# Domácí úkol SSU 1

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## Úkol 1   Independent linear multi-class classifier

We implemented the optical character recognition task using the independent linear multi-class classifier, which is the most simple solution for classifying characters in an image.

The weights for the classifier were learned with and without bias. The learning without bias took less iterations and therefore was much faster, however it presented less accurate results. That causes the fact that the parameter hyperplane has to intersect the origin and therefore cannot divide the classes so precisely as the one with bias.

The learning procedure was also conducted on different operating systems (Windows and Linux). The different results were caused by different order in which the training data were loaded. This shows that the classifier is robust to the order of the training data and produces similar results.

| Classifier type | $Acc_{seq}$ | $Acc_{char}$ | Iterations |
|---|---|---|---|
| With bias (Win) | 0.296 | 0.73 | 59 |
| Without bias (Win) | 0.26 | 0.71 | 26 |
| With bias (Lin) | 0.332 | 0.74 | 57 |

Tabulka 1: Accuracy values

From that, the error values $R_{seq}$ and $R_{char}$ were computed by simple formula:

$$R_{seq} = 1 - Acc_{seq} \tag{1}$$

| Classifier type | $R_{seq}$ | $R_{char}$ |
|---|---|---|
| Without bias (Win) | 0.704 | 0.27 |
| With bias (Win) | 0.74 | 0.29 |
| With bias (Lin) | 0.668 | 0.26 |

Tabulka 2: Error values