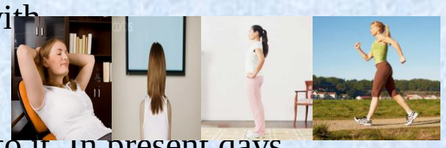
Department of Communication Systems

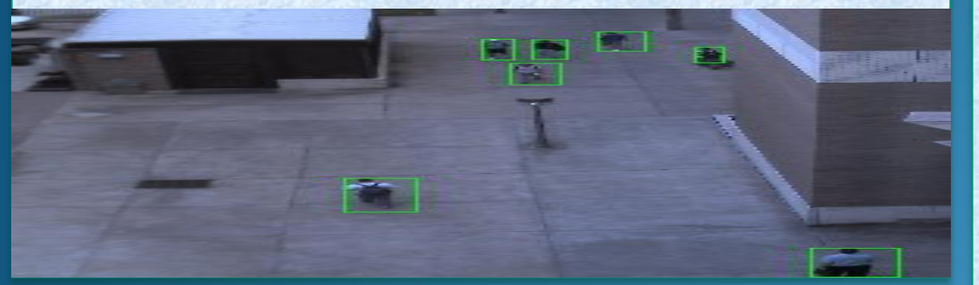
Automatic intelligent recognition of Human activities from Wearable Sensors

LANCASTER UNIVERSITY

1. Introduction - Activity Recognition and Localization

Identifying the behavior of a subject is a valuable information in various fields for example in healthcare, surveillance etc .These identifications are done with the help of software agents which are mostly embedded in the device to add intelligence to it. In present days considerable amount of work is done to make these algorithms evolving because our daily actions are changing with time. In order to predict the future activity with least error, a system needs to learn these changes efficiently.

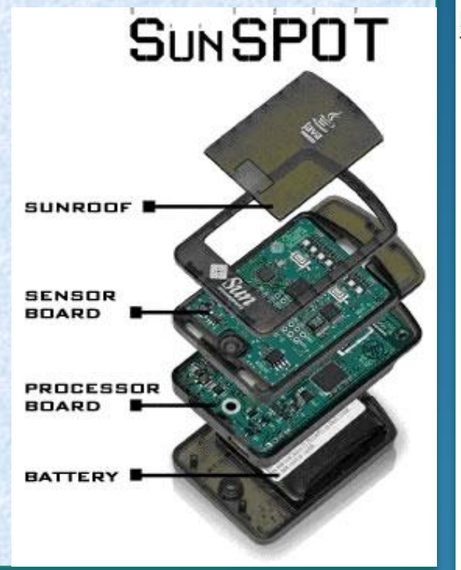




2. Method

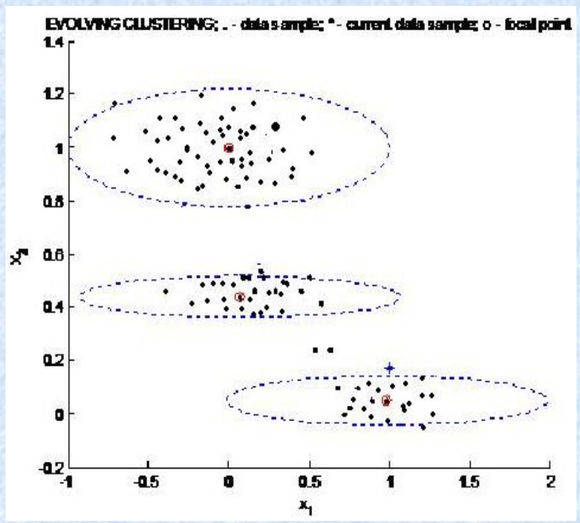
2.1 Data collection:

The method starts with data collection. For the activity recognition, a subject was made to perform four activities which are relaxing in chair, watching television, standing and walking. For the localization, the received signal strength was measured at different distances from the base station. In both cases readings were taken with help of sensor known as sunspot. These are small portable programmable devices which are programmed in Java .

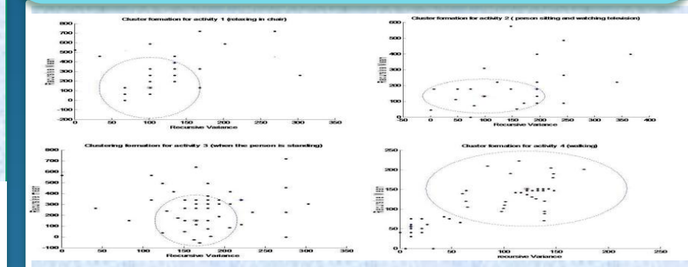


2.2 Testing the data with different algorithm :

The data collected is tested with different algorithms to check the predictions.
Fixed Model ANFIS is a fixed model which constructs an input output mapping . This is basically set of fuzzy "if-then rules", which gets created with the help of the collected data. The predictions are only based in training data .
Evolving Model Here, the rules get updated recursively with the arrival of new data sample. And the process takes place as follows:
1.The first data sample enters the system and a rule is formed.
2.On the arrival of next data , potentials are determined.
3.potentials of new data sample and existing cluster center are compared .
4.On the basis of the potential comparison, rules are updated and the required condition is : (δ min < r/2)



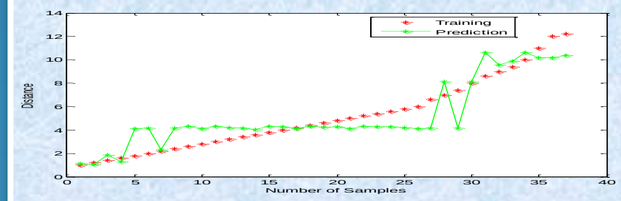
3. Results and Findings



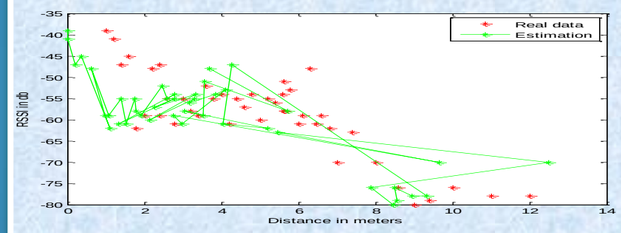
Cluster formation for all four activities

1.For the activity recognition, the root mean square error was calculated to be 0.4550 .
2. Then the sensor was programmed to get the received signal strength of the data at different locations.

The root mean square error of ANFIS and ETS are 1.2873 and 0.1421 respectively



ANFIS Prediction



ETS prediction

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