The vector machine learning methods on sign language recognition problem

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Abstract

Human gesture recognition is a rather new field and many challenges, especial when motion capture devices become more popular. Sign language recognition is a concrete example of gesture recognition. Various studies have shown that the vector machine methods with Gaussian kernels are among the most prominent models for an accurate gesture classification. In this study, we present the application of vector machine learning methods to sign language recognition problem. We demonstrate that the vector machines (VMs) could also achieve the state-of-the-art predictive performance. The experimental results on the Auslan data set show the feasibility and effectiveness of these methods.

Objectives

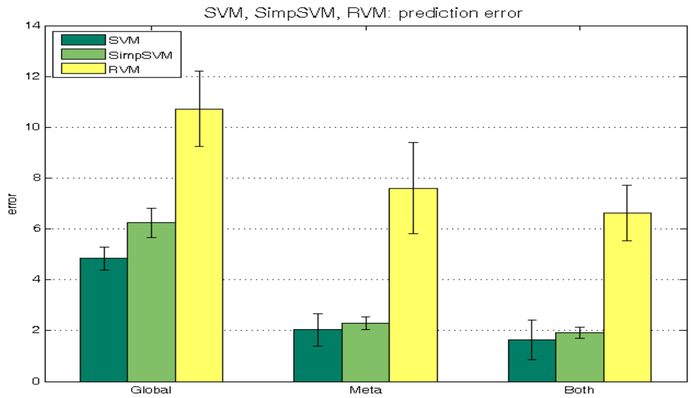
- Support Vector Machines
- Simplification of Support Vector Machine
- Relevance Vector Machines
- A sign language is expressed as a sequence of gestural patterns to convey a meaning. A sign consists of a number of physical components such as the handshape location palm orientation movement of the palms…

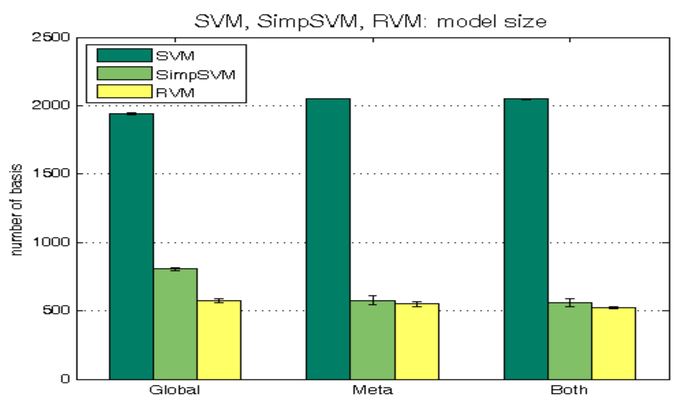
Methods

- Constructing the models of classifier to learn classification signs from the gesture data samples.
- From raw data, we use the method to extract the global features and metafeatures.
- We used grid search to select parameters for SVM, SimpSVM and RVM models.

Results

We compare predictive performance and number of basis functions of SVM, SimpSVM and RVM models on the three types of features: global, meta and both. The results show that when the number of features increases, all three methods increase accuracy. Only use global features, classification accuracy of three methods are low. If using metafeatures, classification accuracy is higher. And it would be better off, if we use a combination of the two feature types above.





The confusion matrices compare the number of errors wrongly classified by SVM, SimpSVM and RVM for all signs. All three SVM, SimpSVM and RVM failed almost the same number of signs.

Conclusion

We present our study on the effectiveness of the vector machine learning methods when applied to the sign language recognition problem. Our experimental results show that the method SVM, SimpSVM and RVM could achieve good classification, feasible, can be applied to solve the sign language recognition problem..

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