



# Students Concentration Prediction System

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**Abstract:** When the brain's working properly, our capacity to focus and concentrate allows us to accomplish incredible things. Distractions are the most common cause of inattention, although they aren't always as obvious as you might think.

Instead, you can feel disorganized or "fuzzy," or you might blame yourself for not being more in command. Focus and concentration, as well as memory and other cognitive processes, can deteriorate as we age, although this is not always the case. In reality, several studies with older adults show no reduction in decision-making abilities, and strategic learning —the ability to understand something in certain ways — can improve with age. In comparison to those in their 50s, people in their 70s can be "more conscientious and vigilant, without becoming hyper-vigilant."

If you have trouble focusing, you may believe that you only need to try harder, but this method is unlikely to help.

Instead, you may improve your focus by focusing on improving the individual brain activities that control concentration and awareness. You can feel sharper and more focused by setting conditions that make it simpler to concentrate and complete your work, especially when you have a specific assignment to do. Consider how many of these elements affect your ability to focus – for better or worse — and how many of them relate to you. Starting at any of these points can help you improve your attention and concentration in all areas of your life.

Concentration and focus are muscles that need to be exercised regularly. Although some students are naturally better at this than others, all students can acquire tactics to assist them to enhance their ability to concentrate. After all, children need to be able to focus and concentrate for long periods to succeed in school and extracurricular activities, not to mention when they enter the workforce.

**Keywords:** Attention span, distractions, solutions, concentration, Gradient Boosting Classifier.

## I. INTRODUCTION

### 1.1 What is the difference between attention and concentration?

For many years, numerous researchers have been interested in the topic of attention. Concentration, according to Kumar (2003), is a learned mental state in which the human mind and all of his or her senses are concentrated on a single subject.

Also, attention can be defined as the process of "encoding verbal input, keeping it active in working and short-term memory, and retrieving it from long-term memory."

This can be explained by the fact that if one maintains a high level of attention, any knowledge or information supplied to them is well received,

and they can utilize it not only to deal with present issues but also to use it in the long run.

There are also additional points of view to consider to gain a better understanding of attention.

"One's intellectual aptitude is limited in terms of how much they can pay attention to at one time," according to the definition of attention.

Learners' willingness to listen to teachers' explanations, complete assignments given by teachers, record important materials, view images or media used, listen to friends' opinions, answering teacher questions, and remaining calm in class are examples of behavior that can give us a better and deeper understanding of what one's concentration is like.



### 1.2 Attention and attentiveness are really important. How?

Teachers always want their students to have a high level of focus, because the closer their attention is, the better their learning outcome and knowledge gain will be. The importance of attention in pupils' learning cannot be overstated process. Learning relies heavily on one's ability to pay attention. Furthermore, Hariyanto once said (2021)"If the learner is paying attention, the learner will follow and carry out the learning exercises well ".

Not only, Attention not only determines a student's engagement in class, but it also has a significant impact on their learning outcome because if there is good attention, there will be good learning. Students can cope with all questions about the learning materials with ease if they concentrate throughout a lesson, gain a good grade as well as gain learning success (Hariyanto, 2021). On the other hand, those who paid, with less intent in class will struggle to receive the next learning content, resulting in a left-behind situation and frustration. With the rest of the course, you can feel overwhelmed and despondent.

### 1.3 Solutions & Using a variety of teaching methods and learning activities.

Once instructors are aware of all potential distractions from both inside and outside the classroom, it will be much easier to find solutions that minimize negative influences while maximizing students' interest and understanding through the use of various necessary teaching strategies that take advantage of students' increased attention span. The following suggestions are intended for teachers who are looking for innovative methods to educate to boost both their own and their students' motivation in class. Furthermore, the following answers are based on the author's personal experiences, with the goal that they will be useful to all instructors of various disciplines.

It's best if instructors don't use the same teaching techniques in class. Lessons should include "a combination of aural, visual, and kinesthetic strategies" to keep students' attention in class (Gerschler, 2012). It isn't only the techniques of instruction that are problematic. To avoid boredom and inattention, allowing pupils to participate in a variety of learning activities is also a good idea. Students will feel the variety of learning methods and be more curious about what they will do next if they constantly complete their assignments with different activities such as group work, games, and role-playing. This will hopefully help them maintain their enthusiasm and increase their information retention.

There are a variety of factors that contribute to students' lack of desire to learn, but the most significant factor is the students' lack of interest in the lesson. Teachers must assist them in establishing a suitable learning goal, ensuring that students are aware of what they are learning. Students' passion and activeness will keep them interested for a long time if they know exactly what they will get from the course and what information they can apply in their daily lives.

