EML10ex01 - Leandro Borzyk, Niels Kissner, Kenneth Styppa, Florian Schrittwieser

1.1 Reading

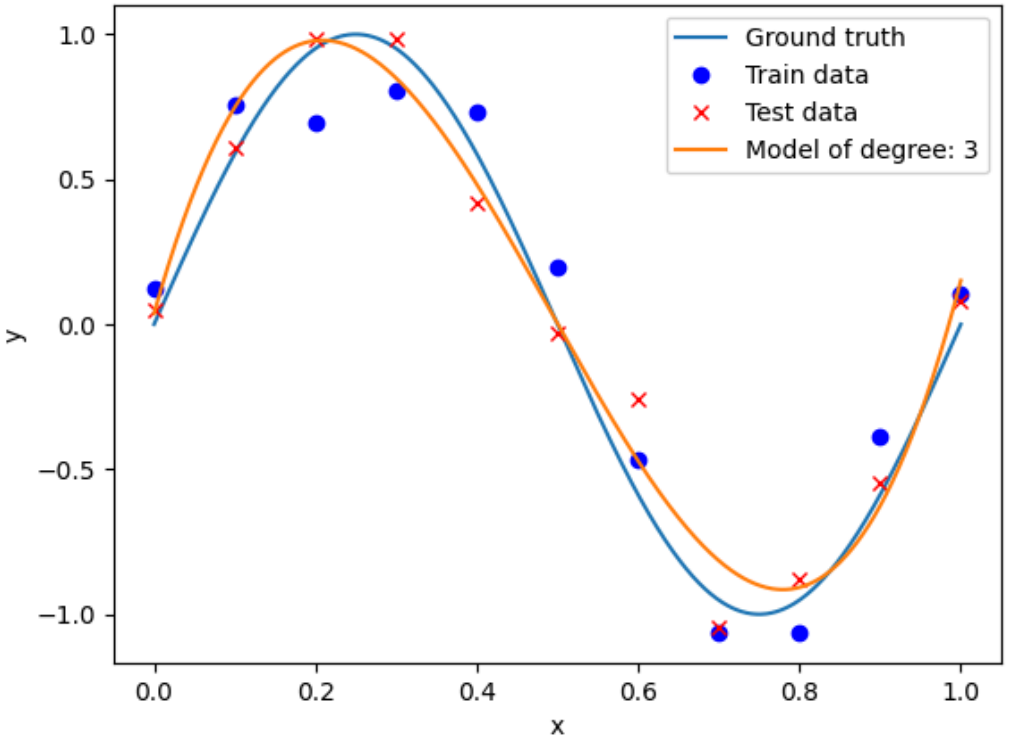
Impact:
The paper provides a key contribution to the TinyML community by publishing an end-to-end modularized evaluation benchmark suite tailored to the needs of the TinyML community. It is to be estimated, that the paper is going to have a lasting impact in solidifying tinyML research on a well-equipped benchmarking system.

Content:
Besides analysing key weaknesses of current approaches and proposing a solution, the paper comes with an actual open-source implementation of their benchmarking system. This system was shown to gain recognition among industry experts as well as academic professionals. In creating the different benchmarking possibilities, the authors demonstrated informed choices with respect to the challenges that come with resource constraints (power, memory) and the large hardware and software-related variety among tinyML applications. Furthermore, their benchmarking system included the metrics necessary for a holistic evaluation of embedded systems (metrics: energy, latency, accuracy).

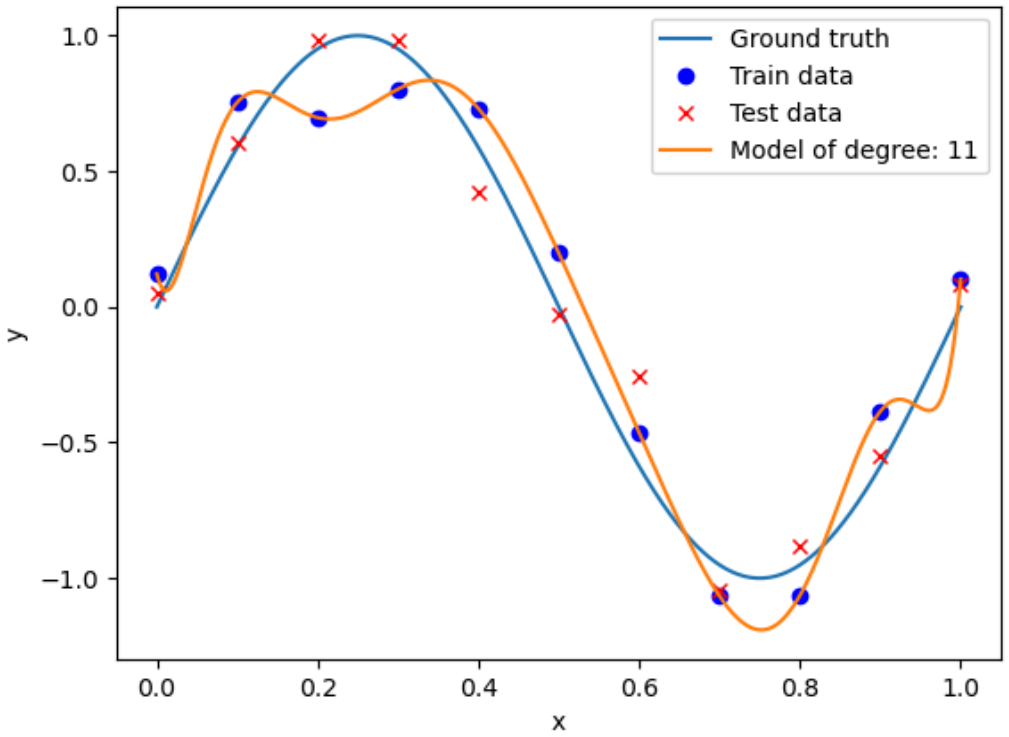
Criticism:
While undoubtedly providing a true asset to the TinyML community, the paper could be improved in terms of clarity by including one of their implementation examples in the appendix. Such a demonstration could ease the adoption process while also clarifying some of the previously mentioned challenges in the evaluation and benchmarking of embedded ML systems.

