

AGGRESSION

DEFINITION, DETECTION AND SOLUTION

Adithya Ramesh

21/07/2017

PROBLEM DEFINITION:

Aggression has been a major problem rather than disorder which exponentially has increased over the past decade not only in the adults, but even in children whose cause is stated unpredictable and mostly dependent on the vicinity of people or the environment the person is subjected to.

A person suffering from aggression can be a harm to his self and/or to the people around him.

We hence are in a state where the use of advance technology may produce results to solve the problem in a more feasible manner and hence reduce the emotional constraint which the person may be subjected to.

It is important to know that, technology, however advance has also been stated to been one of the prime reasons leading to aggression especially in children and the young adults, hence care should be **taken to use the same to finding solutions and not to give raise to a** more complex situation.

I in the following report have stated various reasons leading to its cause and have put forward my best to Identify solutions to the same.

AGGRESSION:

Aggression can be defined as a state of mind in which an individual is subjected to uncontrollable anger or antipathy resulting in a hostile behavior causing harm to them and/or the people around them by the means of a physical or verbal attack, triggered by anxiety, depression, unrest, un-friendly environment sometimes un-controllable emotions whose occurrence may be sudden and due to apparent reasons

There is a general misconception between aggression and violence, as in a person may indulge in a violence act with aggression, but a person with aggression need not necessarily engage in violence attack.

Primary Causes:

I. Physical Discomfort:

Parameters: Inadequate rest or sleep, tired behavior, severe hunger or thirst.

II. Medications:

Parameters: Due to improper medication, sometimes without the consult of doctors for the same.

III. Environmental Factors:

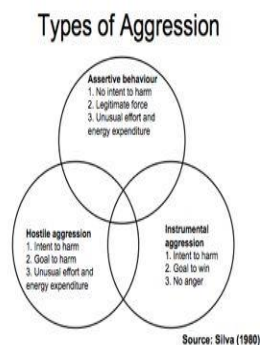
Parameters: Hostile/Un-friendly environment, emotional conditions where the person feels lost, the person is subjected to a lot communication problems such as un-necessary questioning , non-supportive environment.

IS AGGRESSION DANGEROUS?

The answer to this question is mostly generalized - YES. But there were different opinions by the researchers at Southwest Jiatong University, China.

They were successful in providing a broader approach towards the same, the successfully convinced people stating that aggression was a behavior seen mostly commonly in individuals determined towards the goals which was defined as instrumental aggression.

So now the first stage in the report focuses on the classification and detection.



AGGRESSION BROADLY CLASSIFIED AS:

- Instrumental Aggression: They are noticed in people who are determined to extremes on their goals, but can lead, sometimes to harm's way.
- Hostile Aggression: They are intended to harm other people, cases have been noticed in which people have attacked their own family members.
- Assertive Aggression: They are the most commonly noticed, in most of cases not harmful.

The above classification suggests, the first two types of aggression should be given priority in detection and solution.

Relation of Aggression with Alzheimer's disease:

One of the most prime causes of Alzheimer's disease is anxiety, apathy, leading to deterioration of blood cells, intervening with daily activities, initially causing temporary memory loss and finally causing permanent change in the brain cell orientation, but a most important parameters to be considered are the age and the stress level of the person.

Observations were made that people having extreme level of aggression, especially passive aggression are more prone to Alzheimer's disease, the reason that aggressiveness of certain high order cause changes in the brain fluid, leading to damage of brain cells – prime cause to Alzheimer's.

Symptoms:

- Appreciable change in day-today behavior is common.
- Questioning of their activities and temporary memory loss.
- A patient suffering from the disease will suffer from delusions, accuse others of theft and also infidelity in some causes – this is most common problem of passive aggressiveness – noticed

Age Range:

- This disorder is most commonly detected individuals in the age group of 80 above.

- The next age group prone to the same is in the range of 60-80.
- Very few cases were reported in young adults of age group 15-30.

From the above observations, we can observe that old age people are prone to the disease, hence the developments towards the solution should be done such that they are feasible to older people.