Maintaining students' attention is both a task and a motivator for instructors to improve themselves if necessary. There are several elements that might impact a student's ability to maintain concentration, but there are also answers. Although the solutions provided above may not be ideal for dealing with all distractions, particularly those that are uncontrolled, they can be one of the methods for teachers to limit negative impacts and enhance students' attention span. Instructors are also encouraged to use every resource available to them. Furthermore, educators should not be disappointed if a method fails because everything can be resolved as long as there is a passion for the job.

## II. LITERATURE REVIEW

Several elements have been identified as having a favorable or negative impact on pupils' capacity to concentrate. So many elements, even the tiniest ones, may have a significant impact on a student's attention span, and not all of them are within the instructors' control or adjustment. However, there are still subjective aspects that might improve a student's attentiveness in class if they are addressed. Instructors and lecturers put forth a lot of time and effort. Two key elements influence attention span: There are both internal and external variables. Internal factors are those that exist inside students or instructors. Boring, for example, is an internal component since it is a personal feeling. It's a feeling that you've made for yourself. Internal causes are normally changeable and modifiable. External elements, on the other hand, are those circumstances that are beyond the control of the lecturer or the pupils (for example, the sounds of a jet taking off). Finally, teachers or lecturers can take into consideration all of these internal and external aspects to reduce distractions, improve teaching quality, and increase students' focus levels. "Interest is the determiner of excellent attention, and



interest is constantly behind the acts of an attentive pupil," as one scholar once remarked. One of the internal reasons that keep students engaged successfully in class is their interest. The more their enthusiasm for the subject, the more curious they will be about it and the more attention they will pay in class to learn more about it. And, it is critical in keeping students engaged in the classroom. This means that professors or lecturers cannot expect students to be motivated by a dull, poorly planned class. Nonetheless, a lesson with more resources will retain all participants' concentration and continuously captivate students' interest during the class hours. Similarly, students' understanding of the lesson topic and lecturer's instructions throughout class can lead to either increased focus or irritation, resulting in a loss of attention for the remainder of the class. Lecturers must keep a close eye on their students so that they may receive help when they need it. Furthermore, it is a poor scenario when pupils do not grasp only one lesson and then skip all of the other portions because all of the sections are usually related to one another. As a result, the teacher must ensure that pupils have the requisite experience to comprehend the lesson and that advice is given when questions occur. Internal causes that impact attentiveness in class include students' physical and personal features. For example, if students are sick, hungry, or tired, they will find it difficult to maintain their focus throughout the lesson because their body and mind are not well enough to allow them to absorb knowledge. It was stated in one of the research, and it was confirmed through research that students "coming to school without sleep, hungry, or tired makes it difficult for them to collect their attention in the classroom." When it comes to the characteristic component, obstinate children tend to construct their own goals for attending school, which are often unrelated to knowledge. With a different perspective, they come to class to see their friends, pass the time, play games, and may not pay attention in class. They may also conduct inappropriately, causing other students' attention to be severely impacted. External influences are typically uncontrolled, but internal elements may be regulated or adjusted. They may be thought of as objective circumstances that surround both teachers and students and have a significant impact on their performance during class. There are several external influences, but the writer will organize them into four primary groups in this work, which will aid anyone who requires a clear and systematic comprehension of all the potential aspects to come up with solutions to reduce their impact afterward. A well-designed syllabus may help students remember crucial details such as course goals and objectives, grading procedures, assessment and grading standards, and homework. Assume, however, that the curriculum given to pupils is badly prepared. In that circumstance, students may have difficulty defining their course objectives. They are also perplexed as to what specific information they will receive. They are unable to choose which path they should take. They are unable to devise a clear strategy to satisfy their own and the course's intended objectives, resulting in a lack of enthusiasm in class and, as a result, a lack of incentive to pay close attention throughout the lesson. Aside from the content, the syllabus quantity might also reduce students' attention span. The longer a course lasts, the more frustrated and dull students may get. These unfavorable sentiments will significantly detract from pupils' ability to gather knowledge. The second factor is the school or classroom setting. All of the elements in the class can be referred to as the environment. The first is the classroom's amenities, such as the arrangement of chairs and tables, the quality of the lighting system, the cooling system's quality, and the modernity of helping technology. The second is information on students, such as the overall number of pupils in a classroom or the amount of noise created by other students. For example, if the class is overcrowded, students may find it difficult to sit comfortably. Furthermore, some distracted students continue to engage in distracting behaviors, and even the most focused pupils find it difficult to retain their concentration. Some variables break students' concentration when components from outside the classroom are present, such as the sounds of the noise of neighboring construction projects, and so on. Apart from all of the above-listed elements affecting students' attention in class, parents' involvement is another important issue to consider. What are the familial variables that might have a direct impact on a student's ability to concentrate? The influence of the family appears to be significant. Share an unexpected bond. A low-income family is more likely to have low expectations for their children. However, For that amount of money, well-paid parents must high-level education, therefore it's understandable that they want their children to have a good education. To raise their children to be like them. Students who have hopeful parents are more attentive in class because they want to please their parents.

