ML Basic C References

Machine Learning Basics in C++

Neural Networks and Deep Learning

I had the idea for this project while reading Neural Networks and Deep Learning by Michael A. Nielsen. His book is licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported License.

The backpropagation method `void backprop(...)` , the Stochastic Gradient Descent method `void SGD(...)` and the commandline parameteres for my `main(...)` are inspired from his python code. Like him, I use the USPS dataset for my project.

The Deep Learning Book

I learned the machine learning basics and most of the Math from the book Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville.

The Softmax function and its derivative

Eli Bendersky explains on his website, how to derive the Softmax function.

His site is © 2003-2018 Eli Bendersky.

The MNIST Dataset

The "Modified National Institute of Standards and Technology" dataset is a large set of handwritten digits. Like Michael A. Nielsen, I use the MNIST dataset for test and demostration purpose.

You should download the dataset from Yann Lecun's site, since I use the IDX file format, that is described there.

The Eigen Matrix Library

My code uses the Dense Matrix classes from Eigen.

Eigen is primarily MPL2 licensed (see: http://www.mozilla.org/MPL/2.0/).

I installed the latest stable release 3.3.4 from www.tuxfamily.org in the `MinGW\x86_64-w64-mingw32\include` directory.

Compiler, O-S, Hardware

I use the MinGW environment (see http://www.mingw.org)

```
c:> g++ --Version
g++ (x86_64-posix-seh-rev0, Built by MinGW-W64 project) 7.1.0
Copyright (C) 2017 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.  There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

My ASUS Ultrabook UX305F has an Intel(R) Core(TM) M-5Y10c CPU @0.80 GHz / 998 MHz. It is running on Windows 10 Home (c) 2018 Microsoft Corporation. I use Typora (Version 0.9 Beta) to write these Markdown files. For the pictures, I use a free version of Autodesk Sketchbook and paint.net.