The main problem faced is age constraint. Hence the technology developed should be such that it does stand as a burden to them.

Since an aged citizen will be happy to be left alone rather than be subjected to complex procedures.

A study by Journal of American Medical Association stated that people with a low heart sensing rate (LHSR) in the range below 40 beats per minute are prone to aggression, hence resulting in committing crimes.

Relation of Aggression with dementia:

Similar to Alzheimer's disease, dementia also refers to a state of mental disorder due to impairment of at least two brain functions, memory loss and judgment whose causes are several in number, some proving to be irreversible.

The corresponding effects are large enough to cause changes in everyday activities.

PATIENT ON PATIENT AND PATIENT ON CARETAKER VIOLENCE:

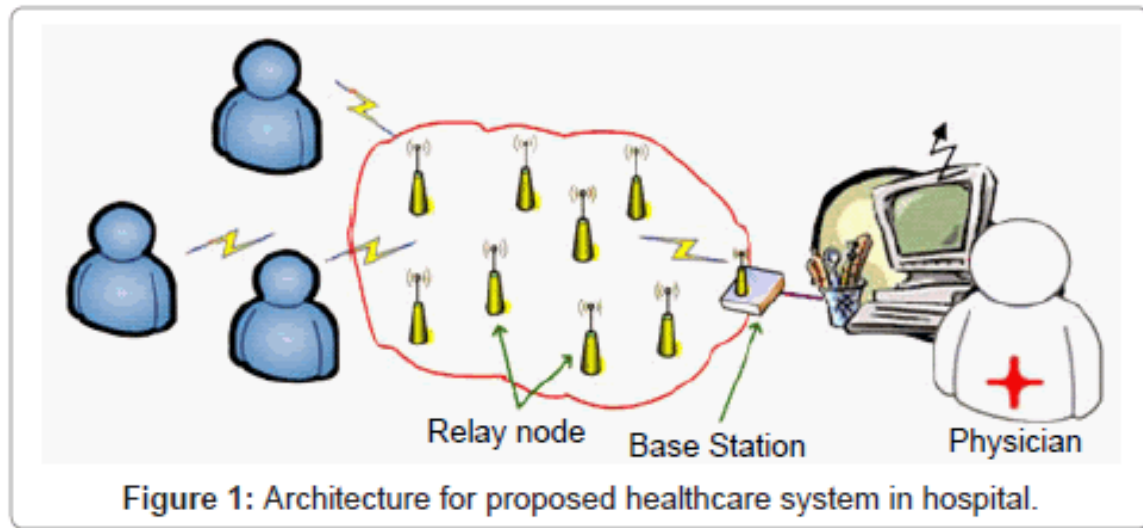
Patient behavior monitoring through a base system.

It is a condition in which patients turn hostile and attack the other patients or the caretakers.

1000 of cases are noted, but not brought into daylight due to improper transfer protocols.

This is common with people with high aggression which might eventually turn into a violent act harming them and also the other patients or the care takers.

One of the most common methods used to prevent them is by using body sensors and send the relayed data to the base station. The advantage of this method is that it does not restrict the patient to the bed, which was previously used in which the sensors were fixed to a PC bedside of the patient.



The above model shows the architecture for the proposed method to transfer the data from a body sensor to a base station using a multi-hop relay system using relay nodes.

A body sensor is attached to measure the heart and the following classification of detection in dementia and Alzheimer's patients is used:

Heart Beat: 40 Beats: 75% chance of person going hostile.

Heart Beat: 30 Beats or below: 85% chance of person going hostile.

Depending upon the above classification, the care-takers are informed from base station to carry out the necessary action.

Each node will play a different role with each wireless sensor, sensing different physiological parameters.

The sensors used are non-obstructive by design.

The sensors will send a Sense_Start signal to monitor the patient's physical parameters such as Blood pressure, Heart Beat, certain facial expressions, the same are sent to the base station and then using a

mobile network, communication is set up between the patient-base station-care taker.

