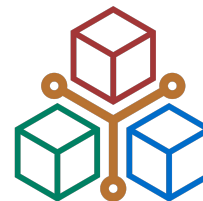




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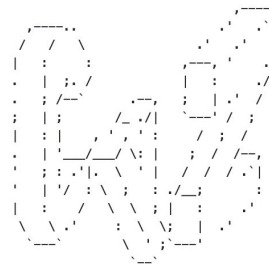
J. de Curtò.

I. de Zarzà.

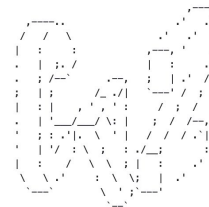
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On the Applicability of the Hadamard as an Input Modulator for Problems of Classification.



De Curtò.
De Zarzà.

The screenshot shows the article page on the Software Impacts website. The header includes the journal name 'Software Impacts' and navigation links 'Submit', 'Log in', and 'Register'. The article title is 'On the applicability of the Hadamard as an input modulator for problems of classification'. The authors listed are J. de Curtò, I. de Zarzà, Hong Yan, and Carlos T. Calafate. The publication date is June 02, 2022, and the DOI is <https://doi.org/10.1016/j.simpa.2022.100325>. A 'Check for updates' button is present. On the right, there are icons for PDF (419 KB), Figures, Save, Share, Reprints, and Request. The background of the article card features a faint image of a document with mathematical formulas, including $C/H \cdot G/H \cdot P/H$.



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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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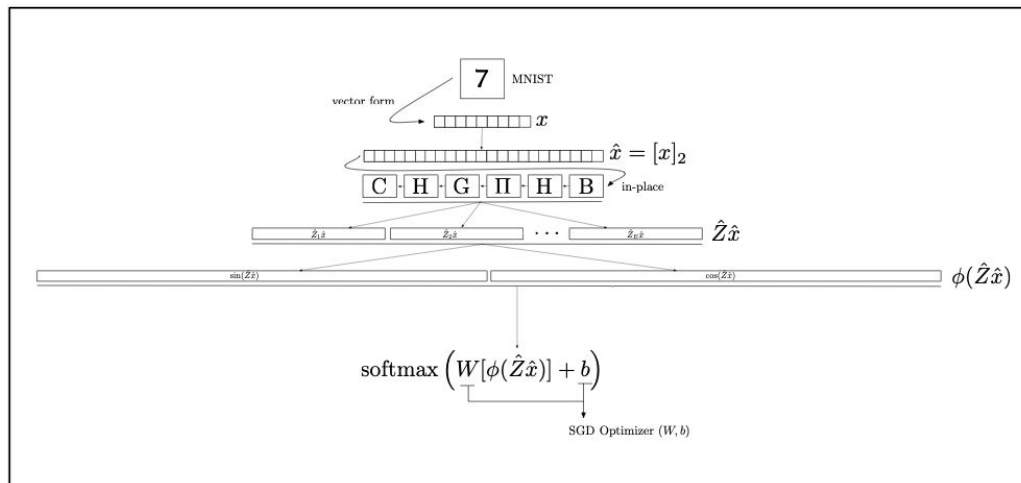
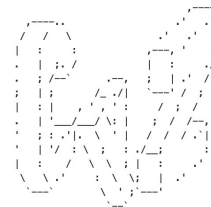


Figure 1: **Diagram of Mckernel.** We visually describe $\text{softmax}(W\tilde{x}+b)$ where $\tilde{x} = \text{mckernel}(x)$. The original image is padded in form of long vector to the nearest power of 2, mapping \hat{Z} is applied in-place. Calibration C defines the choice of Kernel. The tensor is 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

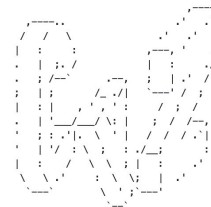
- C++ fast open-source Hadamard that works for any input size. Widely deployed in Signal Processing, Communications and Compressed Sensing.
- Approximate kernel expansions in log-linear time.
- Useful to foster new DL architectures with better human-induced/mathematical priors.
- DL research framework. 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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Impact overview

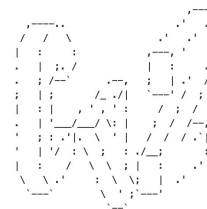
- Useful in large-scale setting to turn any linear classifier into non-linear, **wherever SVM is still useful over DL methods**. For instance, in robotics, unmanned aerial vehicles and ML for healthcare when the number of samples to train on is relatively bounded.
- It offers multiple open questions: **learning C and G** adapts the type of kernel. **Learning B** acts as a mechanism of attention.

