Appendix
Experiment Code Library

The code library developed to evaluate the various biometric system configurations and machine learning techniques described in this book is made available at the link below. Use the 13 digit ISBN, located at the beginning of the book, to gain access.

http://www.uvic.ca/engineering/ece/isot/books/index.php

On this web page you will find two versions of the library, one written for Java developers and the other for .NET developers. Future versions may also feature a user interface for researchers with limited programming experience. This code was initially developed to discover and classify biometric features exclusively within our 8 signal Ground Reaction Force domain, but has since been modified to fit more general biometric recognition problems. Outputs from this library can optionally be written to CSV files for easy analysis in Microsoft Excel.

The highlights of this library include the following:

- **Biometric Evaluation**
  - K-fold cross-validation
  - Equal error rates
  - False acceptance rates
  - False rejection rates

- **Data Formatters**
  - Data amplitude rescaling
  - Area-based sample length rescaling
  - Point-based sample length rescaling

- **Feature Extractors**
  - Geometric and optimal geometric extraction
  - Holistic extraction (PCA)
  - Spectral extraction (*periodogram, magnitude spectra*)
  - Wavelet extraction (*WPD, Fuzzy c-means*)
• **Normalizers**
  – L-type ($L^1, L^2, L^\infty$)
  – Score normalization
  – Linear time normalization
  – Localized least squares regression
  – Localized least squares regression with dynamic time warping (Center Star algorithm, DTW)

• **Classifiers**
  – K-nearest neighbors
  – Multilayer perceptron
  – Support vector machine
  – Linear discriminant analysis (ULDA, KUDA)
  – Least squares probabilistic classification
  – Parameter optimization
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