A method currently in use is to detect the respiration of a patient – convert it into RF signals and then filter them out to detect only the frequency range of anxiety whose frequency range is pre-defined.

DETECTION AND SOLUTION:

One of the method of detection of is through Facial Expression Recognition Analysis, in which each facial movement is considered to be Action Unit (AU), so eventually all the Action Units are detected and all other facial expressions are filtered from aggression through the Local Binary Patterns and Gabor Filter, so suppose a patient's facial Expression is detected, then the parameters for the tensed expressions are filtered out separately and are sent to the related care-taker through the base station.

Local Binary Pattern Algorithm:

The algorithm is based on the comparison of a pre-defined algorithm with the formulated algorithm, which is got from the corresponding facial expression.

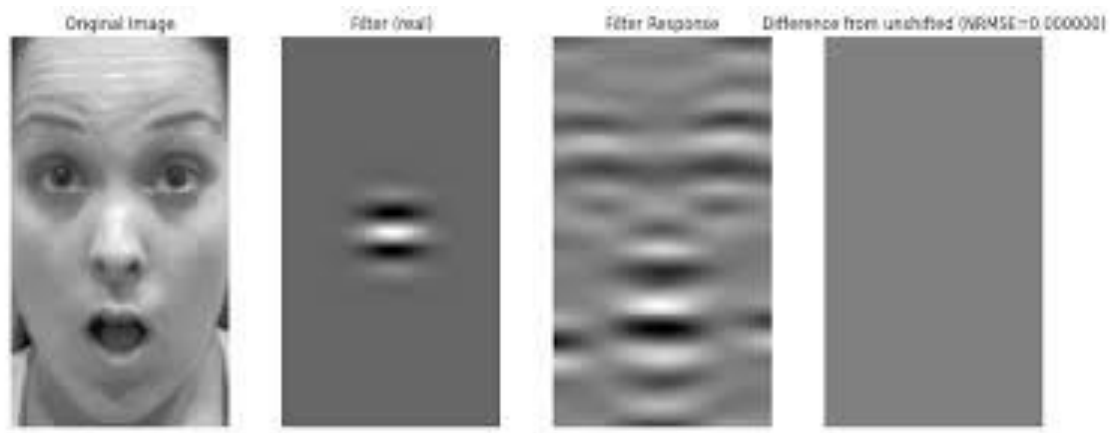
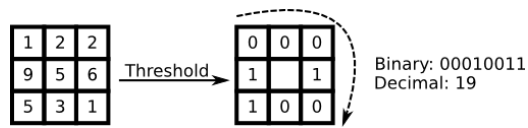
Let us consider an example by formulating a matrix.

Let us first have a center pixel, then depending upon the facial input, the successive pixels are filled, if the intensity of the pixel is greater than that of the center pixel, then 1 is entered else 0 is entered.

Once a complete matrix is completed, then it is compared to pre-defined and also constant matrix for aggressiveness.

If both of the matrices match, then a signal is sent to the care taker conveying the condition (most probably hostile) of the patient.

The following example is similar to the above explained one, but the threshold complexities are neglected here and instead it is compared with a constant and static matrix.



Facial Expression Texture Pattern

The Gabor filter is basically a device which detects pattern changes and produces a corresponding result.

The texture pattern is believed to be different for different expression, considering the contraction and relaxation of facial muscles.

CITATIONS

1. “When Aggression follows dementia”
 - A New York Times Report By Paula Span
2. “The Application of Aggressive Space Mapping Alorith”
 - A combined report by Feng Cheng, Xi Deng, Jingping Song and Yunlin Yiu, Institute of Electromagnetics, Southwest Jiatong University, Chengdu, China.
3. “Calm hearts, Bad minds”
 - By David Kohn
4. “Neuropsychiatry of aggression”
 - A combined publication of Professor Scott.D Lane, Professor Kimberly. L Kjome and Professor F.Gerard Moeller
5. “Facial Action Coding System”
 - A publication by the Paul Ekma
6. “Local Binary Patterns”
 - By Matti Pietikainen.

