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Flint water crisis: How AI is finding thousands of hazardous pipes

Pipework below the city of Flint, Michigan, is being updated
Jim West/ZUMA Wire/REX/Shutterstock

By **Frank Swain**

EFFORTS are under way to replace the lead pipes that have been contaminating the water supply in the city of Flint, Michigan. Nobody knows which of the 55,000 properties are directly affected, but an artificially intelligent algorithm can make accurate guesses.

The Flint water crisis began in 2014 when city officials began sourcing water from the local river instead of the Detroit water system. The water wasn't treated properly and corroded lead pipes, causing the heavy metal to leach into drinking water.

Residents complained of foul smelling, discoloured water that caused rashes, and were advised to boil tap water before drinking. Paediatrician Mona Hanna-Attisha raised the alarm in 2015 when she found herself treating children with abnormally high levels of lead in their blood. A state of emergency was declared and millions of litres of bottled water shipped in.

The water supply has now been reconnected to the Detroit water system, but the lead pipes remain.

At the height of the crisis, Google funded a project to help map the affected homes. A team of scientists from various fields and institutions volunteered to help, but quickly realised there was little information available, as many records were missing, incomplete or outdated.

Jacob Abernethy at Georgia Tech and his colleagues built an AI to predict which homes are likely to be connected to a lead pipe. They drew on work by a separate team that digitised old city plans and more than 140,000 handwritten records of building work in the city.

The system catalogues 71 different pieces of information for every property in Flint, such as the age, value and location of the home. By training itself on properties where lead levels had been measured, the algorithm could predict other homes that were likely to have lead pipes.

Before the AI was developed, homes were selected for pipe replacement based on educated guesses and around 20 per cent of the pipes dug up turned out not to be made of lead, wasting time and money. "We had no good way of doing it, frankly," says Michael McDaniel, who was in charge of the initial pipe replacement programme.

Now, the AI system can produce a list of properties suspected to have lead pipes with a 97 per cent success rate. This amounts to a saving of $10 million, enough to make safe an additional 2000 homes.

The team's AI also revealed that the number of homes affected had been grossly underestimated. A couple of years into the crisis there was a big argument in Congress about how much more money would be needed, says Abernethy. The city had estimated that no more than 10 per cent of homes would be connected to lead pipes, but Abernethy and colleagues found it to be about 40 per cent. This was first predicted by the AI and since then has been supported by ongoing replacements. The revelation helped to secure a further $100 million of federal funding to clean up Flint.

The team has made its data available to the firm now managing Flint's clean up. It has also created an app that allows engineers to log the results of their surveys to improve the predictions. The model can be applied to other cities as well, says the team.

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