Ubiquituos Computing Exercise2

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1 Exercise 1

Features: The given script for feature calculation provides for 19 precomputed features. Out of those we need to find the most useful ones for the classifier we use. For doing that we have two main options:

- Forward / Backward selection: start with one feature and add another one every iteration and check performance.

- Best Subset selection: Given the features, try all possible subsets to find the optimal combination of features.

Considering the feasibility of the two methods for the given task, we only consider forwardselection. The reason for that is that best subset selection means training 2^n models. In our case this would be 524.288 models. Therefore, we choose forward selection of features, always adding one feature, retraining the model and checking the accuracy. This procedure was applied to all models we tried. We are fully aware that doing this, we might miss out on the optimal combination of features.

Normalization: We tested all our models with scaled and unscaled features. For all of them the accuracy with unscaled features was lower. We therefore decided to always normalize the data before training.

Model Selection: First of all, we tried the SVMs with the different kernels that were proposed in the given Notebook. As described in more detail in the Features section above, we conducted forward selection to train the classifiers with different feature combinations. We also tried out a Random Forest Classifier with forward selection.
The table below shows the maximal accuracies we accomplished.

Model	SVM Linear	SVM Rbf	SVM Poly	SVM Sigmoid	Random Forest
Max Accuracy	0,86	0,86	0,93	0,33	**0,97**

The results of our experiments show, that the Random Forest classifier outperforms all the different SVMs by at least 4% accuracy. Our best result(97% accuracy) was achieved using all of the 19 possible features. Below you can find the confusion matrix for the Random Forest classifier.