DD2437 Presentation Lab 2

Samuel Leonardo Gracio
Martin Verstraete

08/10/18

Part I: RBF networks and Competitive Learning

Effect of the number of RBF units

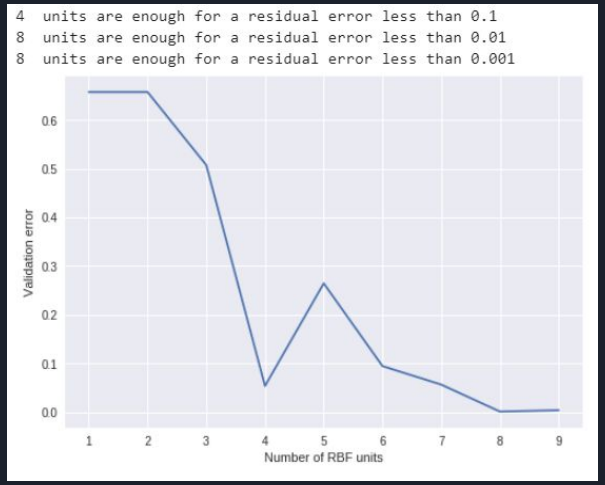


Figure 1: Sin(2x)

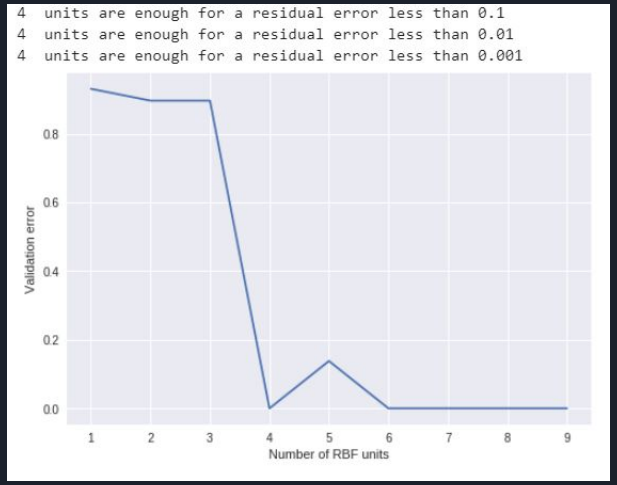


Figure 1: Square(2x)

No noise → the absolute residual error decreases

Noisy patterns
Delta rule in batch mode

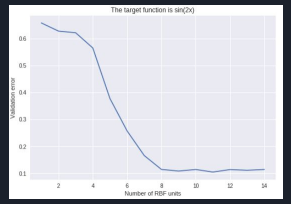


Figure 3: Sin(2x)

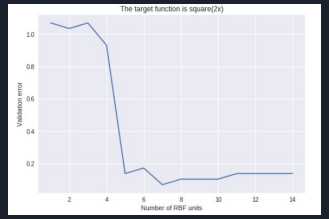


Figure 4: Square (2x)

