Redes Neuronales

Dammiano, Agustín - 57702
Donoso Naumczuk, Alan - 57583
Sanz Gorostiaga, Lucas - 56312
Torreguitar, José - 57519

Variables del diseño

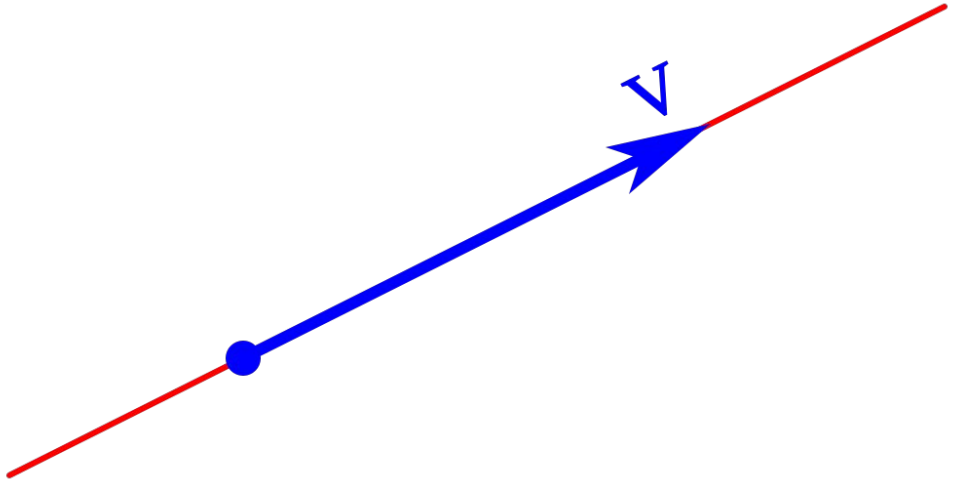
- Arquitectura
  - Capas
  - Neuronas
- Batch vs Incremental
- Factor de aprendizaje
- Épocas
- Modificaciones a backpropagation
  - η adaptativo
  - Momentum

Inicialización de los pesos

- Constante
- Constante que depende de las entradas
- Al azar entre 0 y 1
- Al azar dependiendo de las entradas

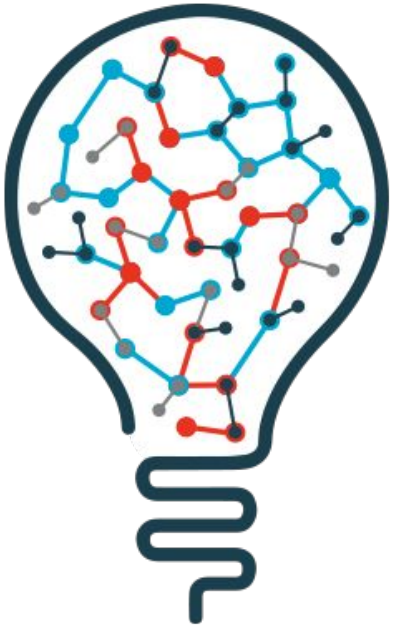
Normalización de la entrada

- f(x) = a + (x - A) * (b - a) / (B -A)
- Dividir por la norma



Métricas

- Error cuadrático medio
  - De aprendizaje
  - De prueba
- Evolución del factor de aprendizaje



Mejoras utilizadas

- **η adaptativo**

$$\Delta\eta = \begin{cases} +a & si \;\; \Delta E < 0 \;\; consistentemente \\ -b\eta & si \;\; \Delta E > 0 \\ 0 & en \; otro \; caso \end{cases}$$

- **Momentum**

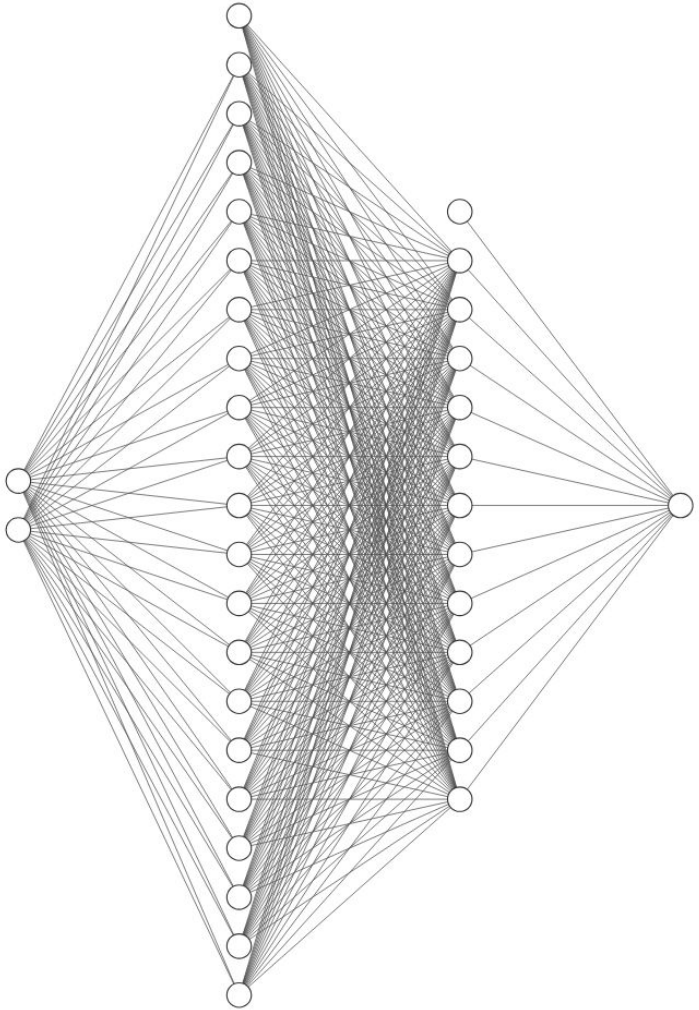
$$\Delta w_{pq}(t+1) = -\eta \frac{\partial E}{\partial w_{pq}} + \alpha \Delta w_{pq}(t)$$