Their homework and knowledge are examined more regularly than youngsters whose family has poor educational accomplishment.

The situation isn't great. Aside from family, teachers or instructors have a direct impact on pupils' academic achievement. The instructors' instructional methods are the first and most important component. Teachers' professional competence, teaching handling-class strategies, and teacher mood are additional characteristics that have an equal impact on pupils' capacity to focus. Teachers with a lot of teaching experience and a high educational level impress students more than others because, because of their teaching experience, they are more flexible in how they use their skills and teaching methods in class to keep students' minds on the



lesson. They can also deal with students asking any questions in class because of their source of knowledge. According to a study in which readers learned that instructors' thorough mastery of teaching topics and information plays a significant role in managing learners' concentration and increasing the quality of the teaching-learning process.

### III. PROPOSED METHODOLOGY

Supervised learning is a sort of machine learning in which machines are taught to predict outcomes using well-labeled training data. The term "labeled data" refers to data that has already been tagged with the appropriate output. The training data presented to the computers act as a supervisor in supervised learning, teaching the machines to accurately anticipate the output. It uses the same principle as when a student is learning under the guidance of a teacher. The process of supplying input and proper output data to the machine learning model is known as supervised learning. A supervised learning algorithm's goal is to discover a mapping function that maps the input variable ( $x$ ) to the output variable ( $y$ ).

Models are trained using a labeled dataset in supervised learning, where the model learns about each category of input. The model is evaluated using test data (a subset of the training set) when the training phase is done, and it then predicts the output.

There are two types of Supervised learning, namely: Classification and Regression. Initially, the method that suited our project was multiple linear regression. Regression: regression analysis is a statistical approach for modeling the connection between one or more independent variables and a dependent (target) variable. It forecasts continuous/real data like temperature, age, income, and price, among others. Linear regression is a predictive analytic tool based on statistical regression. Multiple Linear Regression is a popular regression approach that models the linear connection between a single continuous dependent variable and multiple independent variables.

Later, in the process, it was observed that different kinds of approaches were required to get the desired result, which eventually lead us to the gradient boosted classifier. When employed with sophisticated machine learning algorithms, a variety of ensemble approaches have been shown to improve accuracy. Gradient Boosting is one such approach. Gradient boosting is a type of boosting strategy that builds a strong model by repeatedly learning from each of the weak learners.

It can improve Regression, Classification, and Ranking. Gradient boosting has been used in a variety of technological domains throughout the years. The technique may appear difficult at first glance, but in most circumstances, we just utilize one standard classification configuration and one predetermined regression to meet the need.

$$F_0(x) = \arg \min_{\rho} \sum_{i=1}^N L(y_i, \rho)$$

For  $m = 1$  to  $M$  do:

$$\tilde{y}_i = -\left[\frac{\partial L(y_i, F(x_i))}{\partial F(x_i)}\right]_{F(x) = F_{m-1}(x)}, i = 1, N$$

$$a_m = \arg \min_{a, \beta} \sum_{i=1}^N [\tilde{y}_i - \beta h(x_i; a)]^2$$

$$\rho_m = \arg \min_{a, \beta} \sum_{i=1}^N L(y_i, F_{m-1}(x_i) + \rho h(x_i; a_m))$$

$$F_m(x) = F_{m-1}(x) + \rho_m h(x, a_m)$$

end For

end Algorithm



#### IV. RESULT

This model is working with 75% accuracy. It is predicting the concentration level of the students on a scale of 1 to 10. It is mapping the roll number of the students with the predicted concentrations level and displaying its equivalent result on a scale of 1 to 10.

```
[15] roll = int(input("Enter the Roll no: "))
      Enter the Roll no: 69

[16] predictions = model.predict(X)

      predictions[roll]
      7
```

```
[42] roll = int(input("Enter the Roll no: "))
      Enter the Roll no: 75

[43] predictions = model.predict(X)

      predictions[roll]
      5
```

#### V. CONCLUSION

It's not uncommon for kids, especially at a young age, to struggle with keeping focused in a world full of distractions. However, as pupils become older and more mature, they must be given greater homework and responsibility. Capable of focusing their thoughts on a task and completing it. Concentration and focus are a matter of degree, and they may be enhanced and bolstered by altering some of the current variables. In addition to motivation, students' active engagement is important. This leads to increased focus and improved learning. Some kids may be inherently better at this than others. But all students can benefit from learning practices. Enhance their ability to concentrate.