No need to have many RBF units

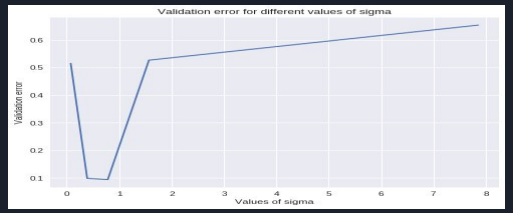


Figure 5

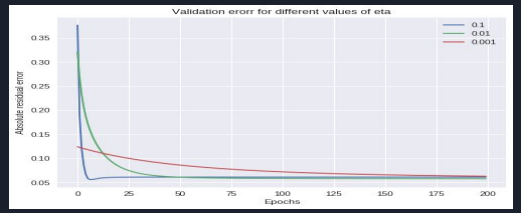


Figure 6

Same value of convergence
but the smaller eta,
the quicker the convergence

Noisy patterns
Delta rule in sequential mode

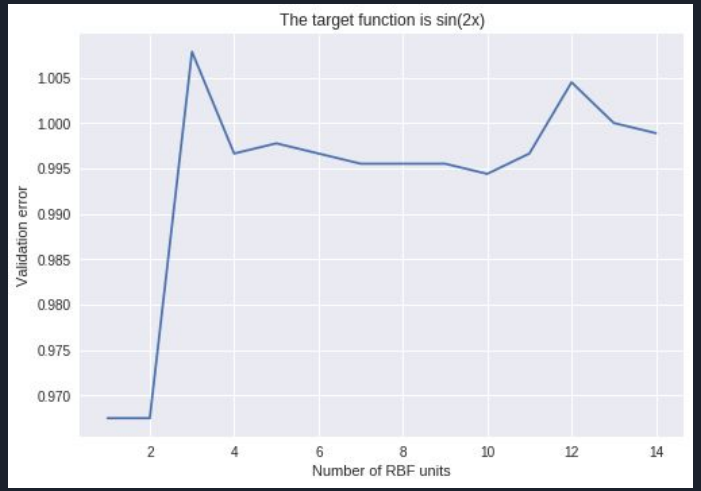


Figure 7

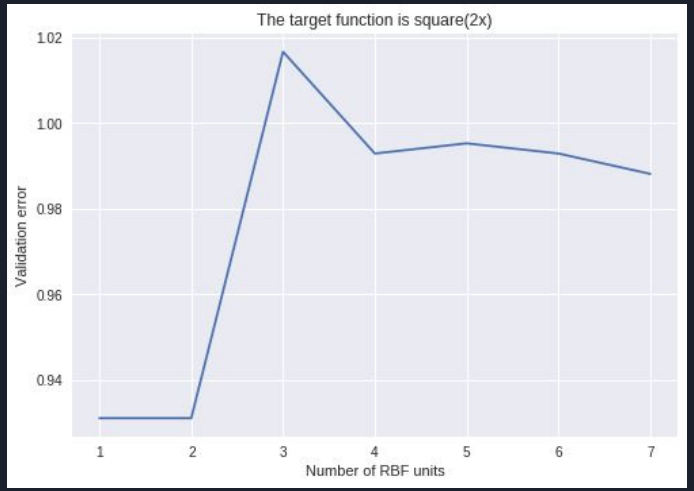


Figure 8

The error is high → sequential mode is not adapted for approximation

Noisy patterns

RBF network trained with LMS

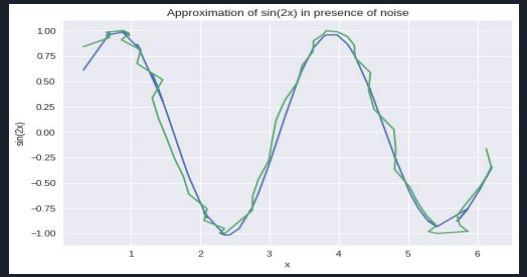


Figure 9

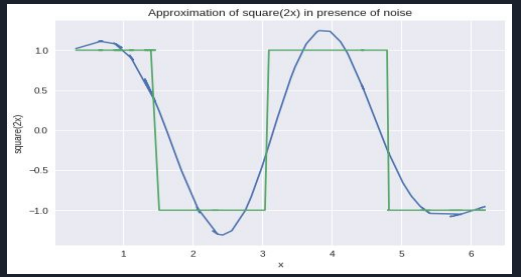


Figure 10

Absolute residual error ~ 0.1 → good approximation

One-hidden-layer perceptron trained in batch mode

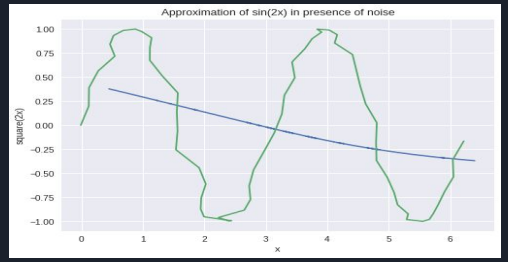


Figure 11

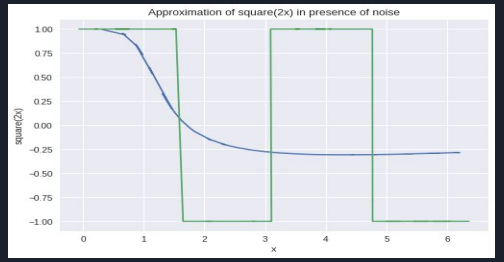


Figure 12

Absolute residual error > 0.4 → poor approximation

Competitive Learning for RBF unit initialisation

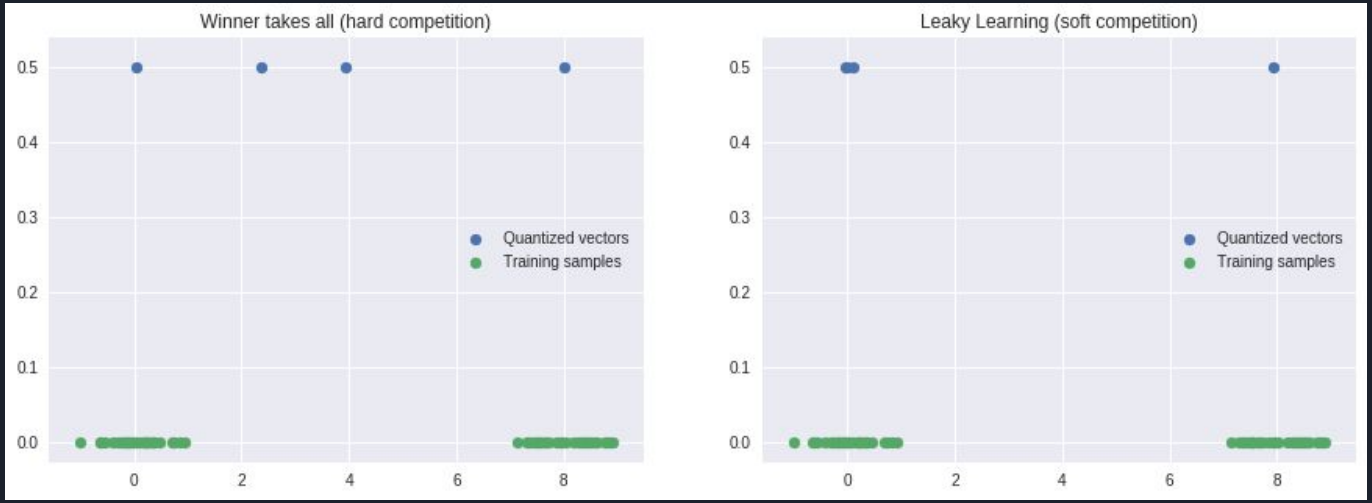


Figure 13

RBF units node are better placed with soft competition

