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On the Applicability of the Hadamard as an Input Modulator for Problems of Classification.

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C++ library that includes a complete learning framework.

<https://doi.org/10.24433/CO.3851581.v1>

<https://github.com/curto2/mckernel>

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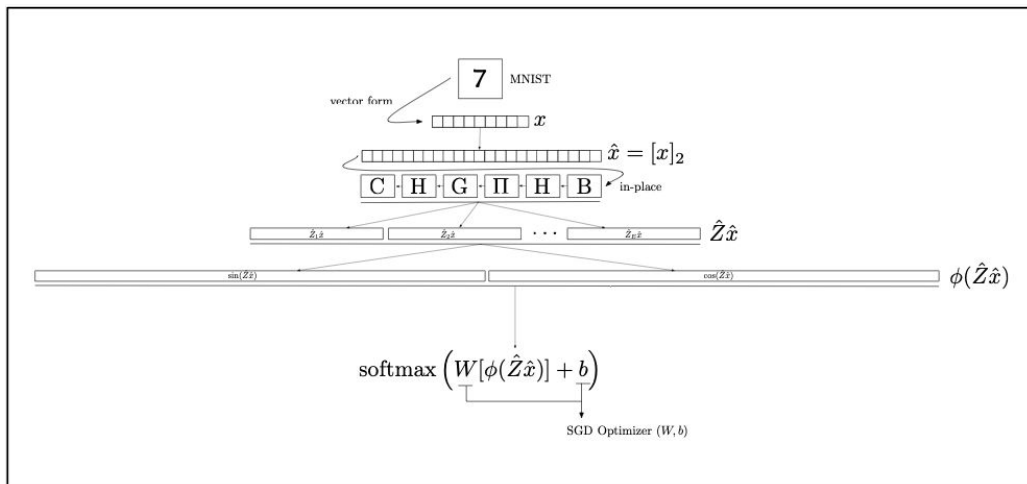
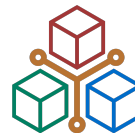


Figure 1: **Diagram of Mckernel.** We visually describe $\text{softmax}(W\tilde{x} + b)$ where $\tilde{x} = \text{mckernel}(x)$. The original image is padded in form of long vector to the nearest power of 2, mapping \hat{Z} is applied in-place. Calibration C defines the choice of Kernel. The tensor is expanded by the number of Kernel Expansions E building a network with high compositionality. Finally, use real feature map ϕ , Equation 2. SGD Optimizer finds appropriate weights W and bias b . Compute \hat{Z} on-the-fly keeping same seed both for training and testing.



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Highlights

- C++ fast open-source Hadamard that works for any input size. Widely deployed in Signal Processing, Communications and Compressed Sensing.
- Approximate kernel expansions in log-linear time.
- Useful to foster new DL architectures with better human-induced/mathematical priors.
- DL research framework that offers multiple open questions. Domains that could be further explored are: end-to-end training, self-supervised learning, meta-learning, integration with evolution strategies, NAS reducing substantially the search space and many others.

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