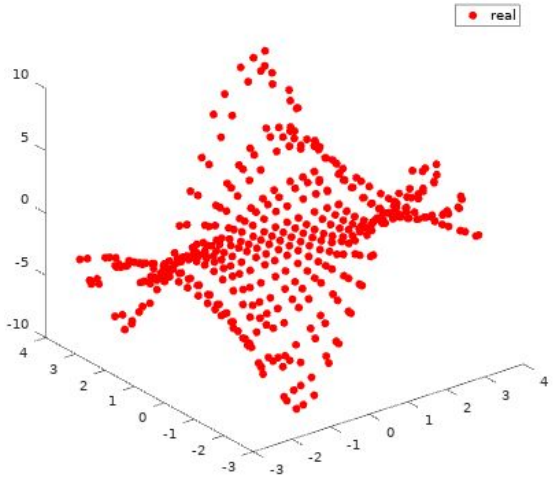
$$Momentum^{n} = \alpha \cdot \Delta W_{n-1}$$

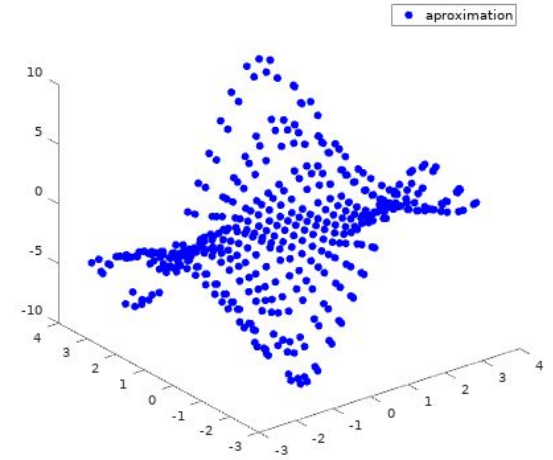
Resultados

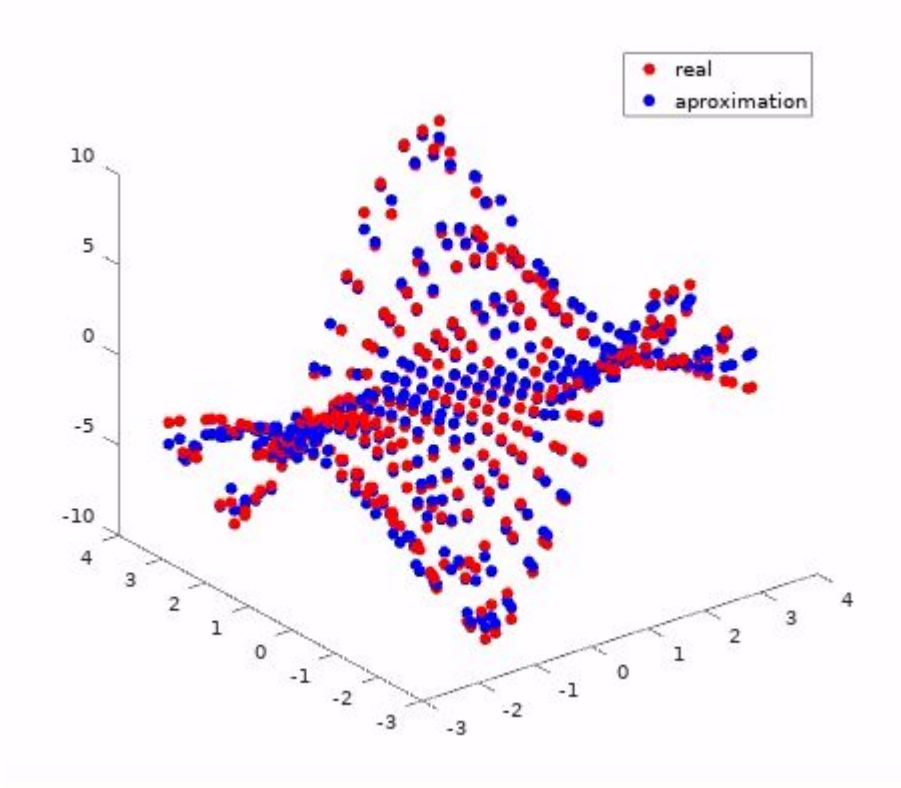
CONFIGURACIÓN

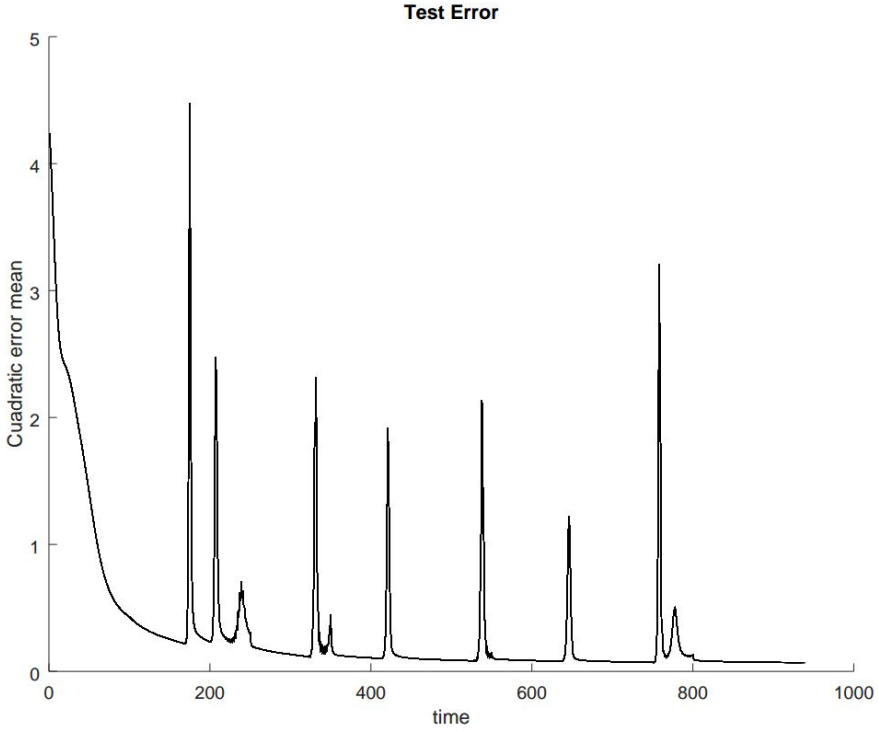
learningRate	0.0001
adaptiveLearningRate	1
timesLR	50
incLR	0.00005
decLR	0.25
momentum	0
momentumRate	0.9
maxError	0.05
epoch	1000
debugTimes	Inf
deltaWCalculation	batch
beta	1
gamma	0
function	tanh
betaLast	1
gammaLast	0
functionLast	linear
learningSamplePercentage	0.7
testingSample	terrain02.data
qtyNeuronsInLayer1	2
qtyNeuronsInLayer2	20
qtyNeuronsInLayer3	10
qtyNeuronsInLayer4	1