Results for ballist and balltest datasets

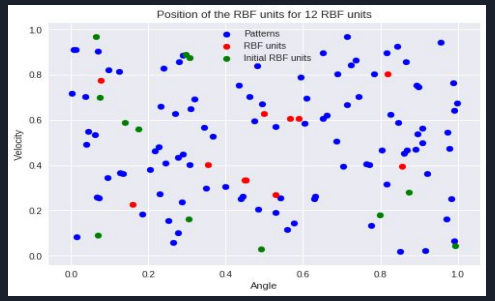


Figure 14

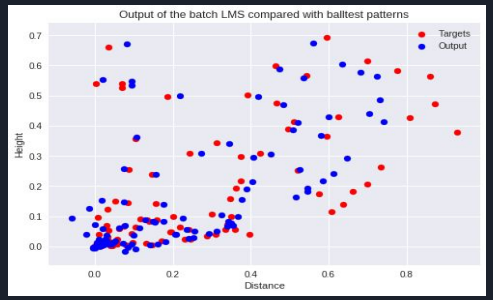


Figure 15

There is still a few dead units but the output seems satisfactory

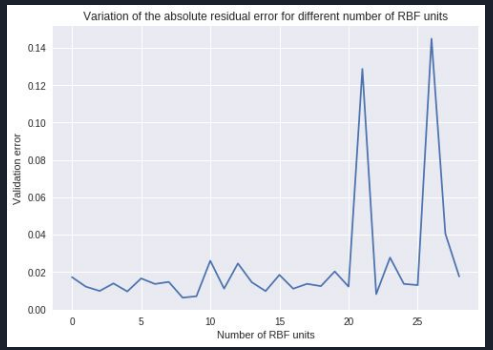


Figure 16

Just a few RBF units are enough

Part II : Self-organizing maps

4.1 Topological ordering of animal species

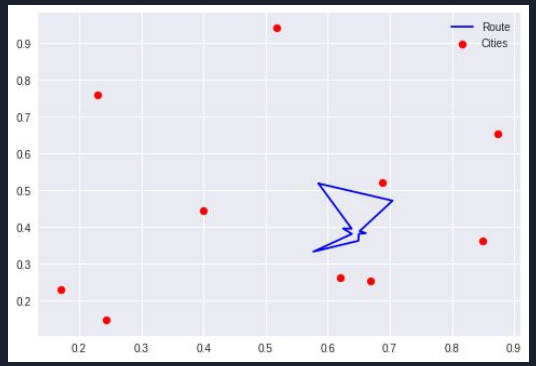
- SOM algorithm on a one-dimensional curve in the 84-dimensional input space

RESULT = ["'beetle'", "'dragonfly'","'grasshopper'","'moskito'","'butterfly'", "'housefly'", "'spider'","'duck'", "'pelican'", "'penguin'", "'ostrich'","'frog'", "'seaturtle'", "'crocodile'", "'walrus'","'bear'", "'hyena'", "'dog'", "'kangaroo'","'skunk'", "'bat'", "'elephant'", "'rabbit'","'rat'", "'ape'", "'cat'", "'lion'", "'horse'",”'camel'", "'giraffe'", "'pig'", "'antelop'"]

- Coherent. Insects together, animals producing eggs together, mammals...

