How AI Can Help Mend Decaying US Infrastructure

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Kevin McCaney

It’s no secret much of the infrastructure of the United States is in a dilapidated condition, threatening the country with trillions of dollars in lost GDP. The Transportation Department estimates nearly two-thirds of the country’s roads and more than 140,000 bridges are in “dire need” of repair. America’s airports have fallen behind those in the rest of the world, and pipelines are a “ticking time bomb.”

And those are just a few examples. Overall, America’s infrastructure gets a grade of D+ in the American Society of Civil Engineers 2017 Infrastructure Report Card.

While Congress and the White House go back and forth over an infrastructure bill, organizations look for ways to improve maintenance and repair, increasingly turning to drones, robotic systems and the internet of things as a relatively inexpensive way
Unmanned aerial vehicles and IoT sensors are being used to monitor buildings, dams and bridges. BSFN Railway, North America’s second-largest freight railroad network, is working in a public-private partnership with the Federal Aviation Administration on Project Pathway. Working with Insitu, a UAS subsidiary of Boeing, BSFN is using long-range drones to inspect rail infrastructure along its 32,500 miles of track. Autonomous systems are quickly becoming the eyes and ears of infrastructure upkeep.

The straw that will stir it all together is artificial intelligence. Video from UAVs and data collected from the IoT adds up exponentially into a massive data set in multiple formats beyond the ability of human operators to sift through.

“Here is an example where AI is absolutely necessary,” Christian Sanz, a Navy Special Forces veteran and CEO of Skycatch, told Forbes. “If you have thousands of surveillance cameras, you typically don’t have the staff to watch them in real time.”

AI systems, with machine learning algorithms that can examine large troves of disparate data, learn from examples, recognize patterns and draw on previous examples, can deliver analysis of all that information in close to real time.

In one example, Fujitsu Laboratories has developed a deep learning system the company says can analyze vibration data gathered by sensors mounted on bridges to determine the rate of internal damage. In another, Avitas Systems, a startup backed by GE Ventures, is tapping into Nvidia’s GPU-powered DGX-1 supercomputers to run its AI-based analyses for inspections in the transportation and energy industries. Nvidia has also launched Metropolis, a unified architecture for performing deep-learning analysis of video feeds. Nvidia is partnering with more than 50 companies on a variety of deep-learning products and services in pushing to take the Smart City concept one better, with the creation of “AI cities.”

The move to AI analytics not only addresses a pressing need when it comes to infrastructure, but can also let local, state and federal government organizations keep up with the relentless accumulation of data.
Video feeds, whether generated by stationary cameras, aerial drones or other mobile devices, already generate more data than any other source in the world, and the number of cameras is expected to grow globally by 2020 to about 1 billion. Human operators barely get a glimpse of everything collected before it’s stored on disks, Nvidia points out.

By putting deep learning capabilities into cameras and monitoring systems via the cloud, AI analytics can potentially get around the buildup of unexamined storage by making accurate, scalable video analysis practically instantaneous.

And in addition to meeting a need, AI systems also can help governments with their bottom line. A Deloitte study that examines the ways AI can benefit government — from scouring case law and reducing administrative backlogs to detecting fraud — predicts AI technologies could save governments as much as $41.1 billion a year. And that is not even considering using AI to avoid the potential costs from an infrastructure calamity a thorough inspection might have prevented.