Saimple: Design step

Improve your neural network design

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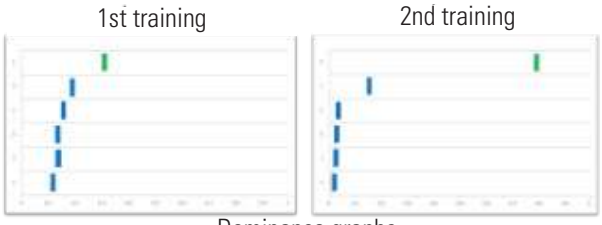
Replace empirical validation methodology by formal methods ensuring your neural network performance success.

Designing an accurate machine learning model is complex, time-consuming and can fail once in production. By controlling and validating the impact of each change made throughout its development, you can build better suited models in a shorter time.

Reference picture



Dominance graphs

Relevance masks

STEP BY STEP AUDIT AND OPTIMIZATION

Tune your models hyper-parameters with better metrics:

- Continuously measure stability variations of your models
- Visualize the impact of inputs for each layer
- Check the robustness evolution on different noises

Understanding the impact of each design change helps to find the correct model. Saimple allows you:

- Compare each metric before and after a change
- Include in your fitness function Saimple metrics to guide your search

Saimple

- Fully integrable API
- Interoperability guaranteed thanks to ONNX
- Convolutional, residual and recurrent models support
- Fully automated and scriptable tool
- Dynamic graphical interface available
- Automatic audit report generation
- Several personalized noises available to test robustness
- Multi-OS client
- Standalone solution on premise or SaaS (Linux)

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Saimple: Training step

Improve your neural network training

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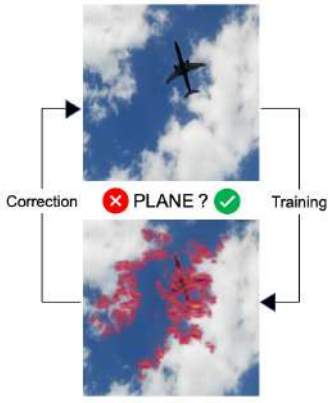
Improving the training set saves time and effort while getting the reliability of your AI models.

To train your Machine Learning systems you need a good training dataset, as its performance will largely depends on the dataset quality. But, it is not enough to check its quality by the means of statistical methods. Now, you can also understand how the Machine Learning system has learned from this dataset.

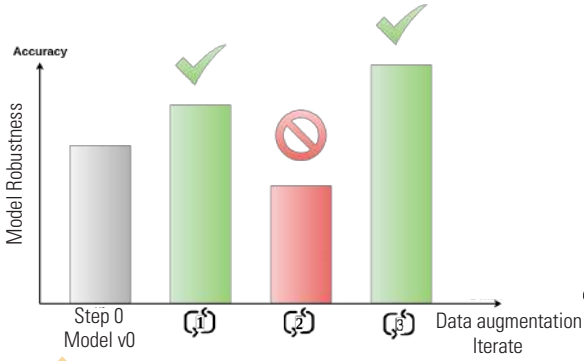
IMPROVING YOUR TRAINING SET

With Saimple formal analysis, you construct direct correlations between the decision and the inputs. You can:

- Identify which features make the training biased
- Orient your adversarial attacks generation
- Drive the iterative reinforcement of your training set



PERFORM THE DATA AUGMENTATIONS ONLY NEEDED



To run into production, neural network or SVM performance and reliability must be carefully controlled and validated. With Saimple you can:

- Check stability boost
- Check reinforced features after each augmentation
- Tune your augmentations through formal metrics
- Stop the augmentation process at the right time.

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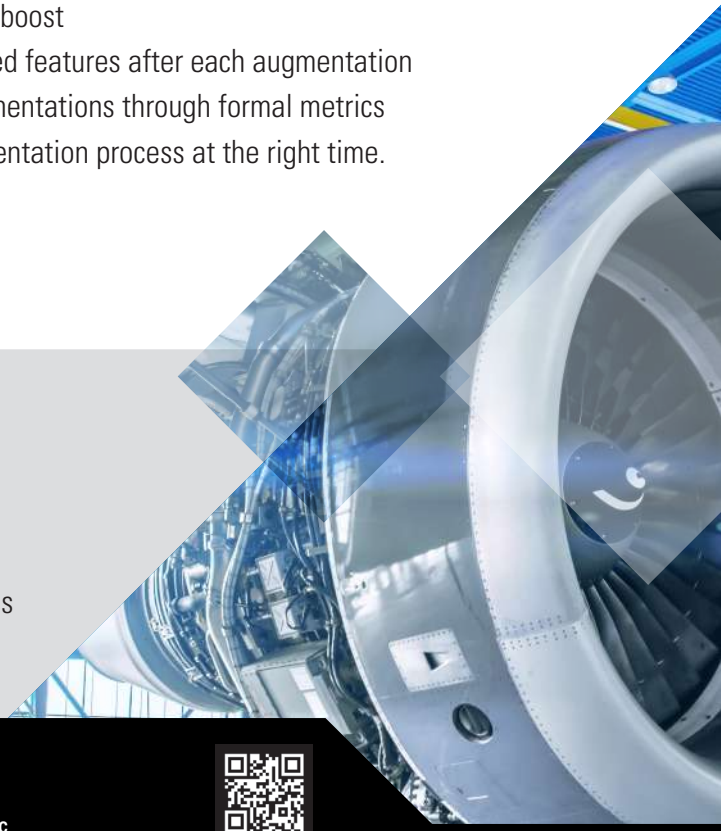