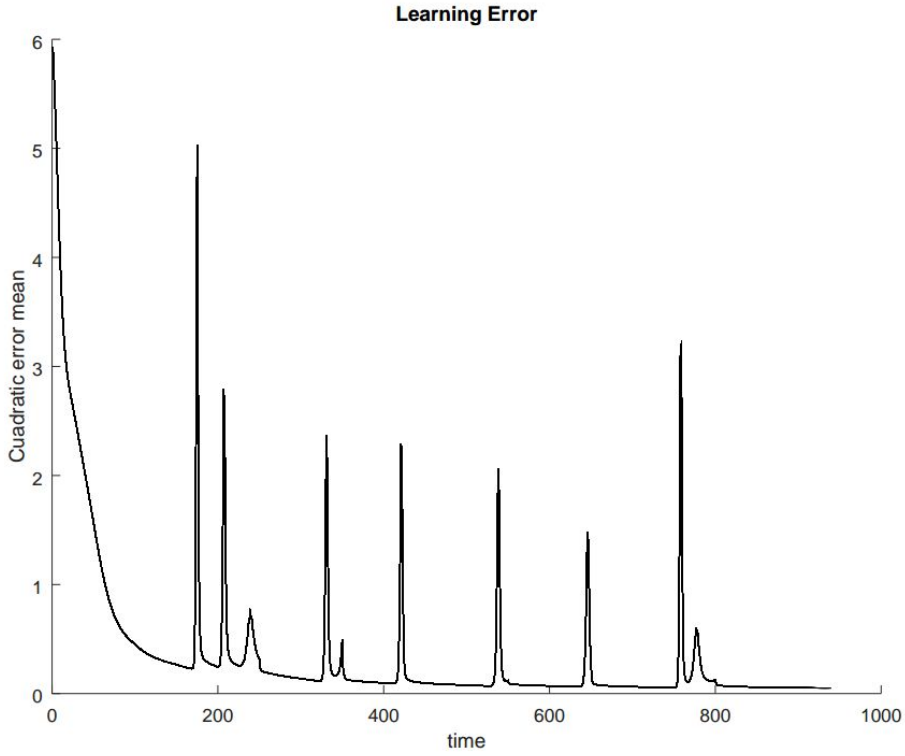


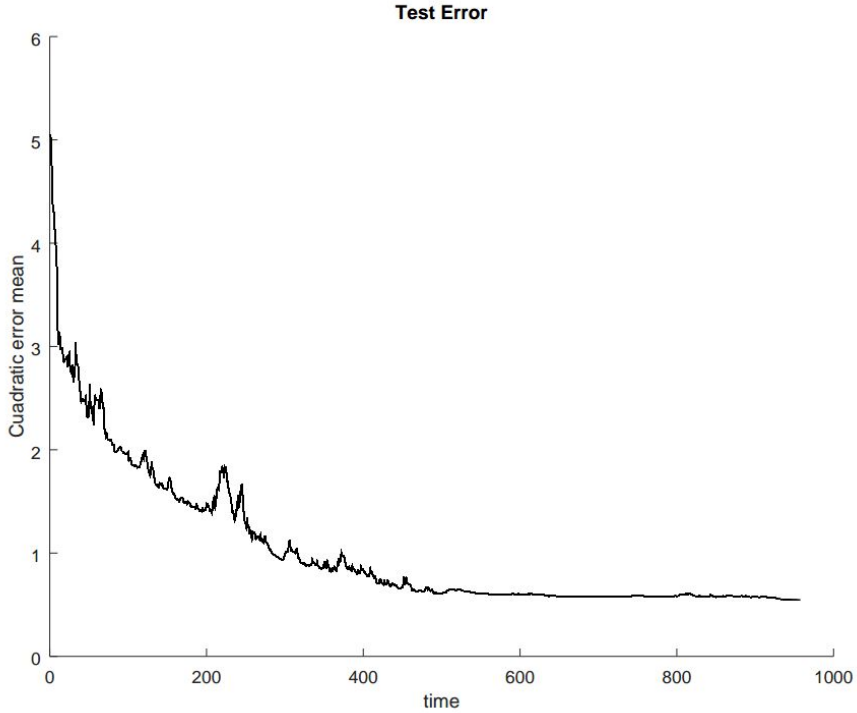

real

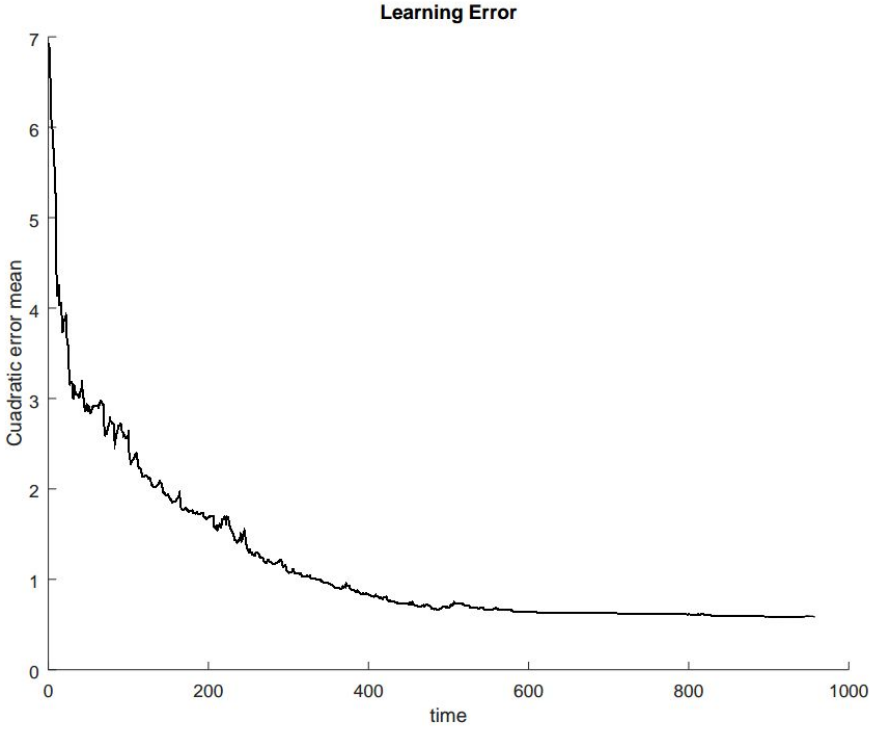

aproximation


real