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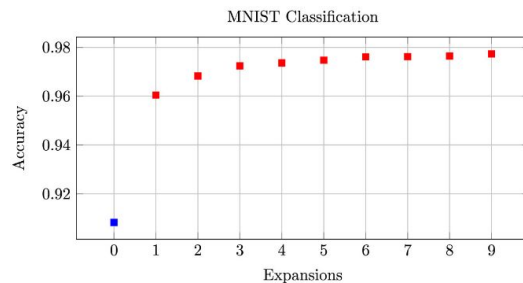
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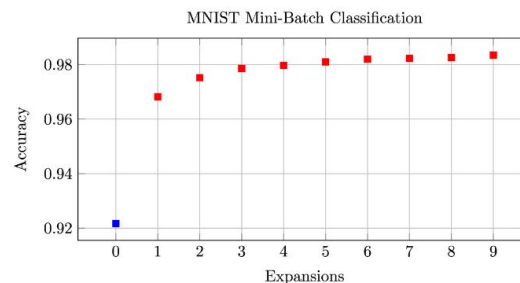
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(a)



(b)



(c)

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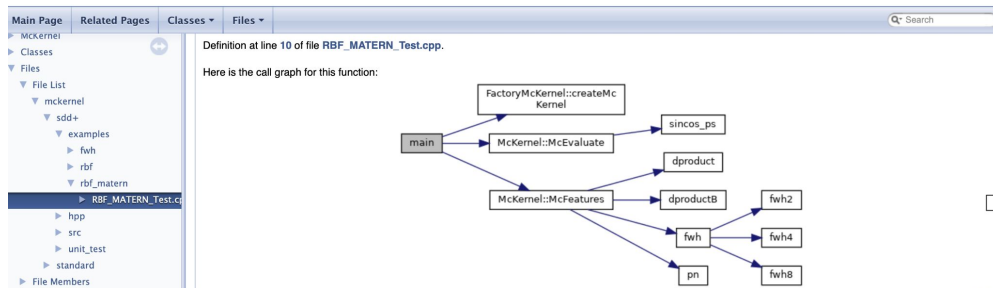


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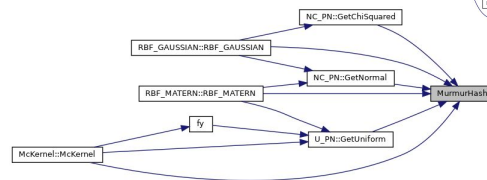
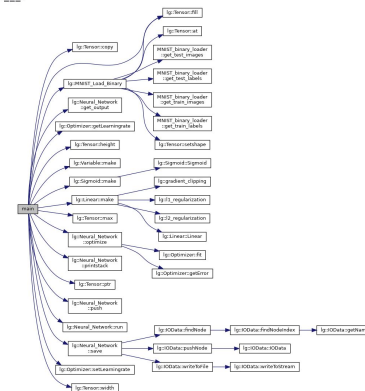


On the applicability of the Hadamard as an input modulator for problems of classification. v2.2

Documentation for McKernel.



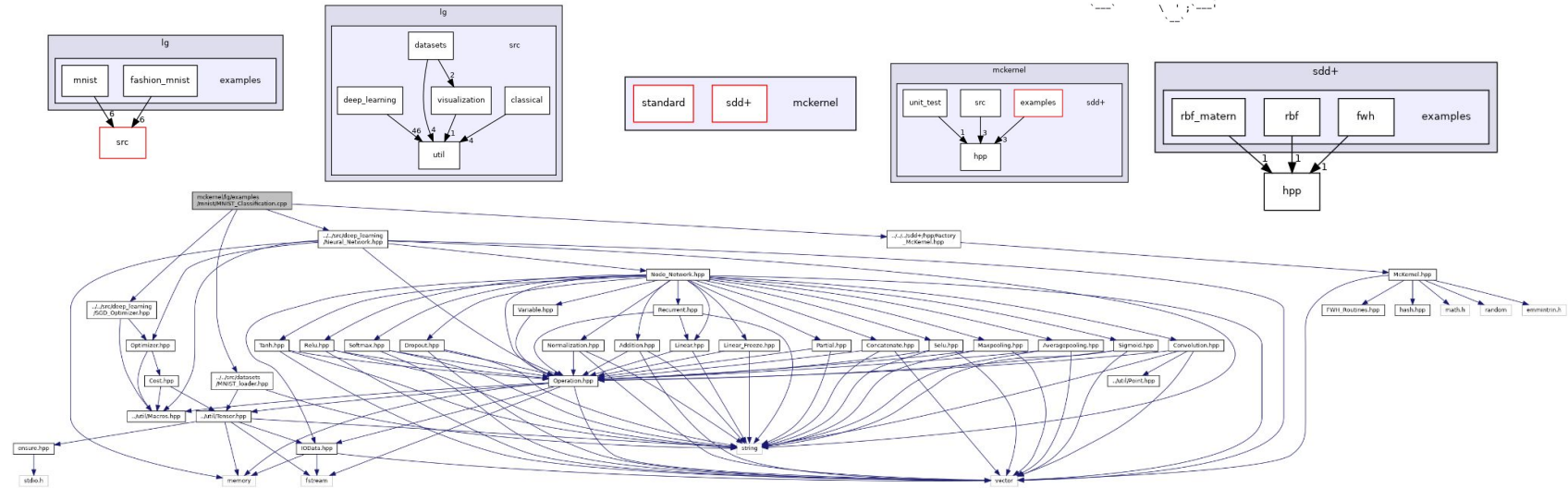
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