Researchers at the University of South Florida have developed a simple, intuitive, yet robust method for cycle splitting, orientation alignment, and gait signal comparison by exploiting the Kabsch alignment, which minimizes the root-mean-square error between device orientation.

Often times, authentication in biometric applications is determined by comparing data from different subjects or from the same subject at different times. One example of such data is sensor data from a smart phone’s built-in accelerometer and gyroscope sensors. A smart phone experiences a considerable amount of change in orientation through the course of its use, and the result of this change produces poor metrics. Change in sensor orientation between gallery and probe collection presents a serious problem in making inertial sensor based gait authentication a practical biometric. Currently, very little research has been published to address this problem, resulting in a growing need to resolve the above issue.

USF inventors have developed a novel orientation invariant gait-matching algorithm by explicitly estimating the orientation between two signal sequences based on the Kabsch approach. The effectiveness of this method resulted into better or comparable to state-of-the-art as tested on three different datasets, collected at three different sites, involving variations in phone placement, activities, time, and whose number of subjects range from 20 to 745. The results have a significant reduction in error and among the best reported in literature, thus increasing the potential for sensor-based gait authentication. This novel technology could be used for mobile biometrics, mobile authentication, activity recognition from inertial sensors, and health monitoring.

**ADVANTAGES:**

- Simple solution that is easy to implement on current mobile devices in real time
- No need for prior training
- Better results due to reduced RMS error

**An Orientation Invariant Matching Algorithm**

*Receiver Operating Characteristics (ROC) curve for OU-ISIR dataset from our algorithm (OU dataset results - Inventors algorithm)*

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