aproximation

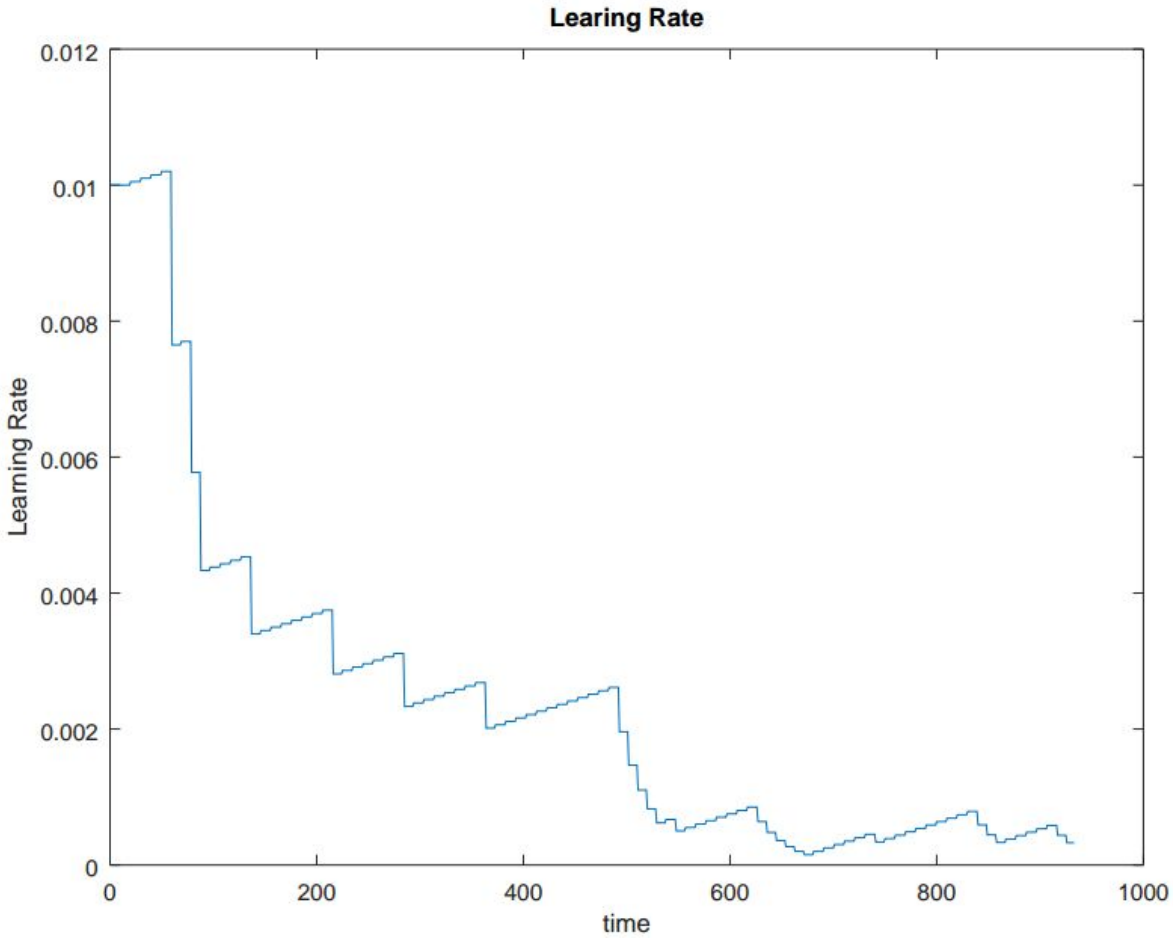

Test Error
Cuadratic error mean
time
0
1
2
3
4
5
0
200
400
600
800
1000

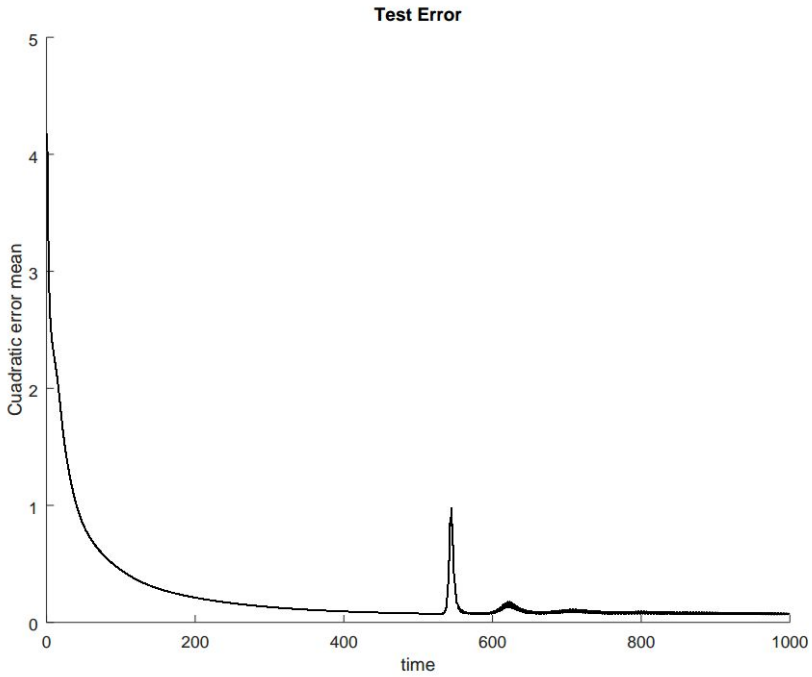

