Templates

The code makes use of templates. These are user-defined reference sounds that can be used to evaluate the algorithm or improve the performance. Three things are stored for each template: region, rectangle and image. To give these files a unique name, a hash-code is used (all three files have the same hash code). There are three types of templates: regular, dml and eval.

Three parts (region, image, rectangle)

The region is an array with numbers which forms a spectrogram when plotted. The array uses grayscale values (0 to 255) and is always scaled between these values. Regions have variable size.

The image is a png plot of the region. It is present for reference purposes only (for the user) and is not used in the code itself.

The rectangle contains the position of the region in a spectrogram according to the format (x, y, w, h). x and y are the coordinates of the lower left corner of the region inside the spectrogram, w and h are the width and height. All of these values are given in pixels.

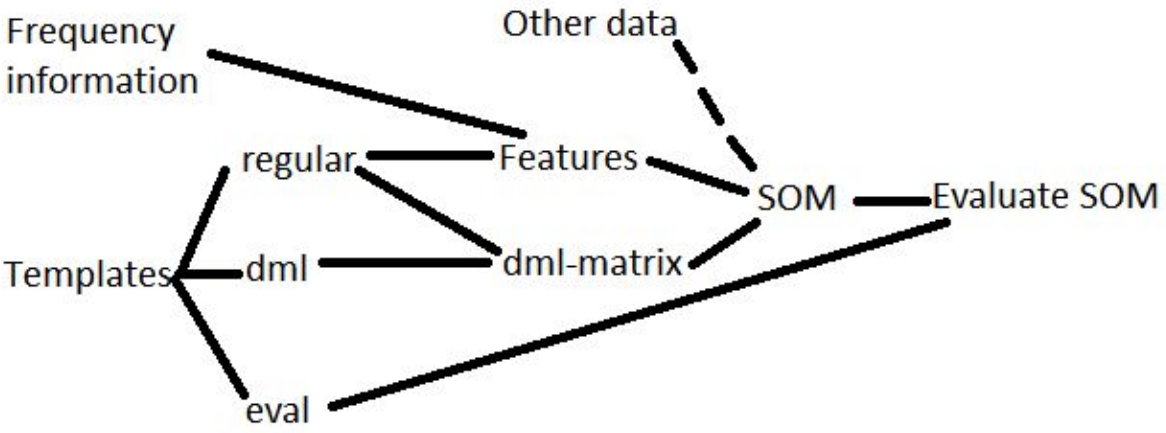
Types of templates (regular, dml and eval)

Regular templates are used as features. When a new region comes in, a similarity score (SSIM) is calculated with all regular templates. Based on these scores, new regions are separated from each other.

Dml templates are used for distance metric learning. The previous similarity scores are combined with frequency information and this results in a number of features. These features are used to separate regions. In distance metric learning, a weight is applied to each feature so they optimally separate different bats. For this, you need examples of regions that are classified. Both regular and dml templates are used for this (you always need a small amount of dml templates because you need more datapoints then features to solve the problem).

Finally, evaluate (eval) templates can be used to estimate the performance. These examples are not used to calculate a dml or a SOM. With this, the performance of a SOM-dml on data it has never seen before can be evaluated.

Graphical overview



The figure above shows a graphical overview of how the procedure works. Features are created based on frequency information and regular templates. A dml-matrix is created using regular and dml templates. A SOM is fitted using features and the dml-matrix as well as other data. This is a broken line because templates can also be used (instead of other data). Finally, the SOM can be evaluated using the unused eval templates.