IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.102 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 13, Issue 8, August 2024

DOI: 10.17148/IJARCCE.2024.13816

"Student Performance Analysis With The Use Of Electronic Gadgets Using ML"

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Abstract: Nowadays electronic gadgets play an important role in students' life as a source of learning. The Dependency of services provided by electronic gadgets has reached a large scale. Electronic gadgets like smart phones have a major impact on people in their day-to-day life [1]. Among all, students are the important one, as they rely on electronic gadgets for their academic activities. The major impact is that it can affect the students' mental and physical health. Students are getting addicted to these electronic gadgets as it becomes inevitable [3]. This project work uses machine learning techniques to demonstrate how gadgets affect students' daily lives. Many parameters used to find association among use of gadgets and student academic performance.

The parameters include how many electronic devices they use and how long they use them for, whether the usage of electronic gadgets shows any improvement in their academic performance. This system applies unsupervised machine learning (ML) techniques to discover which significant attributes that a successful learner often demonstrated in an academic course. Our project main goal is to find the correlation between the use of gadgets and the student academic performance. Many research works are there related to this topic, all works purely concentrated on building static models using machine algorithms but there is no real time application useful for educational sector[4][5][6]. In our New Proposed system we focus on this issue and our system major objective is to predict the student academic ups and downs based on the use of electronic gadgets. Efficient ML algorithms will be used either Apriori algorithm or ECLAT algorithm will be used. System build as real time cum browser based application useful for college. We use efficient tools such as VISUAL STUDIO and SQL SERVER, using these Microsoft technologies we can build attractive and impressive GUI based applications.

Keywords*:* Data Science, Machine Learning, Educational Sector, Supervised Learning, Student Data, Training Datasets. Naïve Bayes.

I. INTRODUCTION

Every Educational institute wants 100% academic performance. Basically student academic performance depends on so many factors like gender, communication skills, grasping capability, health issues, family issues, extra circular activities etc.… [11]. one should understand the student behaviors and can come up with precautionary measures to avoid less academic marks and over all performances [14].

Results of every student will vary based on their skills and also how effectively students use electronic gadgets. They can negatively impact eyesight or posture. Students may spend too much time playing games or using social networks [9]. This means that less time is left for academic activities. Students may also have problems with concentrating and staying focused, especially if the gadget is always at hand.

This system applies unsupervised machine learning (ML) techniques to discover the usages of electronic gadgets with student academic performances. Basically Students often experienced difficulties in learning an introduction to any academic course.

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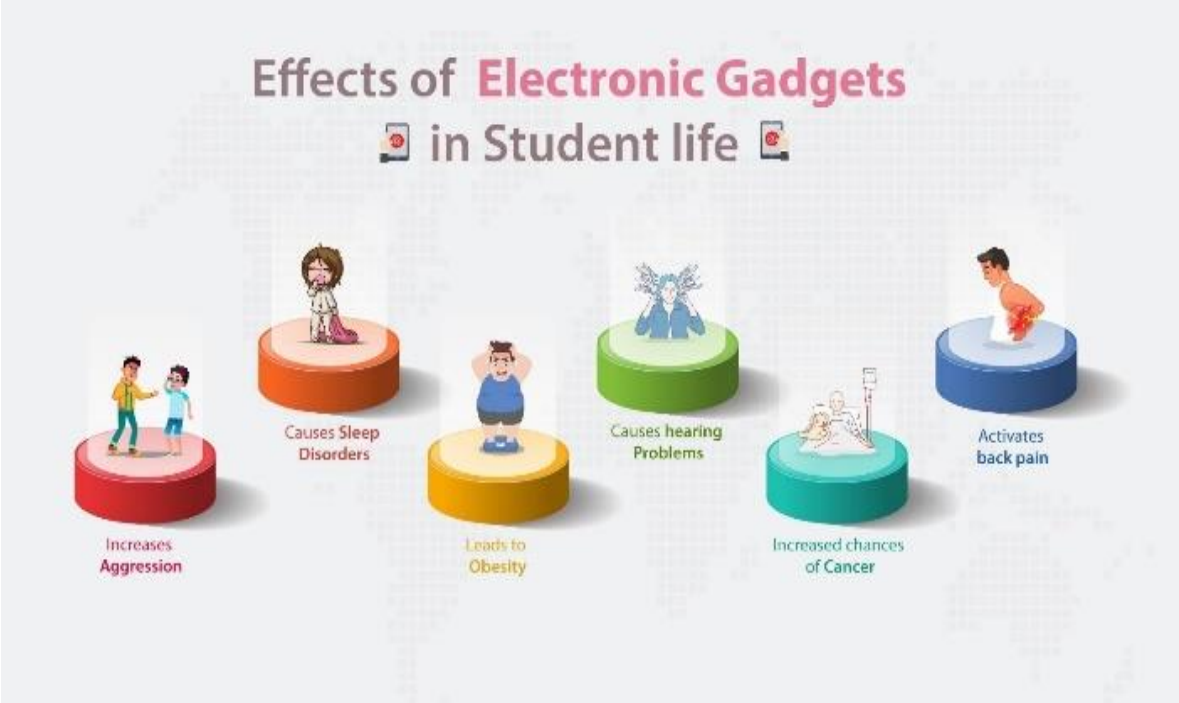

