lucidmode

Release v0.4.1-beta1.0

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lucidmode A Lucid Framework for Interpretable Machine Learning Models	
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Version:	**v0.4.1-beta1.0**
License:	GPL-3.0 License.
Repository:	https://github.com/lucidmode/lucidmode

CHAPTER

ONE

HOME

lucidmode A Lucid Framework for Interpretable Machine Learning Models	
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1.1 Datasets

- **Public Datasets**: MNIST, Fashion MNIST
- **Special Datasets**: OHLCV + Symbolic Features of Cryptocurrencies (ETH, BTC)

1.2 Artificial Neural Network

Feedforward Multilayer perceptron with backpropagation.

1.2.1 Methods

- **fit**: Fit model to data
- **predict**: Prediction according to model

1.2.2 Functionality

- **Weights Initialization**: With 4 types of criterias (zeros, xavier, common, he)
- **Activation Functions**: sigmoid, tanh, softmax
- **Cost Functions**: Sum of Squared Error, Binary Cross-Entropy, Multi-Class Cross-Entropy
- **Regularization**: L1, L2, ElasticNet for weights in cost function and in gradient updating
- **Optimization**: Weights optimization with Stochastic, Batch and Gradient Descent
- **Metrics**: Accuracy, Confusion Matrix (Binary and Multiclass), Confusion Tensor (Multiclass OvR)

1.2.3 Interpretability

- **Visualizations**: Cost evolution, Weights on layers, Convolution operation, Image catalog

1.3 Author/Principal Maintainer

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1.5 Contact

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INTRODUCTION

This is an introduction to lucidmode ....

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EXAMPLES

`lucidmode` requires . . . .

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INSTALLATION

`lucidmode` requires . . . .

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ROADMAP

`lucidmode` requires ... .

CHAPTER

SIX

RELEASE HISTORY

6.1 v0.4-beta1.0

Calculation of several metrics for classification

sensitivity (TPR), specificity (TNR), accuracy (acc), likelihood ratio (positive), likelihood ratio (negative), confusion matrix (binary and multiclass), confusion tensor (binary for every class in multi-class)

Sequential Class

- Move the cost_f and cost_r parameters to be specified from formation method, leave the class instantiation with just the model architecture.
- Move the init_weights method to be specified from formation method.

Execution

- Create formation method in the Sequential Class, with the following parameters init, cost, metrics, optimizer.
- Store selected metrics in Train and Validation History

Visualizations

- Select metrics for verbose output.

6.2 v0.3-beta1.0

Regularization

- L1, L2 and ElasticNet on weights and biases, location: gradients
- L1, L2 and ElasticNet on weights and biases, location: cost function

Numerical Stability

- in functions.py, in cost, added a 1e-25 value to A, to avoid a divide by zero and invalid multiply cases in computations of np.log(A)

Data Handling

- train and validation cost

Visualization

- print: verbose of cost evolution

Documentation

- Improve README

6.3 v0.2-beta1.0

Files

- complete data set: MNIST
- complete data set: 'fashion-MNIST'

Tests passed

- fashion MNIST
- previous release tests

Topology

- single hidden layer (tested)
- 1 - 2 hidden layers (tested)
- different activation functions among hidden layer

Activation functions

- For hidden -> Sigmoid, Tanh, ReLU (tested and not working)
- For output -> Softmax

Cost Functions

- 'binary-logloss' (Binary-class Cross-Entropy)
- 'multi-logloss' (Multi-class Cross-Entropy)

Metrics

- Confusion matrix (Multi-class)
- Accuracy (Multi-class)

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Tests passed

- Random XOR data classification

Sequential model

- hidden_l: Number of neurons per hidden layer (list of int, with length of l_hidden)
- hidden_a: Activation of hidden layers (list of str, with length l_hidden)
- output_n: Number of neurons in output layer (1)
- output_a: Activation of output layer (str)

Layer transformations

- linear

Activation functions

- For hidden -> Sigmoid, Tanh
- For output -> Sigmoid (Binary)

Weights Initialization

- Xavier normal, Xavier uniform, common uniform, according to [1]

Training Schemes

- Gradient Descent

Cost Functions

- Sum of Squared Error (SSE) or Residual Sum of Squares (RSS)

Metrics

- Accuracy (Binary)