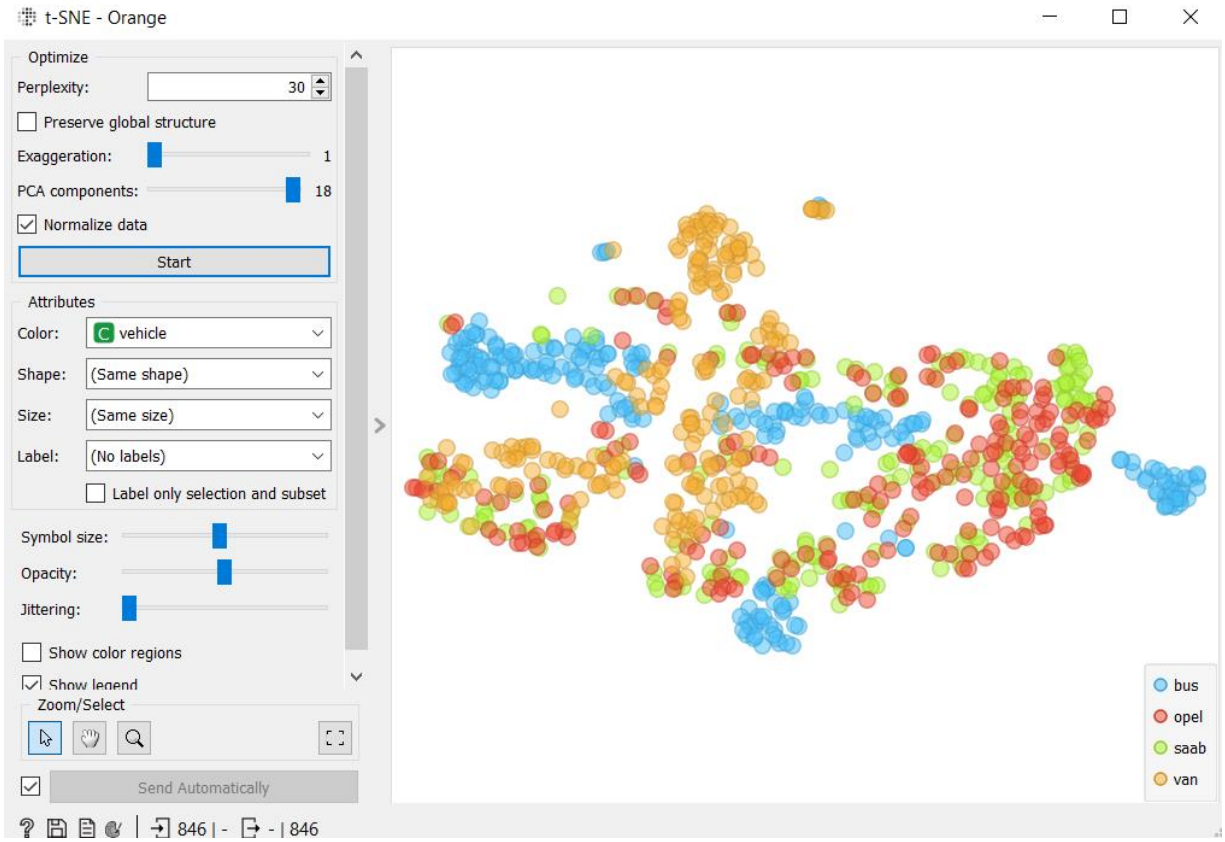
# Anastasia Psarou - Lab 5. Advanced classifiers

**a) Select the dataset which is not too regular (such as glass, but other are welcome!). Read about it and try to understand features.**

I choose “Vehicle Silhouettes” Dataset.