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Saimple: Validation step

Validate your neural network

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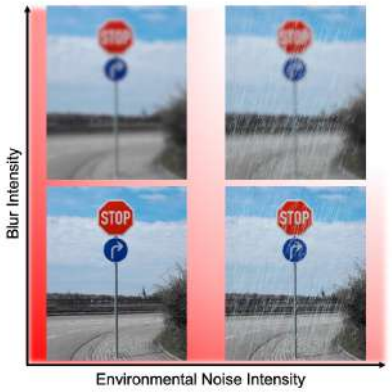
AI adoption is about the trade-off between risk and reward of its use, and for this, validation is crucial.

Before moving a neural network or a SVM into production you need to validate its performance. Saimple goes beyond the validation methods based on testing, it provides methods to prove its reliability in order to limit its risks once in production.

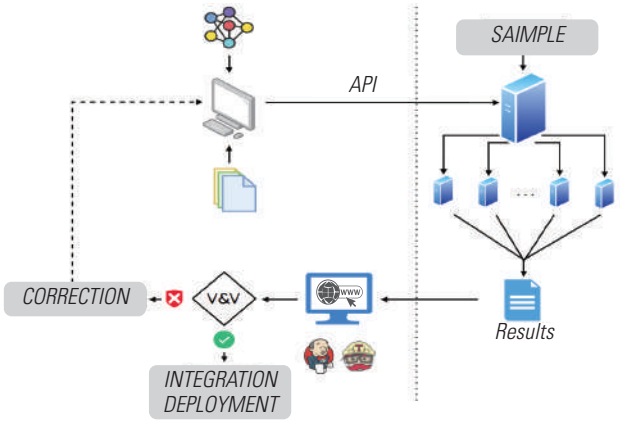
VALIDATE ROBUSTNESS FOR THE REAL WORLD

The real world is more complex than the dataset your AI model is trained on. To validate your model against a wide range of perturbations it can encounter, Saimple can:

- Model classical noises or more environmental ones
- Validate not on isolated inputs but on a domain of use
- Validate against specific noises you can define
- Find out about robustness regression sooner
- Implement unit-test about decision explainability



AUTOMATE THE VALIDATION AND DOCUMENTATION



Automation is the key to boost validation.

- Use Saimple for batch testing using its API (on premise or SaaS)
- Adapt the Saimple's footprint to your hardware resources (number of threads, cores, RAM, etc.)
- Put Saimple metrics in your continuous integration
- Generate audit report automatically

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ISO standards on AI

Discover the ISO 24029 series and the EU AI-Act

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An international initiative is underway to standardize AI technology in order to build trust and its adoption.

The ISO/IEC subcommittee 42 on AI is pushing the standardization work on AI. Within this subcommittee, Numalis is in charge of the topic of neural network robustness.

Proving robustness of neural networks will be essential to allow their adoption in critical applications. The 24029 series, led by Numalis' CEO, aims at helping all AI engineers assess and ultimately improve the robustness of their neural networks. This series will them be used by the EU AI-Act to ensure trustworthiness.

24029-1 : OVERVIEW

The first part of the series is a Technical Report which has been published in 2021. It presents an overview of the existing techniques and tools to assess robustness of neural networks. Whether they are statistical, formal or empirical. It is a great starting point to learn about robustness and the tools at your disposal.

24029-2 : FORMAL METHODS

The second part of the 24029 series is an International Standard that has been launched in 2020 with the support of 15 countries. It will provide guidelines on how to use formal methods to assess robustness of neural networks during the AI lifecycle. It will cover all the steps from how to use formal methods, when to use them, for what purpose and what action can be taken based on their results.It would be published in 2023 just before the EU AI-Act.

JOIN THE PROCESS

To participate in the effort for AI standardization you can contact your national body of standardization in order to register as an expert to the ISO/IEC JTC 1/SC 42.

The 24029 series meetings are being held within the Working Group 3 (AI Trustworthiness).

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