

## Basic Instructions for the Heart Sound Classifier

To develop the Heart Sound classifier, you need the following software:

- MATLAB R2016b (for in-app hyperparameter tuning and cost matrices, R2019b)
- Toolboxes: Statistics and Machine Learning, Signal Processing
- Optional: MATLAB Coder (for code generation) and Wavelets (for wavelet scattering)

You can execute most of the script with just MATLAB and the Statistics and Machine Learning toolbox, by skipping investigating the signal in the SignalAnalyzer app, by skipping the code generation and integration section near the end, and the (optional) section on Wavelet scattering.

The Live Script **HeartSoundClassification.mlx** will take you through the complete demo. It will use various functions and tools from the “HelperFunctions” folder.

You will also need to download the training dataset from the *PhysioNet/CinC challenge 2016*, available at <https://archive.physionet.org/pn3/challenge/2016/>. The data is expected in subdirectories of the Data directory. You really only need the validation data, and (to run the mini demo at the very end), the demonstration directory.

The other files in this directory are MATLAB data files that allow you to get through the demo quickly, without waiting several minutes for the computation intensive steps of feature extraction and (programmatic) hyperparameter tuning: the processed feature table, and several "pretrained" models.

If you downloaded this to follow along with the advanced machine learning eBook, the accuracies should be close (if you investigate the same models) but not identical. A seminar using an earlier version of this demo is available at <https://www.mathworks.com/videos/essential-tools-for-machine-learning-1481139920800.html>.

*Mac Users Beware!* MATLAB and this demo will generally also work on a Mac. Just for code generation, you'll need to have Xcode available, since MATLAB isn't compatible with any Mac C compiler. And if you don't go through code generation, the “Validate final model” demo won't work on a Mac, because the repo does not include a MEX suitable for execution on MacOS.

### Updates/Improvements since last version:

- Updated link to original data to new location
- Fixed problem with BinnedX during code generation
- Added hyperparameter tuning and misclassification cost from within Classification Learner
- Added (bonus) section applying Wavelet scattering to this data