Fig: 1 Use of Gadgets

II. RELATED WORK

2.1.1 Title 1: Prediction on Impact of Electronic Gadgets in Students Life Using Machine Learning [1].
Authors: Saraswathi K,Devadharshini B,Kavina S.
Year of Publications: 2023.

Description: Now-a-days electronic gadgets play an important role in students' life as a source of learning. The Dependency of services provided by electronic gadgets has reached a large scale. Electronic gadgets like smart phones have a major impact on people in their day-to-day life. Among all, students are the most affected ones, as they rely on electronic gadgets for their academic activities [16]. The major impact is that it can affect the student's mental and physical health. Students are getting addicted to these electronic gadgets as it becomes inevitable. This study uses machine learning techniques to demonstrate how electronics affect students' daily lives.

Limitations:
- Here only student mental health is predicted but no academic performances.
- Machine learning models developed.
- No real time implementations done.
- Not suitable to education sector.
- Less datasets used.

2.1.2 Title 2: A Deep Learning Model to Smart Education System [2].
Authors: Palanivel Kuppusamy,Suresh Joseph K.
Year of Publications: 2021

Description: Deep learning methods enable software applications to develop intelligence to adapt and improve on their own as per the situation [17]. It opens a wide range of possibilities in smart education, especially in customizing course content for each student's preferences. Learning management systems provide quantitative data in the form of reports and learning data. The teachers can refer to these data for analyzing and improving the course content and delivery. They can collect qualitative feedback in the form of surveys and discussions through cloud-based learning management systems. In the existing system, the teachers have to manually process these data to identify patterns and improve the course material.

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Limitations:
- No real implementations done.
- Images datasets used.
- Less accuracy and results

2.1.3 Title 3: Artificial Intelligence and Machine Learning Approaches in Digital Education: A Systematic

Revision [3].
Authors: Hussan Munir, Bahtijar Vogel and Andreas Jacobsson
Year of Publications: 2022

Description: The use of artificial intelligence and machine learning techniques across all disciplines has exploded in the past few years, with the ever-growing size of data and the changing needs of higher education, such as digital education [18]. Similarly, online educational information systems have a huge amount of data related to students in digital education. This educational data can be used with artificial intelligence and machine learning techniques to improve digital education. This study makes two main contributions. First, the study follows a repeatable and objective process of exploring the literature [19]. Second, the study outlines and explains the literature's themes related to the use of AI-based algorithms in digital education

Limitations:
- Just idea presented.
- No implementations done.
- Survey work

2.1.4 Title 4: The Impact of Electronic Gadget Uses with Academic Performance among Secondary School Students [4].
Authors: Noratikah Othman,Muhammad Khairuz, Thandar Soe Sumaiyah Jamaludin.
Year of Publications: 2020.