Learning Error
Cuadratic error mean
time
0
1
2
3
4
5
6
0
200
400
600
800
1000

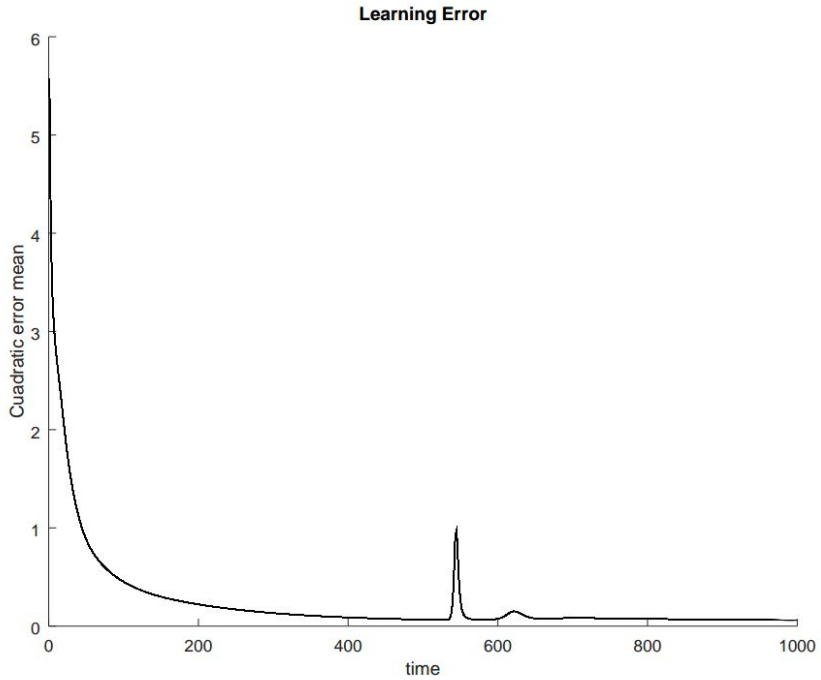




