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Editorial Article

The Influence of Artificial Intelligence in Global Research of Steel Reinforced Concrete Corrosion

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INTRODUCTION:

Corrosion of steel reinforced concrete is among one of the major unresolved issues until now. Ample amount of research has been carried out in the past to resolve this prolonged problem. However, a conclusive solution has not been found so far. Research on this topic requires huge amount of funds, time, logistics, coordination, organization, planning, complex experimentation and time-consuming modeling techniques. By the introduction of Artificial Intelligence (AI) for the past few years, things have become quite different. It has never been easier to predict, control, estimate and prevent corrosion of reinforced concrete structures thanks to the availability of AI in the present times.

USE OF AI FOR THE ASSESSMENT AND PREDICTION OF CORROSION:

With the use of this advanced tool, it has been possible to predict and assess the corrosion of steel reinforced concrete structures with a much faster rate and more reliable accuracy compared to the non-AI era. The use of machine learning (ML), deep learning (DL), support vector machines (SVM) and artificial neural network (ANN); corrosion which was not easy to predict every time with the same accuracy has now become very much predictable with reliability and reproducibility. Also, the time consumed in this process is now much reduced by the combination of finite element methodology

(FEM) with the above AI tools incorporating real time and space variables. AI has made it possible to integrate more variables from the infrastructure and environment at the same time. This has led to a much better assessment and prediction of corrosion magnitude, location, time of initiation as well as service life prediction of reinforced concrete structures. AI has also enabled human beings to incorporate more complex situations by lesser effort. Thus, making it possible to predict the corrosion for almost every possible scenario without going for the laborious experimentation in the laboratory.

WORLDWIDE APPLICABILITY AND SIMULATION OF CASE STUDIES:

AI has enabled researchers to prepare exact copies of real corroding structures of any shape, size and type by exact simulation anywhere in the world in any type of environmental condition. This has made it easier to predict the service life of real existing structures and to be constructed structures with much more accuracy, ease and reliability. Whether it is the cold regions of Europe/USA or the hot climate of Arabian Middle East; no matter if it is a sky scrapper or a single residential unit; a dam or a road infrastructure, AI has it on its finger tips to predict, control and prevent the corrosion of steel rebars in no time.

CHALLENGES AND PROSPECTS:

In spite of the above-mentioned advantages of AI, the challenge of accurate information handling and transferring to user interface still remains something to be improved a lot. AI can sometimes be misleading as the internal black box computations of this tool cannot be seen with the naked eye resulting in wrong predictions and inaccurate assessment of the data obtained by this tool of the present and future. Everyone using AI has encountered such issues varying from very simple to complex problems. There is always need for human interference to counter check the results generated by AI, especially for a not always easily predictable phenomenon such as corrosion. Researchers working on corrosion understand that experimentation does not always give reproducible results even with the exact same variables. Having said that a lot of opportunity still remains on the hands of future generations as a lot more is on its way with respect to this amazing artificial intelligence.

CONCLUSION:

Conclusively, it can be said that the pros and cons of using AI for global research of steel reinforced concrete corrosion weigh much more towards the beneficial side and the future is surely very bright in this context. Artificial intelligence has now entered almost every field and the fruits of its usability are already obvious to the world. AI will surely be a very effective and handy tool of the future to safeguard and maintain global infrastructure against corrosion and may end up being a final decisive solution to this yet to be fully resolved issue of corrosion.