Description: Many school students who own electronic gadget spent most of their time on it. As a result, both of the aspect of academic achievement and health status is affected as they are too dependent on electronic gadget. Objective: The general objective of this study was to determine the association of electronic gadget use with academic performance and health status among selected secondary school students.

Limitations:
- Applied for secondary school students.
- Not suitable to education sector.
- Supervised learning algorithms used.
- Only ML models build, no real time application
- Not a generic platform.

III. PROPOSED SYSTEM

- System is browser based application meant for education sector. System is a real time application where lecturers and students can access. System main goal is to find the correlation between usages of electronic gadgets with the student academic performances. System uses parameters such as smartphone, IPhone, Tab, Laptops, Low results, average results, high academic results etc. System uses training datasets downloaded from www.kaggle.com, www.dataworld.com and www.data.gov.in.

ADVANTAGES:
- System uses efficient unsupervised learning algorithms such as ECLAT algorithm, Apriori algorithm or FP growth algorithm etc...
- System compares the algorithms results and predicts the better algorithm.
- System helps education institute to improve the student academic performances.
- System built using Full stack development technologies such as Visual Studio, SQL Server, and C #, HTML, CSS, JS and JQuery.

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IV. METHODOLOGY

4.1 Machine Learning

Machine learning is a process of studying a system based on data. Machine learning is a part of data science where we use machine learning algorithms to process data.

4.1.1 Supervised Learning Technique

It's a predictive model used for the tasks where it involves prediction of one value using other values in the data-set. Supervised learning will have predefined labels. It classifies an object based on the parameters to one of the predefined set of labels [19].

We have many algorithms to build model in supervised learning such as *KNN, Naive bayes, Decision Tree, ID3, Random Forest, SVM, Regression techniques* etc.…. Depending of the requirement, labels, parameters and data-set we select the appropriate algorithm for predictions. Algorithm is used to build a model that makes predictions based on evidence in the presence of uncertainty.

In this project for prediction we make use to "*naive bayes algorithm or KNN algorithm*" which is an efficient and works fine for all different sets of parameters. It also generates accurate results.

A. Implementation Steps

Naïve Bayes ML Model Process

Step 1: Data Collection (training Data)

This is the first step in the data analysis process where we collect data and stored in database.

Step 2: Data Preparation

Here training data analyzed and only relevant data extracted. The data required for processing extracted and segmented according to the requirement. Required data extraction is done because entire data not required for processing and if we input all data, it requires too much of time for processing, so data processing is done.

Step 3: Specify Constraints

Parameters used for prediction are fetched. Parameters such as Gender, Age, use of smartphon, use of tab, use of social media, use of games, use of iphone, time, etc...

Step 4: ML Algorithms - Supervised Learning

Supervised learning is an approach to machine learning that is based on training data that includes expected answers.

Naïve Bayes Algorithm or KNN algorithm

Algorithm is used for stress prediction because of the following reasons;

1. efficient classifier
2. Works fine for less number of parameters as well as more number of parameters.
3. Works fine for small data-set as well as big data-set.
4. more accurate results

Step 5: Prediction Module

System predicts the outputs based on the parameters using machine learning algorithm. We use algorithms for prediction "*KNN algorithm or Naïve Bayes Algorithm*".

Step 6: Results

Here we find the accuracy of the algorithm by dividing the training datasets into training and testing datasets. 90% considered as training datasets and 10% considered as testing datasets.

Step 7: Visual Representation

Outputs displayed for the users on GUI.