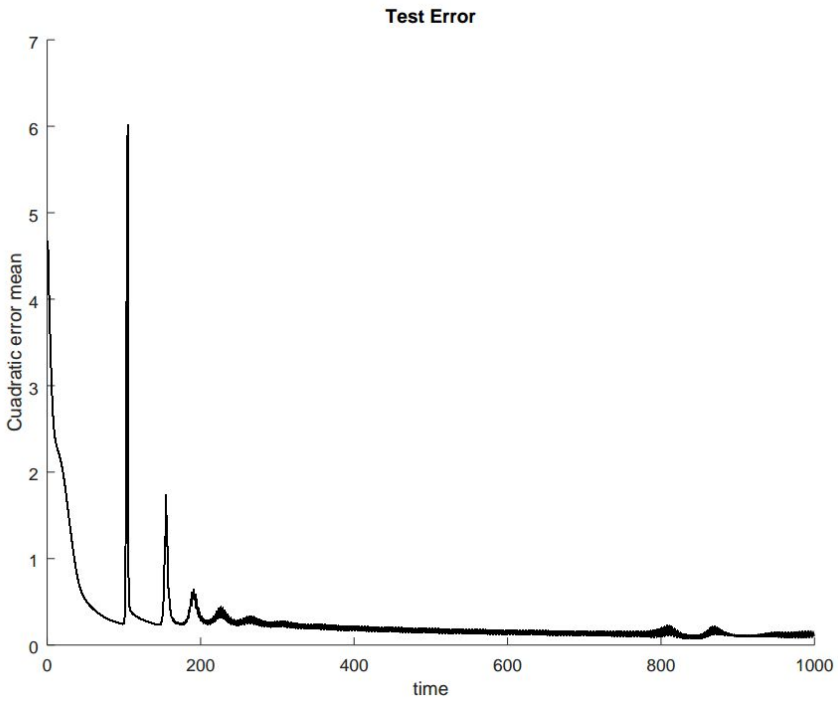
Incremental

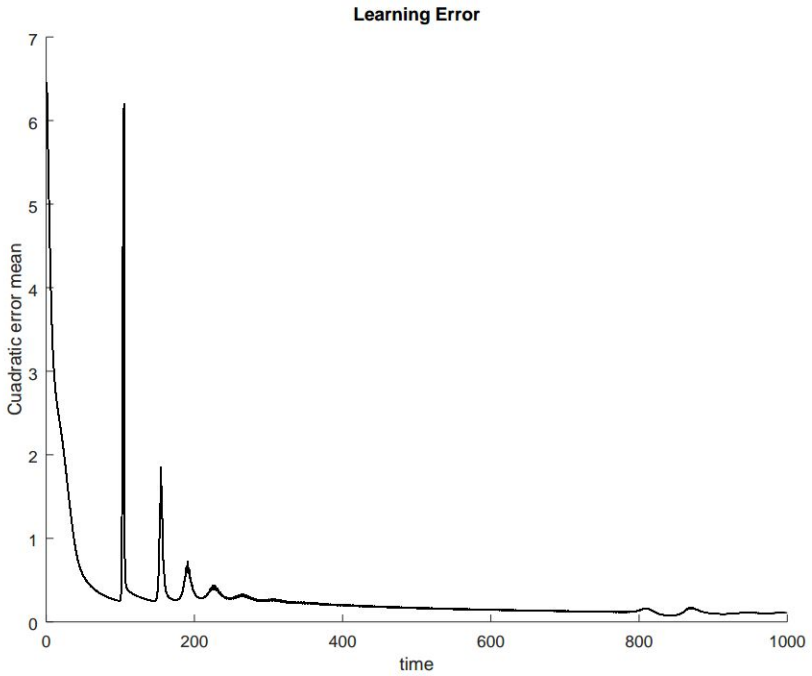

Learing Rate
0.012
0.01
0.008
0.006
0.004
0.002
0
Learning Rate
0
200