4.2 Cyclic Tour

- Two dimension
- Needs to be circular : we have to count the last and the first output nodes as neighbours



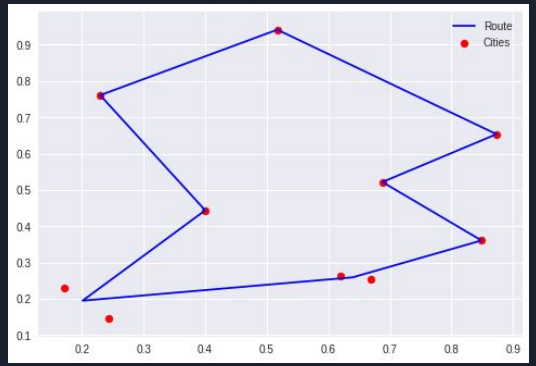


FIG 17 : Beginning of the Algorithm. Epoch 1	*FIG 18 : End of the algorithm, 100 epochs, 0.3 of learning rate.*

- Good results in a short time.
- Circular, seems to be an optimal route.

4.3 Data clustering : Vote of MPs

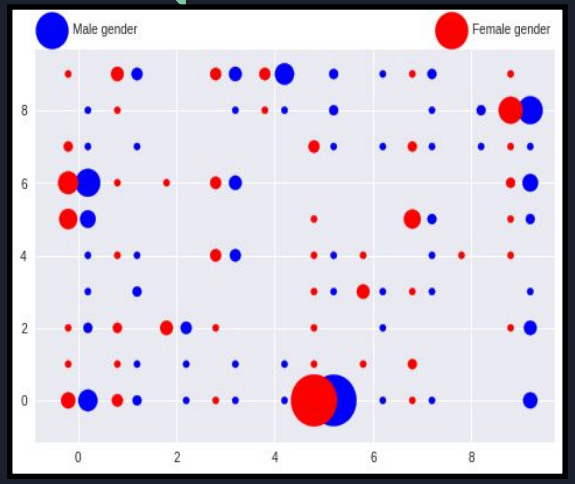


Figure 19 : Male and Female

- Almost the same number of men/women voting for different laws.
- Not a criteria to classify the data.

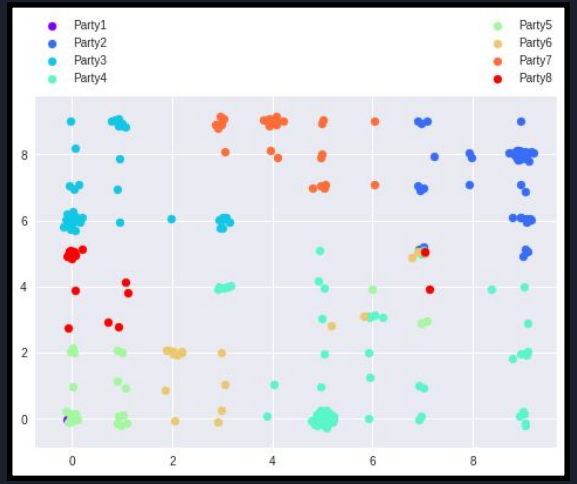


Figure 20 : different parties

- Clear blocks, few outliers.
- Left/Right, liberal/anti-liberal.
- Definetely a good criteria to classify the data.

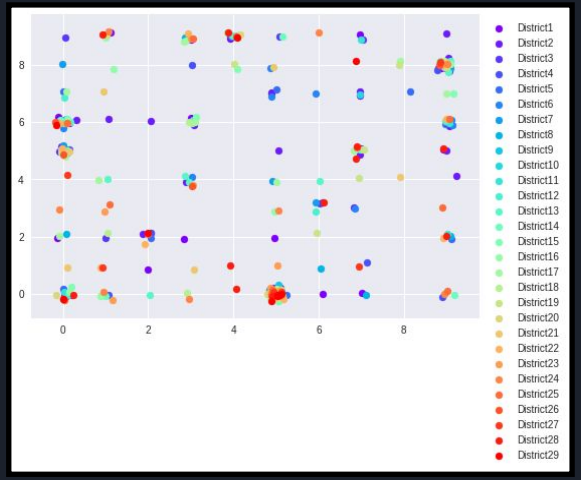


Figure 21 : different districts

- Almost random.
- District is not a good criteria to classify the data.

Remarks

- SOM Algorithm very useful to classify data in term of coherence.
- Very interesting for 2D-dataset because it is visually striking, can help you to know which criteria to choose to discriminate the dataset.