Galileo Ferraris

Galileo Ferraris' Contest preliminary results

April 17, 2024

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Preliminary results

- the first part of the workflow (steps 1 $\rightarrow$ 4) is fully operative
- thermal and structural modules are now under testing to hone their accuracy
- first datasets on electromagnetic problem have been generated on one motor size (approx. `Tesla model 3`) and the reliability of results has been assessed
- a share of the results KPIs are currently been used to train the *surrogate*:
  - torque
  - torque ripple
  - copper volume
  - permanent magnet volume

  first two KPIs are related to motor performance, the remaining two to its cost-effectiveness

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Preliminary results

- a dataset containing about 5000 records has been created sampling a 8 dimensional degrees of freedom space
- CPU time needed to create the dataset on a HPC cluster is of about 12 *hours*
- surrogate models based on different approaches (statistical, support vector machines, neural networks) have been applied

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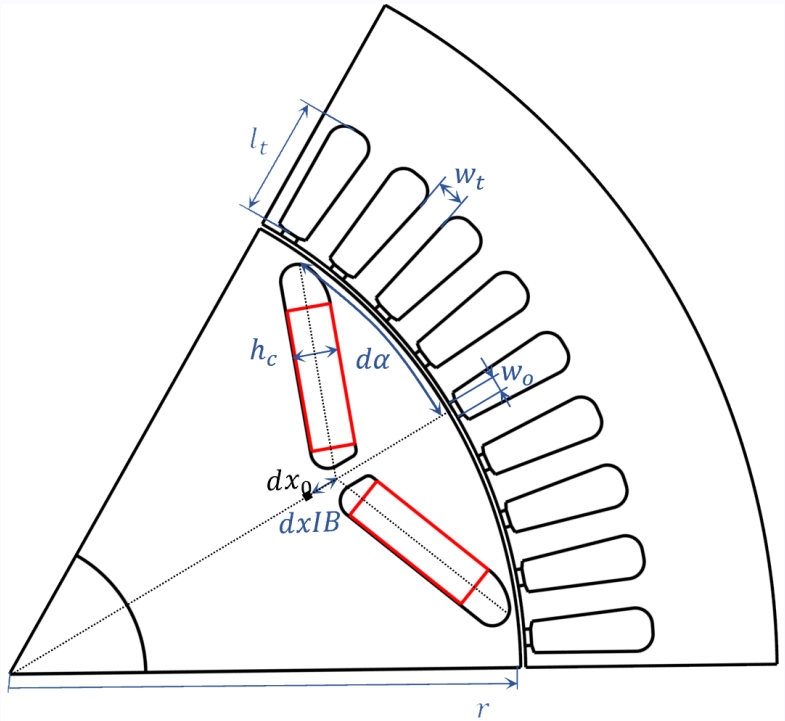
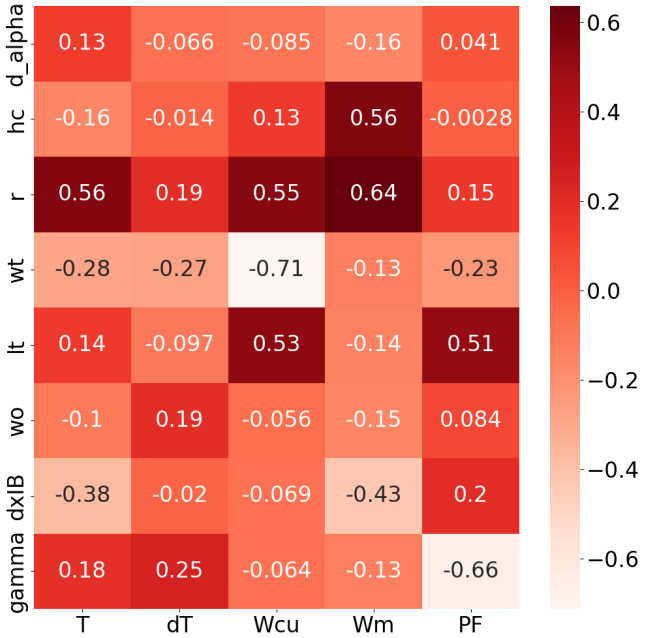
Surrogate modelling (preliminary)