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Navie Bayes Algorithm Flow

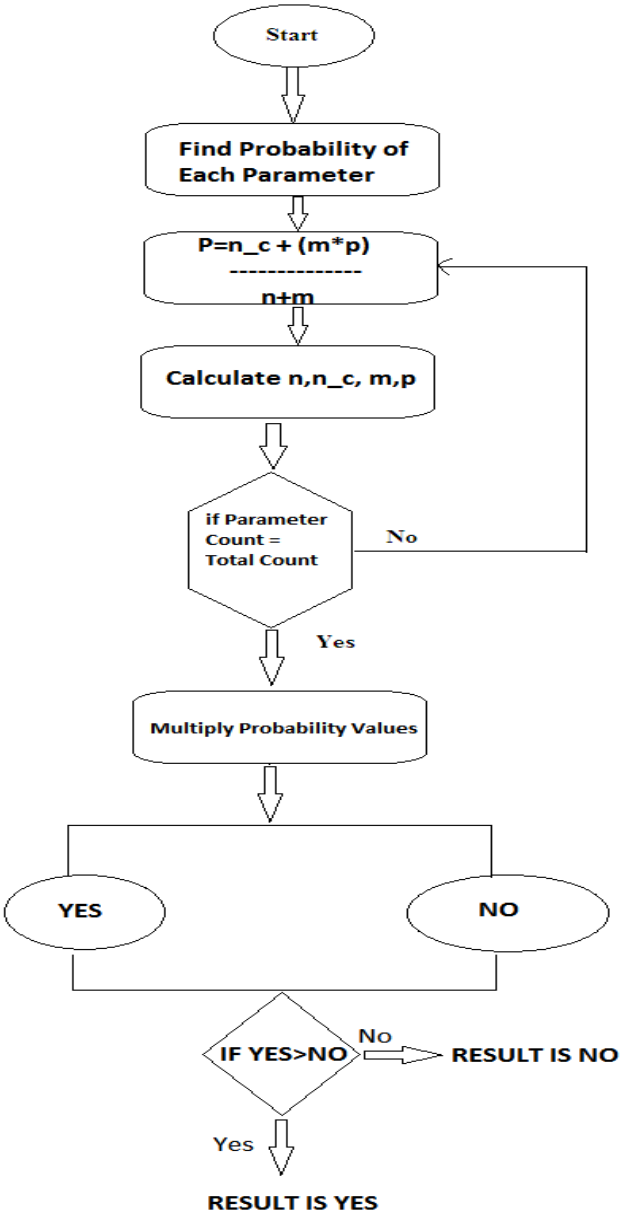

Fig: 2 – NB Algorithm Flow Diagram

B. **Result Analysis**

Naïve Bayes Algorithm

Here we build a real time application useful for the society. This project build using Microsoft technologies. Educational datasets trained using Naive Bayes algorithm and we got very good results. Naive Bayes algorithm is programmed in such a way that, it works for dynamic datasets. Naive Bayes algorithm logic is written and it's our own library. We are getting around 99.2% of accurate results and it takes around 2500 milli seconds for prediction.

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Constraint	NB Algorithm
Accuracy	**99.2** %
Time (milli secs)	**2606**
Correctly Classified (precision)	**99.2** %
Incorrectly Classified (Recall)	**0.8 %**

Table 1: NB Accuracy

V. IMPLEMENTATION

Proposed system build using 3 tier architecture design. 3 tier architecture is a standard architecture design used for the project development. This architecture design can be used on any platform such as Java, PYTHON, PHP etc. In the project development basically there are 3 types of architecture design namely;

- Single tier architecture (tight coupling)
- tier architecture
- tier architecture

When we are developing the project or working on real time application, it is very important to select the suitable architecture design. We have select the architecture design in such a way that future complexity of the topic should be less.

VI. CONCLUSION

Electronic gadgets like smart phones have a major impact on people in their day-to-day life. Among all, students are the important one, as they rely on electronic gadgets for their academic activities. The major impact is that it can affect the students' mental and physical health. Students are getting addicted to these electronic gadgets as it becomes inevitable. This project work uses machine learning techniques to demonstrate how gadgets affect students' daily lives. Many parameters used to find association among use of gadgets and student academic performance. Efficient algorithms used to predict educational patterns.

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