Machine Learning in Civil Engineering

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Introduction

Practical applications of machine learning vary from theoretical studies. Advanced data analysis can be accomplished from Machine Learning. Machine Learning can also be used in Civil Engineering. It can be much explored but also precautions are to be taken to consider a successful task [1].

Machine Learning Can Produce Stronger And Less Corrosive Metals

Scientists studied grain boundaries for decades and acquired insight into the types of properties grain boundaries. Research team of interdisciplinary cracked the code with an algorithm that allows it to learn the elusive.

Grain boundaries aid to determine the properties of metals that are important to humans. For instance, they can be improved in metal's strength (buildings), corrosion resistance (bridges) and conductivity (electricity) [3, 4].

## Novel Technique Framework In Material Design Through Machine Learning

In this study scientists demonstrated a novel machine learning framework that trains "on the fly" it means that it can process data instantaneously and learns from it to accelerate progress of computational models. This new technique allows scientist to perform optimization of computational models at unusually faster speed until they arrive required properties of a new material [5, 6].

Perched Landing Using Machine Learning

Researchers from University of Bristol in collaboration with BMT Defense Services developed a novel technique of Unmanned Aerial Vehicle (UAV) was performed a perched landing using machine learning algorithms.

This innovative development of a fixed wing airplane that can land in lesser or confined space has considerable impact on intelligence congregation and delivery of aid in a humanitarian disaster [7].

Figure 1. Illustrates Workflow of occupancy detection using vibration sensors and machine learning [2].

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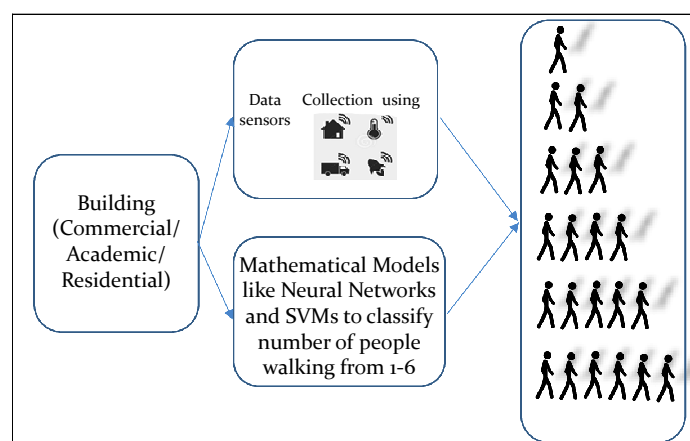
Machine Learning In Structural Health In Civil Infrastructure

Scientists at University of Surrey in collaboration with King's College London have created a new machine learning algorithm that transforms the way we monitor major infrastructure for instance dams, bridges, etc.,

It was built on the modified Alex-Net neural network, the research team set up an impact hammer test under lab conditions and was able to accurately describe the subtle condition changes of connection bolts on steel frame under 10 damage. They were successfully accomplished and trained four repeated datasets and had 100 percent of identification record in their tests [8, 9].

Figure 2. Illustrates Machine Learning for Sustainable Structures [10].
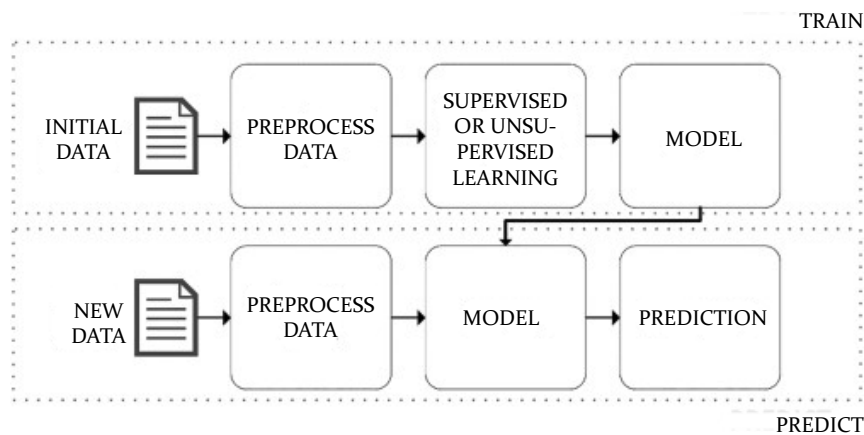
Reducing Injury In Construction Industry

Artificial Intelligence is allowing scientists at University of Waterloo of new awareness to reduce wear and tear injuries and boost the productivity of skilled construction workers. In their research, it shows master masons don't follow the standard ergonomic rules taught to novices. Instead, they create their own method of working quickly and safely. Examples include more swinging than lifting of blocks and less bending of backs.

Studies demonstrated that using sensors and Artificial Intelligence have disclosed that expert bricklayers use previously unidentified techniques to limit loads on their joints, information can now be passed on to apprentices in training sessions [11, 12].

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