Putting Computers to the Task of Solving a Part our Ageing Infrastructure Problem

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Abstract: Throughout the world, ageing public infrastructure has been suffering from a chronic lack of funding. USA and Canada are no exception, where the lack of investments has led to an alarming number of structures which are in an advanced state of deterioration. Public infrastructure is essential to the economic development. Nevertheless, the society cannot afford to mitigate this risk by retrofitting or replacing every deficient structure; we thus face the challenge of increasing their service life. A promising solution for mitigating the risk posed by ageing infrastructure is to have arrays of sensors deployed across cities to monitor, in real time, the condition of infrastructure. We now have the technological capacity to measure and store the data for thousands of structures. However, what is holding back structural health monitoring (SHM) is that there is currently no generic and robust way to interpret the data collected by sensors. Factors such as the complexity of the interactions between structures and their environment, the errors caused by difficult operational conditions, and the large volume of data, are all causing false alarms undermining the economic viability of SHM. This seminar will expose how methods issued from the fields of Machine Learning and Artificial Intelligence allow overcoming these limitations by putting computers to the task of detecting structural state changes.