

Universidade Federal do Rio de Janeiro  
Palestra NCG013 “Priscila Lima”

# Weightless Neural Network for Hand-Written Digit Classification

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## Introduction

- Dataset presentation
- Parameters of interest

## Results

- Dataset Analysis
- WiSARD



- MNIST - converted in jpg with `mnist-to-jpg.py` :

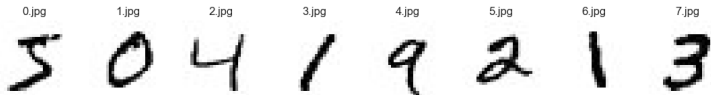


Figure: First 8 figures in Luminance space

- Some results without pre-processing from MNIST:

Classifier	Accuracy
linear classifier (1-layer NN)	0.88
K-nearest-neighbors, Euclidean (L2)	0.9691
SVM, Gaussian Kernel	0.986
2-layer NN, 300 hidden units, mean square error	0.953

Dataset parameters :

- ▶ Number of figures used for **training** : 900
- ▶ Number of figures used for **testing** : 100
- ▶ threshold :

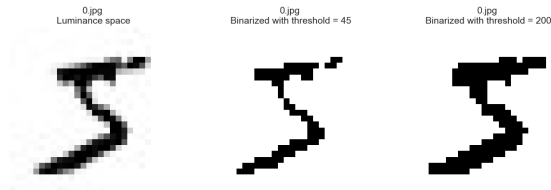
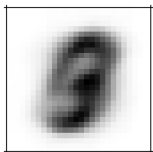


Figure: Influence of threshold

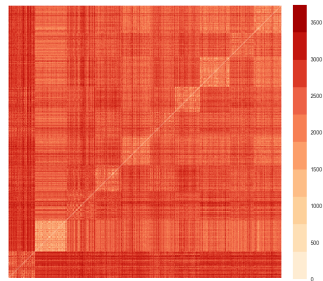
WiSARD parameters studied :

- ▶ num\_bits\_addr
- ▶ bleaching

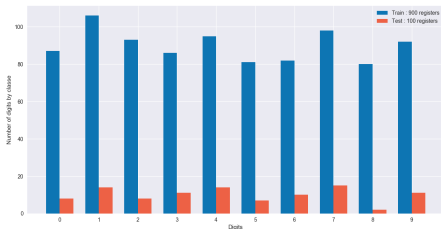
- Mean value per pixel :



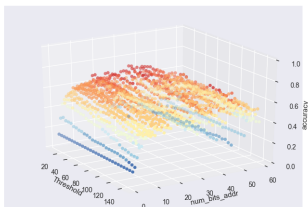
- Distance Matrix :



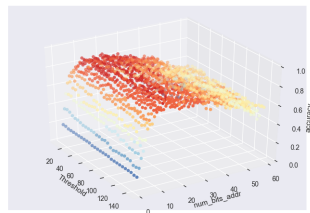
- Bar plot of classes :



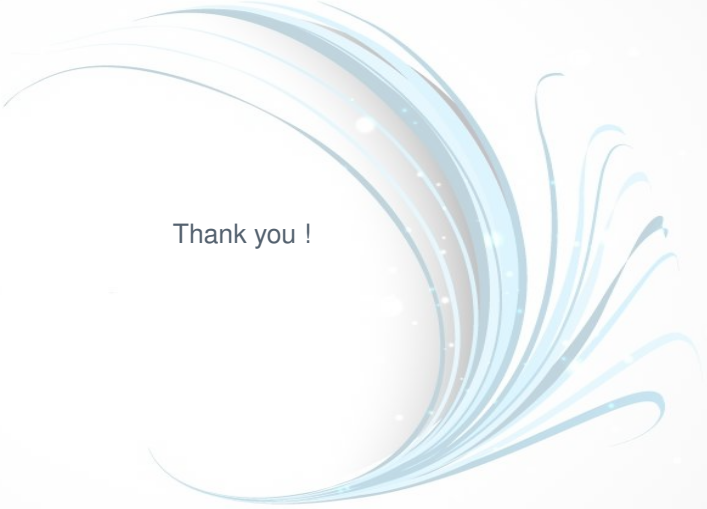
- Scatter plot **without** bleaching :



- Scatter plot **with** bleaching :



Classifier	Threshold	num_bits_addr	Accuracy
WiSARD without bleaching	35	38	0.75
WiSARD with bleaching	45	27	0.90
NearestNeighbors	15	None	0.86
MultiLayerPerceptron	50	None	0.93



Thank you !