Machine Learning techniques for Model Order Reduction applied in Engineering

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PhD Research Report. Data collected to be verified and analysed increase exponentially as days gone by. The ability of managing large amount of heterogenous data and extract useful information has became a mandatory skill for people working in data science fields. As collected datasets become larger, increases the need of finding the smallest data samples which can be generalized to the whole data.

Data analysis rises interests in areas such as agriculture, healthcare, psychology, education or banking operations. Nevertheless, technical fields manipulates considerable amount of data in order to produce and release sustainable longlife products. In particular, this work tries to take advantage of Machine Learning techniques [3] in order to obtain relevant data to be analysed for an electrical motor analysis.

In simulating and testing stages from technical fields, the accuracy of different processes depends on how collected data manage to express both particular and general cases. This implies repeated simulations for different contexts and, consequently, more data to be analysed with higher costs, in terms of time, software, hardware and human resources. The ability to find patterns in data or to reduce a real life system to a smaller model represent important concerns.

Working with models which are constantly improved and evaluated is an essential practice in the technical field. Techniques like Model Order Reduction[1, 2], Proper Order Decomposition, Principal Component Analysis or Single Value Decomposition simplify the work with large amount of data, offering a high rate of accuracy. What is of high interest in is finding a machine learning technique method which best approximates the model on a lower scale.

References

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