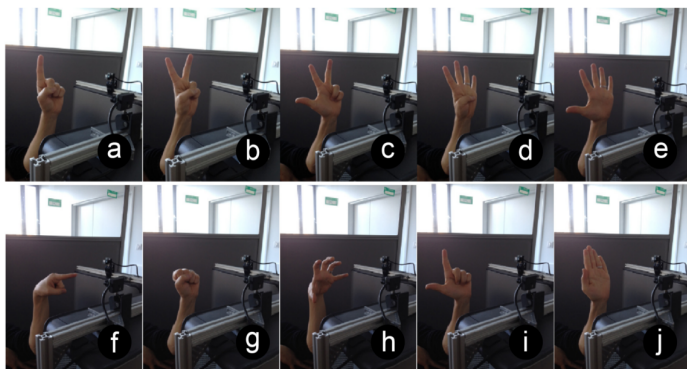


Neural network based data fusion for hand pose recognition with multiple ToF sensors



Hand pose recognition in real-time

Outdoor scenario: ToF sensors deliver robust depth data under daylight conditions and in real-time

Employment of different holistic 3D Point Cloud descriptors for stable results

Setup of a large database of pose samples for a multi-class classification problem

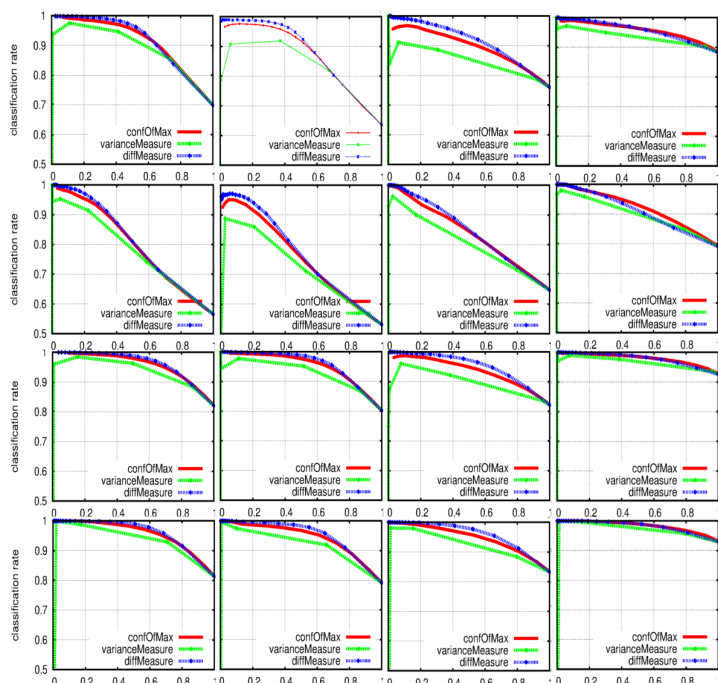
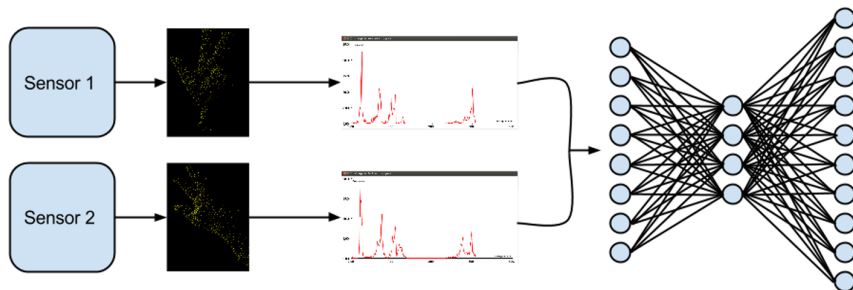
Robust real-time capable hand pose recognition system through carefully chosen parameters

Key Aspects

Fusion of sensor data allows to induce more information into the MLP

Robust decision techniques stabilize recognition results

Reduction of false positives: Confidence measures for increased performance



Significant Insights

low-cost, low-resolution ToF sensors allow for a robust real-time application in outdoor scenarios

Data fusion improves the overall classification rate significantly

The choice of Descriptor brings substantial improvements concerning the overall performance of our approach

No need for extensive camera calibration: ToF sensors are placed in either 90° or 30° angle with roughly the same distance to the object

Various confidence measures boost the results tremendously and can be implemented without drawbacks in execution time

3D Point Cloud categorization with an MLP in a multi-class setting is a feasible approach

Authors: Thomas Kopinski, Stefan Geisler, Alexander Gepperth, Uwe Handmann

References: Th. Kopinski, A. Gepperth, S. Geisler, and U. Handmann. Neural network based data fusion for hand pose recognition with multiple ToF sensors. In *Artificial Neural Networks and Machine Learning - ICANN 2014*, volume 8681 of *Lecture Notes in Computer Science (LNCS)*, pages 233–240. Springer Verlag, Berlin, Heidelberg, Germany, 2014.