

EM1 PFD Package README

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1 Synopsis

This package contains the EM1 software required to simulate the EM1 Transformed Model, estimate the respiration rate, extract features and create respectively use the J48 and MLP classifiers.

2 Files

```
WP6_EM1/  
    createJ48Classifier.m  
    createMLPClassifier.m  
    em1_sim.mdl  
    exampleGenerateAndExport.m  
    exampleGenerateAndUse.m  
    exportFeatures.m  
    extractNormalizedFeatures.m  
    files/  
        example-2class.arff  
        example-3class.arff  
        example-5class.arff  
        featsets.mat  
    generateRandomFeatureSets.m  
    normalizeMinMax.m  
    plotNominalRespiration.m  
    plotRespirationCases.m  
    shuffleFeatureSets.m  
    simObs.m  
    simulateEM1m.m  
    simulateFeatures.m  
    simulateRespiration.m  
    WEKA/  
        COPYING
```

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weka.jar

Please refer to the MATLAB help command for documentation of the functionality.

3 WEKA

3.1 Installation and use from MATLAB

MATLAB comes with a JRE included and an interface to Java. To use the classification from within MATLAB, you need to append the *weka.jar* file in the MATLAB *CLASSPATH* file, that can be obtained and edited with:

```
which classpath.txt  
edit <path to above file>
```

Please refer to the MATLAB Help when in doubt. Important is to restart MATLAB, which is required for this change to take effect.

3.2 Standalone

To run the WEKA Machine Learning Toolkit you can either directly use the included JAR file (see WEKA directory, version 3.4, double-click the JAR) if your machine has Java installed already, or you can to download an installation version for your system (including a JRE).

When WEKA starts up, it will show the GUI Chooser (see figure 1)



Figure 1: WEKA GUI Chooser

Select the *Explorer*, which will show a window similar to figure 2.

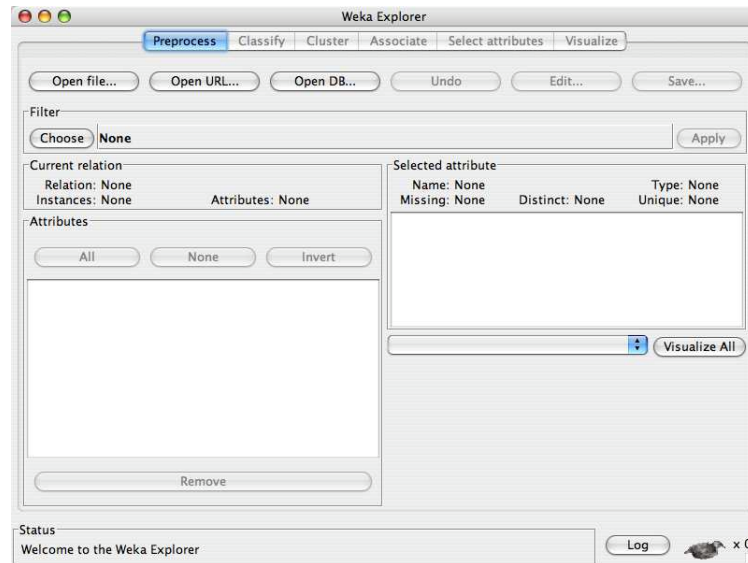


Figure 2: WEKA Explorer

Choose open file, navigate to one of the files we have generated with MATLAB and load it. For a quick classification, you can use the “*Classify*” tab select a Classifier and run it in the GUI. For more information, please refer to WEKA documentation.

4 Examples of Use

4.1 Respiration Profiles

The following scripts are examples for the simulation of EM1. They will simulate, estimate the respiration rate and plot results:

```
plotNominalRespiration
plotRespirationCases
```

4.2 Machine Learning and Classification

4.3 Generate Datasets

Calling:

```
featsets = generateRandomFeatureSets(50);
```

will generate a dataset of about 2000 featuresets (which might take a while). Alternatively you can use the included pre-generated dataset to check the rest of the package without having to wait too long:

```
load files/featsets.mat
```

4.4 Classification from within MATLAB

The package includes scripts that use the MATLAB/Java interface to call WEKA directly from within MATLAB (if the WEKA library is installed correctly). These are:

```
createJ48Classifier  
createMLPClassifier
```

when called with the test parameter set to 1, the functions will split the given data set after random permutation into a 66% training set and 33% test set. The produced classifier will be tested using the test set and corresponding results (including the model) will be printed in the command window.

4.5 Classification in WEKA

To work with WEKA standalone, an export script is included that will export the generated data set to an ARFF format file (WEKA native format). Please see:

```
help exportFeatures
```

for more information. To save time, you can also use the already included ARFF files:

```
files/example-2class.arff  
files/example-3class.arff  
files/example-5class.arff
```

These correspond to the different cases compared in the Deliverable 6.1 (2 class can be used for detection only, 3 class can be used for detection and diagnosis of the parameter affected, 5 class can be used for detection and diagnosis of the parameter affected, as well as direction of change). These files are text and can be edited or viewed with any standard text editor.