400
600
800
1000
time



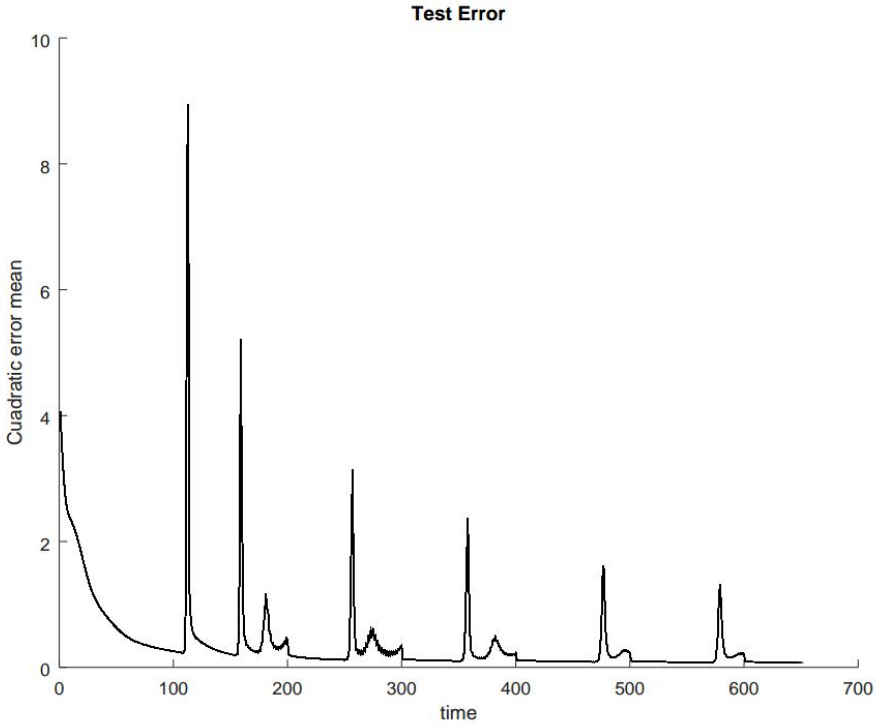


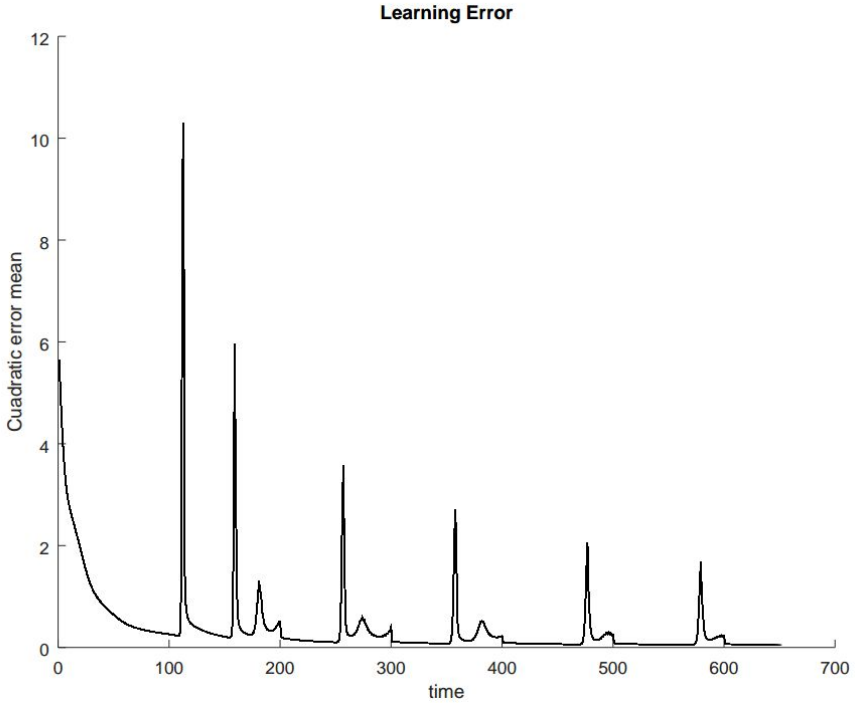
Constant learning rate & without Momentum



