies
- Give tailored business development support

