

Instructions for usage of provided software

The provided convolutional neural network “FinalNet_PLOS.mat” is a MATLAB-implemented program, which aims to classify the shapes of red blood cells (RBCs) in flow. These pictures of RBCs have to be in a square format of 90x90 px to be fed into the algorithm.

To be able to use the provided data sets as well as the software, first unzip all the compressed folders.

The training data set is already pre-processed in order to train a neural network without further treatment for the desired purpose.

In order to make the programs more comprehensible, we organized the whole source code into logical sequences, where

- “F1_training” builds (trains) a new convolutional neural network (CNN) with the implemented specifications. For further documentation, please have a look into the source code, where details will be explained. In order to train the network (i.e. run this program), you need to have installed the latest MATLAB version (2017b or higher) and a high performance graphics card (e.g. NVidia GeForce 1080 Ti). In the folder “Kihm_et_al_2018_RBC_CNN_training_data.zip”, you will find all the used training images in the correct folder structure. Please do not change anything within the folder architecture to make sure you will not get any error messages. Specify the root folder of these images when running MATLAB.
- “F2_batchEval” uses a trained neural network to analyze the input image data, specified in “Kihm_et_al_2018_RBC_CNN_input_data.zip”. Again, please do not change the folder architecture since this might cause error messages. For the network, you may either train a new one by running the routine above or use the CNN which was also used in the manuscript and which will be provided along with all the data. To do so, you have to load the network-file, either by drag and drop or command-line prompt. Again, please have a look into the detailed comments inside the source code. The output will be a map of all the fed input images (3,090 in total) and their CNN-assigned value, mapped onto an 8-bit range. From this output, the parameters for fitting will be deduced, which are the key feature of the further representation of shapes in phase diagrams.
- “F3_phaseDiagram” uses the established parameters from the previous program to create phase diagrams based on the input images. Again, specify the root folder of the images to obtain the desired phase diagram.

In case you have further questions, do not hesitate to contact the corresponding author of the article.