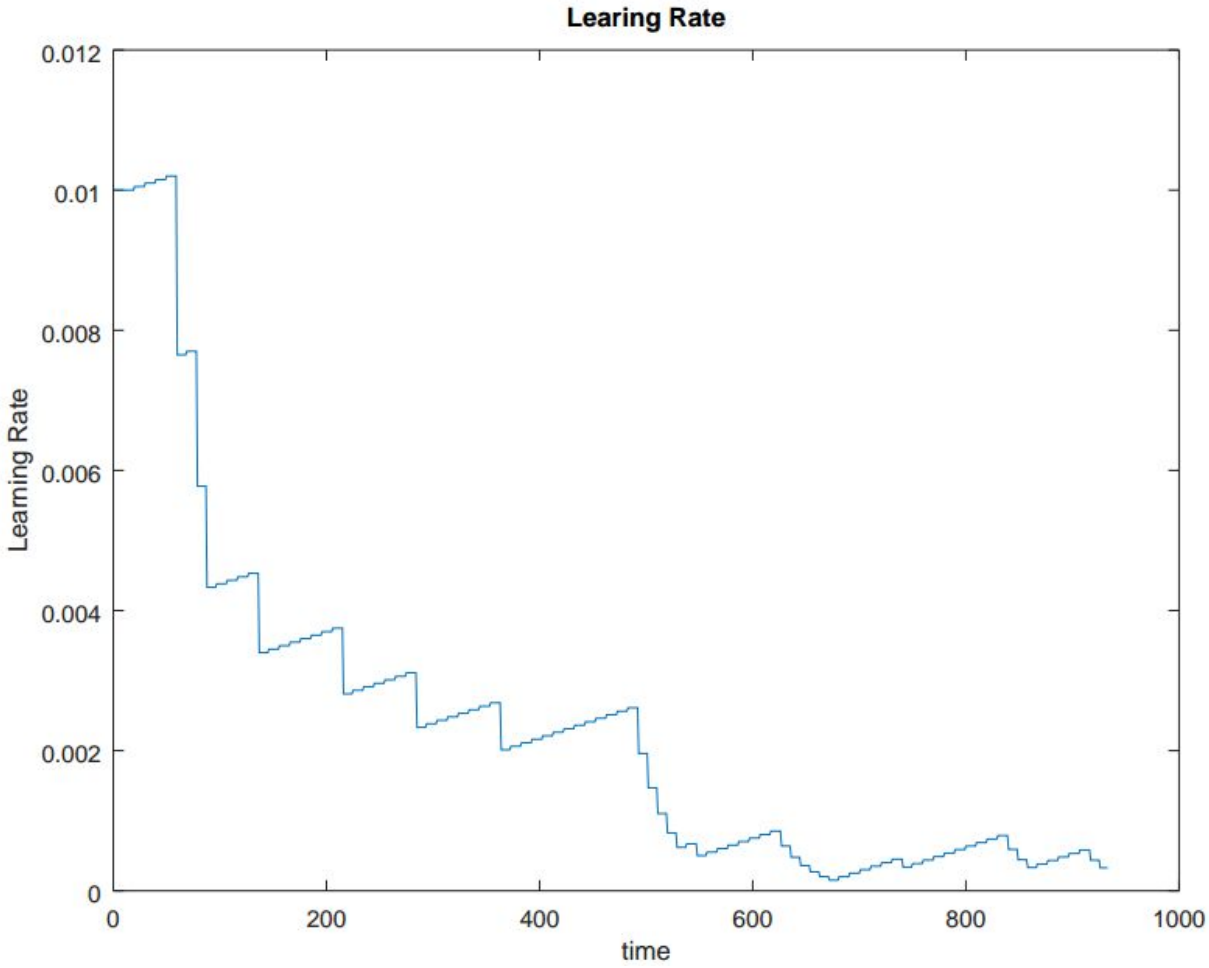


Constant learning rate & Momentum





Adaptive learning rate & Momentum


Learing Rate
0.012
0.01
0.008
0.006
0.004
0.002
0
Learning Rate
0
200
400
600
800
1000
time

¿Preguntas?