For online test the application for "Supervising and controlling White Wines Fermentation Parameters Evolution" use the link: http://193.226.29.27/WineFermentation/

In this application you can configure a Neural Network and/or a Genetic Algorithm that can simulate the white wine fermentation and based on your datasets you can observe the "Alcohol Concentration" and "Substrate" evolution in the fermentation process and after training you can test with some different parameters to see the results that can be obtained.

We explain here all section that need to be configured for working the application.

1. In "configure Neural Network" section are specified the parameters for Neural Network. For example, we recommend the following parameters:
   a. NN architecture = Simulate without pH and CO2 parameters
   b. Hidden Layer Size = N1 + 6
   c. Learning Rate = 0.5
   d. Activation Function = Sigmoid
   e. Weight initialization = Use random Xavier initialization
   f. Number of Epochs = 200000
2. Section "Configure Genetic Algorithm"
   You need to configure this section only if that in the previous section you choose "Use weights pretrained with GA" otherwise you can skip this section. If you choose to use weights pretrained with GA and need to configure this section, we propose:
   a. Population Size = 50
   b. Number of max epochs for fitness function = 20000
   c. Number of max generations for GA = 15
   d. Probability of crossover = 0.9
   e. Probability of mutation = 0.5
   f. Beta coefficient = 0.2
   g. Selection method = elitist
3. Section "Normalize Data Set" is used if you have your dataset and need to be normalized before to be used in the training network. If you have a dataset already normalized, you can skip this section. For example, we propose in the attached archive 2 original files one "without pH and CO2" and "one with pH and CO2". If you chose to normalize a datafile you need to specify the following values:
   a. Lower bound: need to be "0" if in NN section you specified to use "Sigmoid Function" or "-1" if you specified to use "Tanh function" as activation function
   b. Upper bound: need to be specify "1" for all activation functions

   If you chose to normalize the dataset use "Choose File" to load the dataset, complete the field and use "Normalize data" button that become active to obtain a normalized dataset (**It does NOT work on the server version**, because generate the file on the server and not offer the possibility to download it!!!). A former version of this application can be downloaded from the following link - http://webspace.ulbsibiu.ro/adrian.florea/html/simulatoare/WineFermentationPrediction.zip and use the README.txt file. Based on this, can help the user to compile his solution and fix the previous "bug" regarding normalization.

4. Section "Train and Test" is section where you configure the dataset that is used for training and testing the NN. Use "Choose File" to select a dataset. We propose 2 datasets in the attached archive "**DataSetNormalized0,1.xslx**" that is recommended to be used for "Sigmoid

activation function" or "**DataSetNormalized-1,1.xslx**" that is recommended to be used for "Tanh activation function". Also, for DataSet with CO2 and pH are these two versions. Follow you need to choose what parts from the dataset are used for training and what part is used for testing. We recommend selecting DataSet1, DataSet3 and DataSet4 for training (DataSet2 left for testing). Now you finish the configuration and can press the button "Test & Train" and wait because this step takes some minutes depending on number of epochs that you set.

5. In section "Network results" are showed result after the training and testing the network was finished. Are showed the following results:
    a. Training Error: - error obtained by NN in the last training epoch
    b. Testing Error: - error obtained by NN on the testing dataset
    c. 2 charts with Alcohol Concentration and Substrate found in the used dataset

6. Section "Predict Fermentation Process Parameters" is section that can be used after finishing the training and testing and previous section was completed. You can specify the input parameters and press "Predict" button to obtain the results. For example, you can specify:
    a. Biomass [g/L]
    b. Time [h]
    c. Temperature [C]
    d. Initial substrate [g/L]

And obtain the following results:

    a. Alcohol concentration [g/L]
    b. Substrate [g/L]