

AME Patterns library - a generic, open source C++ library for pattern recognition

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presentation format: poster accompanied by laptop demo

Abstract

The AME Patterns library is a new C++ pattern recognition library, currently focused on real-time gesture recognition. It uses concept-based programming to express gesture recognition algorithms in a generic fashion. The algorithms can then easily be applied to any modality as long as the developer provides some basic information - such as what type of *observations* makes up a gesture (e.g., a body gesture can be made up of individual observations of body poses, and a mouse gesture can be made up of individual observations of mouse movement directions), as well as how to computationally compare two observations. In the past, we have successfully used the implemented algorithms in settings as varied as full-body gesture recognition using optical motion capture, full-body gesture recognition using a pair of video cameras, and tangible object gesture recognition using a mouse, stylus, or a tracked ball.

The library has recently been released under the GNU General Public License as a part of AMELiA (the Arts, Media and Engineering Library Assortment), an open source library collection. It implements both a traditional hidden Markov model for gesture recognition, as well as some reduced-parameter models that provide reduced training requirements (only 1-2 examples) and improved run-time performance while maintaining good recognition results. The online documentation shows more information on how to use the library.

As generic programming in C++ can be daunting to programmers unfamiliar with it, portions of the library have also been ported into an addon for openFrameworks, an easy-to-use C++ library framework. We are also continuing to add new

functionality to the library. For example, we are currently implementing algorithms for real-time detection of approximate repetition of sequences of observations (in any modality).

This poster presentation will also be accompanied by a demo presented on a laptop. The most interactive element of this demo will feature a mouse gesture recognition application built using the library. Those interested will be able to interact with the application in training mouse gestures, and observing results of the gesture recognition algorithm as they execute gesture and non-gesture movement. The application interface provides both final gesture recognition results (e.g., notifying the user that a specific gesture was recognized, and displaying a recording of the recognized execution of the gesture), as well as the intermediate results of the algorithm (e.g., partial probabilities produced as a part of the Viterbi algorithm). Users will also be able to play with a few parameters and observe their influence on the recognition.

In addition to live mouse gesture recognition, the audience will also be able to experience 3D body gesture recognition using the Optitrack motion capture system, since our demo for that system uses the AME Patterns library.

Finally, for those interested in developing their own applications using the library, we will provide brief tutorials on downloading, setting up, and using the library.

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