

# EPIC 센서를 이용한 GMM, SVM 기반 동작인식기법에 관한 연구

## Research of Gesture Recognition Technology Based on GMM and SVM Hybrid Model Using EPIC Sensor

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### Abstract

SVM (Support Vector machine) is powerful machine-learning method, and obtains better performance than traditional methods in the applications of multi-dimension nonlinear pattern classification. For the case of SVM model training and low efficiency in large samples, this paper proposes a combination of statistical parameters of the GMM-UBM (Universal Background Model) model. It is very effective to solve the problem of the large sample for the SVM training. The experiment is carried on four special dynamic hand gestures using the EPIC sensors. And the results show that the improved dynamic hand gesture recognition system has a high recognition rate up to 96.75%.

## I . INTRODUCTION

Recent flow of UI in attracting mobile, etc. Exhibition is definitely Natural UI. NUI is utilizing gestures, and voice recognition capabilities of the various human-computer interaction is the Human Computer Interaction Technology. NUI is a technology developed through a Command Line Interface, Graphical User Interface of a command based on the Graphic. This includes elements such as described sensing technology, speech recognition technology, motion recognition technique[1,2].

## II. SMART SENSING TECHNOLOGY USING EPS

EPIC sensor can detect any disturbance of the electric field to tens of meters. Because it acts as a large container of the substance including a human body is moving polarity, it can be the target that by causing a large perturbation in the electric field can be easily detected on the sensor. Using these properties as EPIC sensor is a single sensor can measure the ambient electromagnetic field. When using two sensors the difference value of the two sensors may measure the signal changes in a direction forming an axis being the removed noise to be measured at the same time on the two sensors.

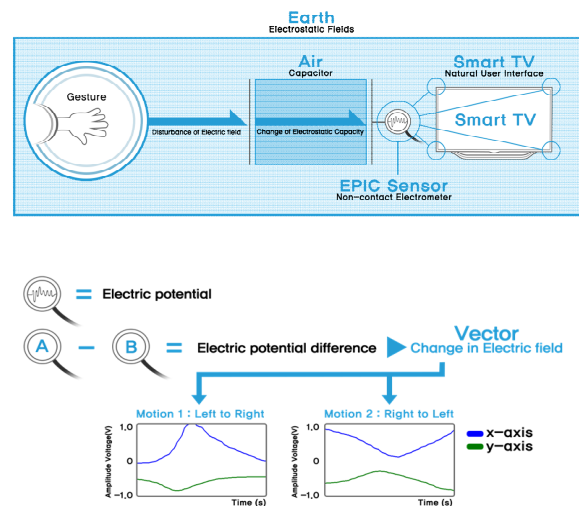


Figure 1. Epic Sensor measure methods

## III . PROPOSED METHOD

We can see the proposed method in figure 2. This method is divide into two parts, one is training part, another one is testing part. On training first use the EM algorithm to get the GMM-UBM Model [3] and then with the MAP Adaptation [4] to find the GMM supervector for SVM training. But on testing step we direct to use the MAP Adaptation to find the GMM

supervector and input to trained SVM Model. Finally we use the new SVM Model for classification.

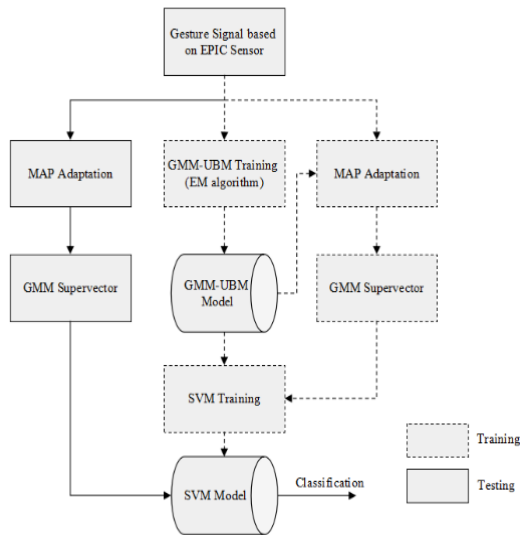


Figure 2. The proposed recognition system based on GMM and SVM Hybrid Model

#### IV. EXPERIMENTAL RESULTS

- 3 persons
- 4 gestures (LR, RL, CW, CCW)
- 100 times
- 1200 data sets
- 800 data sets for training and 400 data sets for testing

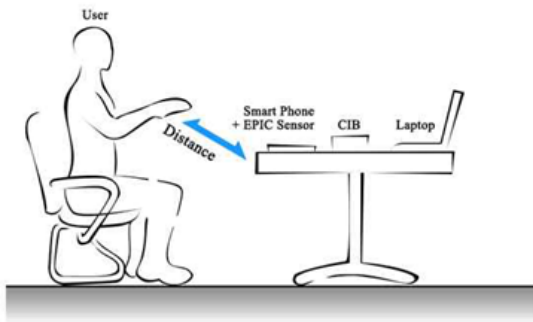


Figure 3. The signal collecting and testing environment

Table 1. Four gesture Recognition rate

	Gesture 1 →	Gesture 2 ←	Gesture 3 ↻	Gesture 4 ↻	Recognition Rate
Gesture 1	96	3	0	1	96%
Gesture 2	3	96	0	1	96%
Gesture 3	0	0	98	2	98%
Gesture 4	0	2	1	97	97%
Total					96.75%

#### V. CONCLUSION

In this paper we use EPIC sensor to collect the signal and based on proposed method of GMM and SVM Hybrid model for 4 gesture recognition, and the recognition rate up to 96.75%. That we proposed method to existing data have better classification results. But now the database is not enough perfect, we need much more experimenter to get the more data to prove our method in practical applications can achieve better results.

#### References

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