After all, children need to be able to focus and concentrate for long periods to succeed in school and extracurricular activities, not to mention when they enter the workforce. Our project can assist in detecting the elements impacting the person and recognizing the pattern that is resulting in the individual's present concentration level. Before assisting someone in honing their attention abilities, it's critical to first comprehend the variables that make focusing tough in the first place.

Once you've figured out what's causing the person's difficulty to concentrate, you'll know how to help him or she strengthen his or her concentration muscles.

It can assist in the elimination of tiredness, lack of attention, and motivation.

The purpose of the project was to equip pupils with the features that they lacked... order to achieve in academics and other areas of life that need a high degree of focus.

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- 8 “**Mohammad Reza Davahli, Waldemar Karwowski, Edgar Gutierrez, Krzysztof Fioł, Grzegorz Wróbel, Redha Taiar, and Tareq Ahram (2020)**” The identification of human behavior can provide useful information across multiple job spectra. Recent advances in applying data-based approaches to social sciences have increased the feasibility of modeling human behavior. In particular, studying human behavior by analyzing unstructured textual data has recently received considerable attention because of the abundance of textual data. The main objective of the present study was to discuss the primary methods for identifying and predicting human behavior through the mining of unstructured textual data.
- 9 “**Sungjoon Choi, Eunwoo Kim(2013)**” There is a growing interest in smart homes, and predicting behaviors of inhabitants is a key element for the success of smart home services. In this paper, we propose two algorithms, DBN-ANN and DBN-R, based on the deep learning framework for predicting various activities in a home. We also address the drawbacks of contrastive divergence, a widely used learning method for restricted Boltzmann machines, and propose an efficient online learning algorithm based on bootstrapping.
- 10 “**Varsha T. Lokare, Laxman D. Netak(6 Feb 2021)**” Concentration level plays a significant role while performing cognitive actions. There are many ways to predict the concentration level, such as with the help of physical reflection, facial expressions, and body language. Self-evaluation on a scale of 0 to 1 can also be used to measure the concentration level. In this paper, a publicly available dataset is used for classifying the concentration level using students’ brain signals recorded through Electroencephalogram (EEG) device while performing different tasks that require varying concentration levels.
- 11 “**Erasmó Maldonado, Jorge Zamarripa, Maritza Delgado(20 December 2019)**” There is a strong belief that physical education can affect an individual’s physical activity, healthy habits, and behaviors through pleasant, positive, and significant exercise experiences, a practical knowledge base, and comprehensive teaching strategies. However, a crucial cognitive aspect for the effective and significant learning of the activities offered in the educational environment is the concentration of students. This study aims to test a hypothetical model based on self-determination theory to assess the degree of support prediction provided by the teacher for student autonomy in the various types of motivation and on student concentration in physical education classes in high schools.
- 12 “**Ganbayar Batchuluun, Jong Hyun Kim, Hyung Gil Hong, Jin Kyu Kang, Kang Ryoung Park(15 September 2017)**” With the development of intelligent surveillance systems, human behavior recognition has been extensively researched. Most of the previous methods recognized human behavior based on spatial and temporal features from (current) input image sequences, without the behavior prediction from previously recognized behaviors. Considering an example of behavior prediction, “punching” is more probable in the current frame when the previous behavior is “standing” as compared to the previous behavior is “lying down.” Nevertheless, there has been little study regarding the combination of currently recognized behavior information with behavior prediction
- 13 “**Nhathai Phan, Dejing Dou, Hao Wang, David Kil(April 2017)**” Human behavior modeling is a key component in application domains such as healthcare and social behavior research. In addition to accurate prediction, having the capacity to understand the roles of human behavior determinants and to provide explanations for the predicted behaviors is also important. Having this capacity increases trust in the systems and the likelihood that the systems actually will be adopted, thus driving engagement and loyalty. However, most prediction models do not provide explanations for the behaviors they predict.
- 14 “**Ori Plonsky, Ido Erev, Tamir Hazan, Moshe Tennenholtz(2017)**” We introduce a synergetic approach incorporating psychological theories and data science in the service of predicting human behavior. Our method harnesses psychological theories to extract rigorous features from a data science algorithm. We demonstrate that this approach can be extremely powerful in a fundamental human choice setting. In particular, a random forest algorithm that makes use of psychological features that we derive, dubbed psychological forest, leads to the prediction that significantly outperforms best practices in a choice prediction competition. Our results also suggest that this integrative approach is vital for data science tools to perform reasonably well on the data. Finally, we discuss how social scientists can learn from using this approach and conclude that integrating social and data science practices is a highly fruitful path for future research on human behavior.