**b) Visualize the dataset employing t-SNE to show that its regularity is poor.**



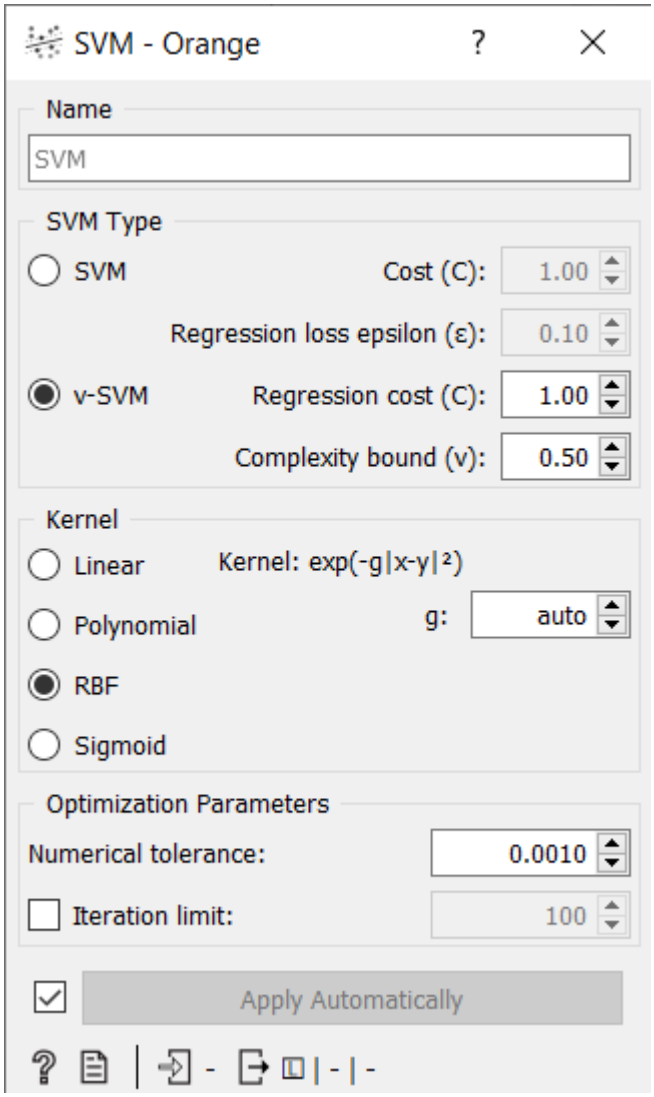

Classes are not very distinguishable between each other.

**c) Use SVM and Neural Network classifiers as the baseline. Select the metaparameters producing the best F1 values for these classifiers.**

The best F1 value I got for SVM is:

| Model | Train time [s] | Test time [s] | AUC | CA | F1 | Precision | Recall | LogLoss | Specificity |
|---|---|---|---|---|---|---|---|---|---|
| SVM | 1.615 | 0.085 | 0.948 | 0.781 | 0.774 | 0.783 | 0.781 | 0.472 | 0.928 |

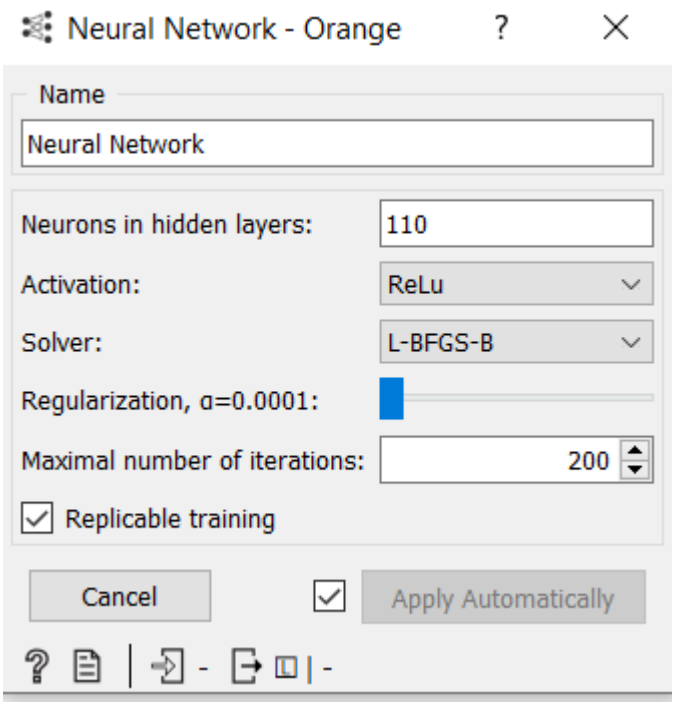
The values I used to get this result are:




As far as Neural Network is concerned the best results of F1 I get is:

| Model | Train time [s] | Test time [s] | AUC | CA | F1 | Precision | Recall | LogLoss | Specificity |
|---|---|---|---|---|---|---|---|---|---|
| Neural Network | 5.668 | 0.058 | 0.962 | 0.851 | 0.851 | 0.851 | 0.851 | 2.928 | 0.950 |

This happens with these parameters:




**d) Your main task is to show how the performance of MLP is changing with #layers. However, when increasing the number of layers, you should remember that the number of NN parameters is CONSTANT!!!**

An effort was made to maintain the parameters constant at 2200. Having 18 features and 4 classes a 1 hidden layer Neural Network of 100 neurons a 2 hl of (2*)37, a 3 hl of (3*)28, a 4 hl of (4*)24, a 5 hl of (5*)21, a 10 hl of (10*)14, a 15 hl of (15*)12 were used.

**f) Formulate conclusions.**

At first, by increasing the numbers of layers we can have better performances with the Neural Network as a classifier, peaking at 4 layers. Although, after that the performance starts to drop little by little and at 10 layers we observe worse performance than the initial one layer.