Parametric geometry



Pearson correlation



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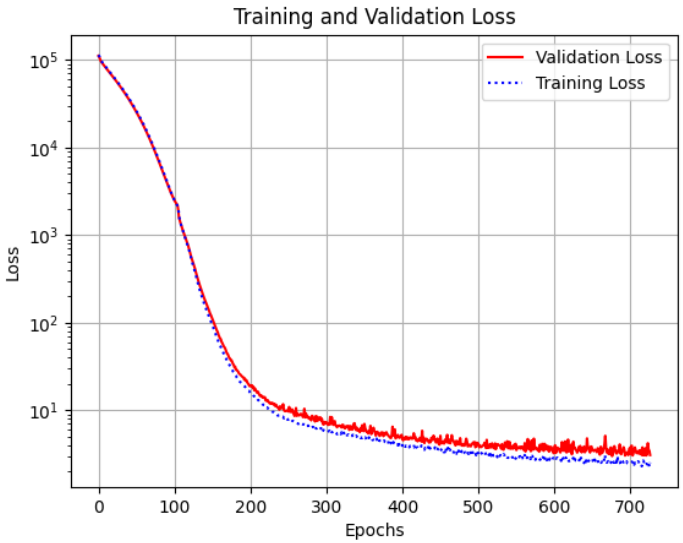
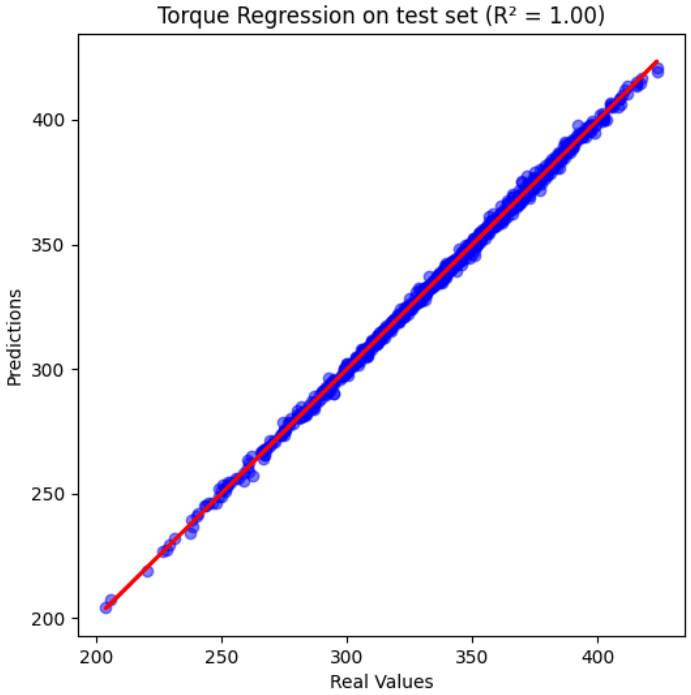
Artificial Neural Network





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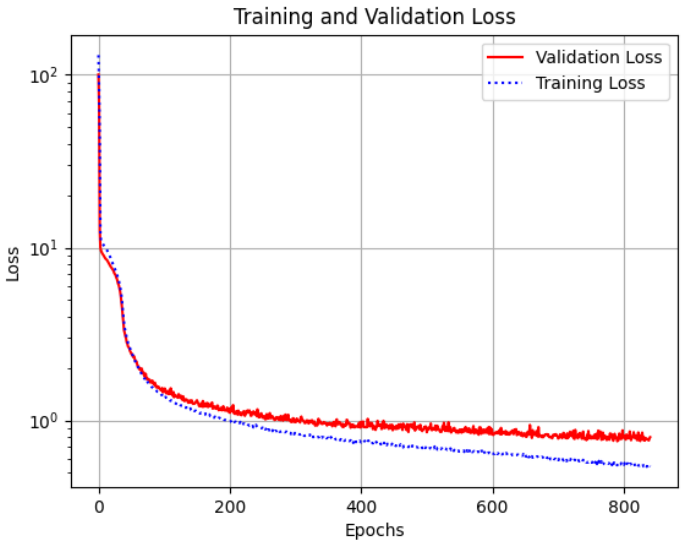
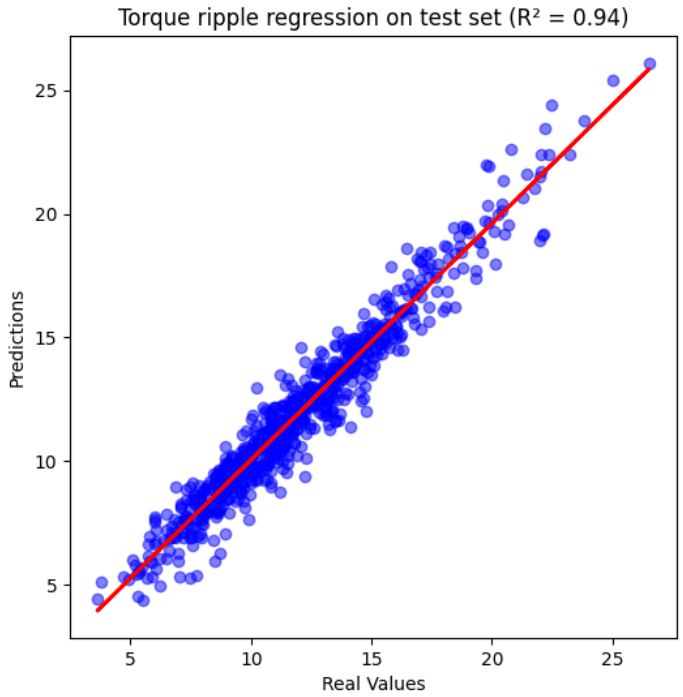
Artificial Neural Network





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Support Vector Regresion