Highlights

Cooperative Data-driven Modeling

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ABSTRACT

Abstract

1. Introduction

The mechanics followed a deterministic approach for many years. This deterministic approaches helped humanity in various engineering and design problems. Over the last 5 decades engineering problems got increasingly complexer as the needs of the humanity changed in a similar fashion. These complex problems are tackled mostly with the combination of experimental and computer aided simulations until recently. In this combined endeavour, where experiments are hindered, computer aided simulations helped significantly eliminate the money and time limitations of the experimental approach. Especially due to increasing availability and accessibility of the computational power. Although, their wide spread use the deterministic high-fidelity numerical solutions, also known as computer aided simulations, requirement of time and money is also increasing as the complexity of the problems increase further. It is getting evidently clear that the Moore's Law is loosing its validity due to physical limitations of the silicone technology Arenas, Herrera, Muñoz and Munoz (2021). Thus, if we want to continue solving complex problems in the coming future, the need for another approach that can further reduce the time and money requirements of the current experimental and computer aided numerical solutions.

Machine learning (ML) applications from computer-vision, to speech-recognition are getting more and more essential part of our daily life. To this end, it is not a surprise that ML found use cases in mechanics as well. To the authors knowledge the first mechanics applications of the machine learning paradigm dates back to the second-boom (1990's till 2000's) of ML in the fields of civil and mechanical engineering (*e.g.*Reich (1997); Reich and Travitzky (1995); Bishop and James (1993); Adeli

Although, machine learning also benefited from the increasing computational power, to reach the popularity and wide-spread application areas can be attributed to the more open and development aimed attitude of the field.

2. Continual learning

2.1. Methods overview

3. Proposed method (CDDM)

4. Numerical experiments

4.1. Data generation

4.2. Results

5. Discussion

6. Conclusion

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