



# An Exploratory Study on Student Inattentiveness using ANN

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## ABSTRACT

*In day to day classroom student behaviors such as troublesome, awful avoidance of work, interfering with teaching activities, harassing classmates, rudeness to teachers, daydreaming in class can vary from mild to severe is a problematic issue. These issues are reported by the teacher as intolerable and stress provoking. Every teacher must spend a lot of time to manage these kinds of students. These kinds of misbehaviors can affect the effectiveness of teaching and it may also affect the proper learning of the student. We can conclude that all the above-mentioned issues are comes under inattentiveness of a student. This work is focused on bridging the gap between qualitative and quantitative approaches to classify student inattentiveness. Thus, this research applies K-means and ANN machine learning algorithms to automatically identify and classify the inattentive students by using Kinect RGB-D sensor. Results of this research can be used to recruit teachers with years of teaching experience and training background to get an apt solution for the issue.*

**KEYWORDS-** K-means, ANN, Kinect RGB-D sensor

## INTRODUCTION

In a classroom scenario it is always difficult for a teacher to maintain continuous contact with all the students. In the presence of a teacher in the classroom students express many inattentive behaviors which are unobserved. A biometric device-watch can be used as an indicator of student inattentiveness. Hand and facial movements are used to determine student inattentiveness. Also developing an automated feedback for teachers by measuring the student misbehavior.

This paper describes a system which uses an RGB-D sensor camera to monitor, count and record hand gestures and facial expressions to identify the student inattentiveness such as

yawning, playing with pen/pencil, raising eyebrow, digging/poking etc.

## RELATED WORK

Existing system deals with classifying attentive and inattentive students in a classroom by using a biometric bracelet as an indicator with the help of K-means and SVM machine learning algorithms.

## PROPOSED SYSTEM

Proposed system focuses to identify inattentive students in a classroom with the help of their facial and hand movements using K-means and ANN machine learning algorithms. The advantages of the ANN over the SVM as follows: ANNs can handle multi-class problems by producing probabilities for each class. In contrast, SVM handle these

problems using independent one-versus-all classifiers where each produces a single binary output.

## METHODOLOGY

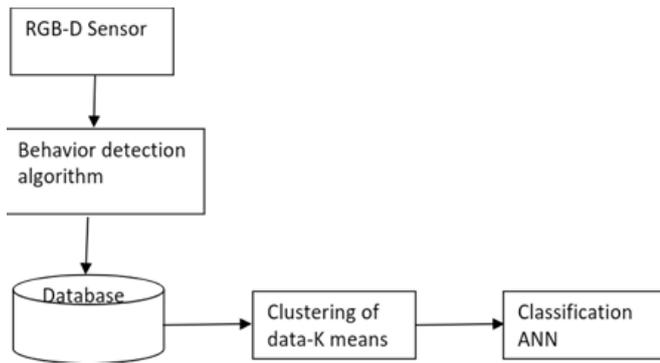


Fig-1 System Overview

In the above system overview an RGB-D sensor is used to observe student's behavior. For this, a behavior detection algorithm can be used to detect and count various behaviors that indicate inattentiveness. Data are stored in a database. When all the students in the classroom has been observed data in the database are clustered into two groups using K-means algorithms. After clustering ANN algorithm is used for classifying the clustered data.

## MODULES

### A) Kinect RGB-D Sensor:

We are using a Kinect RGB-D sensor to detect various students' behaviors. It has many capabilities to detect and record student's behavior (e.g.: raising his/her hand, raising eyebrow, yawning etc.)

### B) Behavior detecting algorithm:

There are many behaviors that indicate student inattentiveness in the classroom. With the help of a behavior detecting algorithm and the RGB-D camera these behaviors are observed and recorded. (e.g.: poking, sleeping, yawning etc.)

### C) Database:

The respective data are stored into a database separately in a matrix format with rows and columns. Since each student has one RGB-D sensor to observe his/her behavior and once the observational and instructional session has been over a new row is created inside the database. The number of occurrences of each behavior is recorded in different column of that row.

### D) Data Clustering:

For clustering the data K-means algorithm is used. Once the data is recorded clustering starts and these data are grouped into two and labeled as attentive and inattentive depending on the distance from the origin of the data.

<p><b>Input:</b> <math>k</math> (the number of clusters), <math>D</math> (a set of lift ratios)</p> <p><b>Output:</b> a set of <math>k</math> clusters</p> <p><b>Method:</b> Arbitrarily choose <math>k</math> objects from <math>D</math> as the initial cluster centers;</p> <p><b>Repeat:</b></p> <ol style="list-style-type: none"> <li>1. (re)assign each object to the cluster to which the object is the most similar, based on the mean value of the objects in the cluster;</li> <li>2. Update the cluster means, i.e., calculate the mean value of the objects for each cluster</li> </ol> <p><b>Until</b> no change;</p>
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### E) Classification:

Once the data are clustered and labeled a supervised learning algorithm-ANN is used to classify the clustered data. Here certain data points are taken for training and remaining for testing.

## RESULT AND DISCUSSION

The dataset contains twenty student's data for analysis and these data were created randomly. For illustration purpose we have taken two features number of yawning; and number of times eyebrows were raised. The K-means algorithm is used to cluster the data and after clustering and labeling they were classified using the ANN algorithm. In a real-world application of the system more students would be considered and can be observed automatically clustered and classified using k-means and ANN algorithms. Accuracy of the system is also improved by using ANN algorithm

## CONCLUSION

This work shall help the teachers to identify the inattentive students in a classroom. Using an RGB-D camera to identify and record the student's behavior then grouped and classified them according their behavioral status.

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