Advanced Methods in Medial Image Analysis: Exercise 4

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Exercise 4: Logistic Regression

The linear regression we have seen in the lecture, can be extended to binary problems where two concepts have to be classified. It is called logistic regression. The model is adjusted by plugging in the linear model into the logistic function. However, because of the non-linearity of the logistic function, the problem becomes intractable, that is why in logistic regression the model has to be iteratively fitted to the data. Implement a logistic regression classifier which is able to separate images of oranges and images of grapefruits and fit your model to training samples in a leastsquares sense. Use the code snippet *snippet-logisticregression.py* as basis.

- Divide the data provided into a training and test set (80/20). The images are vectorized from $100 \times 100 \times 3$ to $30,000$ dimensions.
- Implement the LogisticRegressionModel class which derives from nn.Module. In the constructor, setup a nn.Linear module and initialize the weights and bias with zero.
- Instantiate your model, the nn.MSELoss and the optimizer.
- In the closure for the optimizer evaluate the model with the training input and calculate the loss.
- Run the optimization with an optimizer we have seen in the lecture.
- Report the performance of your optimizer in form of convergence plots (e.g. using matplotlib.pyplot.plot) and report the training and test classification errors
- Hand in your code, which does not throw exceptions.