# Assignment 3: Audio Classification using Machine Learning

CS 4347: Sound and Music Computing

due February 18 (Monday), 11:59 pm

Before you start, please download `features.arff` from IVLE. You will need it for this assignment.

1. **Visualization**

   Before performing any analysis of data, a good starting point is always trying to visualize it. What does your data look like? To visualize, plot the following pairs of features:

   - ZCR_MEAN_TIME (x-axis) and PAR_MEAN_TIME (y-axis)
   - ZCR_STD_TIME (x-axis) and PAR_STD_TIME (y-axis)

   Each plot should have axis labels, distinguishable markers and a legend. Save these plots as `zcr-par-mean.png` and `zcr-par-std.png`. **Hint:** you can use the python library `arff` to load an arff file. Could you use any of these features to distinguish between music and speech? Why? Keep these questions in mind for the next section.

2. **Classification**

   Build a classifier to perform classification on the features in the given ARFF file in Weka with `trees.LMT` (Logistic Model Tree) with 10-fold cross-validation and save the results. Choose at least one other classification algorithm with 10-fold cross-validation to build another classifier, perform classification and save the results.

   Compare the results of these two algorithms and save your findings to a file called `classifications-results.txt`. This file should answer at least these three questions:

   - Which algorithm gives you the best results?
   - Which features contribute most significantly in classification?
   - Where do these features come from (time, spectral or perceptual domain) and why do you think these features can contribute?

   You are encouraged to write down any other findings. After answering these questions, save the Weka results for the two algorithms and put them at the end of the text file.

3. Submit a zip file to IVLE containing the two plots (`zcr-par-mean.png`, `zcr-par-std.png`) and the `classification-results.txt`. Name the zip file using your student number (e.g. `A0123456H.zip`). Late submissions will receive no marks.

4. Grading scheme:

   - **3/7 marks**: correct and well labeled plots.
   - **4/7 marks**: results and discussion of Weka output.