Decision:
Given the likely impact of the novel benchmarking approach and its actual implementation, the paper is a “strong accept”. However, we would advise the authors to include one of their implementation examples in their GitHub repository and include a link not only to their repository but to the “tutorial” specifically in their paper.

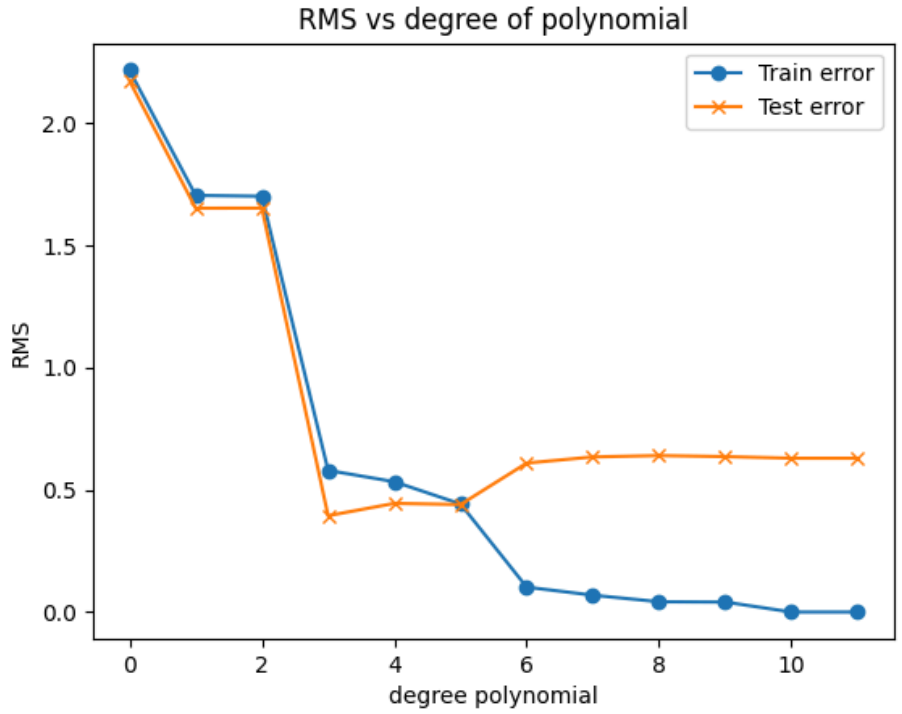
1.2 Polynomial curve fitting



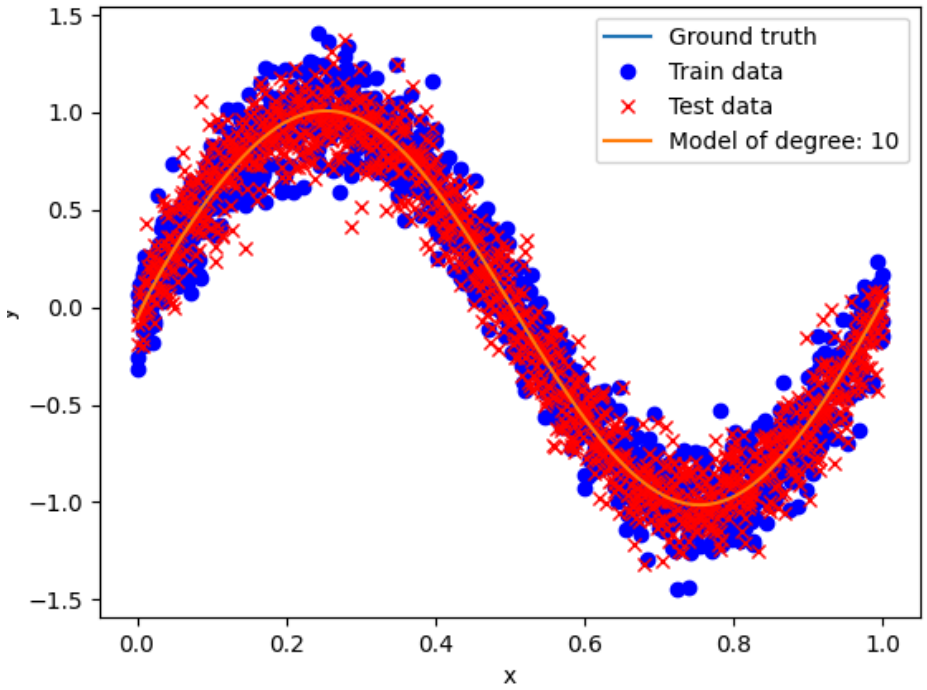
As expected a mode with the degree fits nicely the training and test data



with increasing modelsize the model is overfitted. train data is 100% fitted, the test data shows in relation a bad fit.



With the chosen data points the RMS over degree of polynomial plot shows a decreasing curve for train error. The test error firstly decreases, with a higher degree of polynomial than three the test error starts to rise again.
The best fit is found at third degree, here the test error is minimal.



With a target error of 0.0001 there need to be at least 1200 data samples to reach this accuracy.

1.3 Willingness to Present:

Willing to present 1.1 and 1.2.