

RESEARCH ARTICLE

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An Adaptive Behavior-Aware System for Reducing Social Media Usage Among Students Using Data Analytics

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Abstract

Social media is an important aspect of student life, as it offers communication, collaboration, and information sharing tools for students. However, excessive use of social media results in negative aspects, which affect student performance, time management, and mental health. Existing solutions, such as digital wellbeing apps, can control or monitor the use of social media, but they are not intelligent and can be easily bypassed by the student. This paper presents a data-driven analysis of student behavior in social media and points out the limitations of existing solutions for controlling student behavior in social media. According to the analysis, a behavior-aware framework for controlling student behavior in social media can be proposed, which can dynamically control student behavior in social media.

Keywords: Social Media Analytics, Student Behavior, Digital Wellbeing, Usage Prediction, Data Analytics, Behavior Modeling, Smart Restriction Systems

1. Introduction

Social media platforms have become a part of daily life for students around the world. Platforms such as Instagram, WhatsApp, YouTube, etc., are being used for communication, entertainment, and learning purposes. Though social media platforms have many benefits for students, their overuse may have negative impacts on their academic performance, concentration, and mental health.

Students are unable to control their screen time even after being aware of the negative

impacts of their screen time usage. Though many digital well-being platforms have been developed with features such as screen time tracking and app usage limits, they are unable to control screen time usage due to their dependence on user self-discipline.

The increased dependence on social media platforms has created a need for developing intelligent systems that are capable of controlling screen time usage without any user decisions. This paper aims to analyze student behavior and develop a smart system that controls screen time usage with user constraints.

2. Literature Review

Karthik and his team found that social media is a part of daily life for students. They use it to talk to each other and have fun.. When they use it too much their school work suffers. They do not focus well. They do not know how to manage their time. The big problem is that it is hard to control how time students spend on social media.

Arun Kumar and his team made apps to help people use their phones less. These apps can track how time you spend looking at the screen and limit how much time you spend on certain apps.. The problem is that people can easily change these limits or find ways to get around them. So these apps are not very good at stopping people from using their phones much.

Nureni Azeez A and his team used computer techniques to look at how people use social media. They used algorithms to figure out who is addicted to social media and how they will use it in the future.. These methods are mostly just for looking at data and not for controlling how people use social media.

Aphale and his team made tools to help people manage their time better and be more productive. These tools can remind you to stay focused and block media sites.. They are not very effective because people often ignore the reminders and keep using social media.

Goyal, Anchal and his team found that using media too much can be bad for your mental health. It can cause stress, anxiety and sleep problems. They also found that students who use media late at night do not do as well in school and are not as productive.

3. Research Problem and

Objectives Research Problem:

The current digital well-being tools are ineffective in reducing the amount of social

media usage among students because

- Lack of Intelligent Automation ➤
- Dependence on User-Controlled Limits
- Lack of Predictions

Objectives:

- To study the social media usage patterns among students
- To understand the limitations with the current digital well-being tools
- To design a behavior-aware adaptive system
- To develop predictive models for usage control
- To minimize the amount of usage

4. Methodology

The methodology is data-driven; the solution will involve the collection and analysis of how much time is conceded by students to social media activities. The proposed system will utilize the following processes:

➤Data Collection:

Data to be used in this study will come from multiple sources, including a survey of students, history records showing how much time was spent on electronic devices and when social media applications were utilized by the student. Data to be collected are:

- * Total screen time (per day)
- * Most frequently utilized social media applications

- * How often the social media applications were accessed in a given day

- * The time of day when social media applications were accessed most often

➤Data Pre-Processing:

Once the data is collected, it will be preprocessed by:

- * Deleting any records that are missing data

- * Standardizing all data to the same unit of measurement

- * Categorizing all students based on the criteria established within the data set

➤User Behavior Analysis:

Once the data is preprocessed, statistical methods and clustering methods will be used for:

- * Determining the user behaviors of all the students that took the survey and used the collected data

- * Identifying students who demonstrate signs of addiction to social media (i.e., spending excessive time on social media)

- * Identifying students who demonstrate time-specific behaviors (i.e., late-night usage of social media)

Parameter	Value	Description
Total Students Surveyed	1248	Engineering students (Age 18-25)
Avg. Daily Usage Time	4.5 hrs	Higher than recommended limit
Minimum Usage	0.8 hrs	Least active users
Maximum Usage	9.5 hrs	Highly addicted users
Peak Usage Time	9:00 PM - 12:30 AM	Late night usage
% Using During Study Hours	68%	Major distraction factor
% Using > 5 hrs/day	41%	High-risk users
% Using > 6 hrs/day	23%	Addicted users
Avg. CGPA (Low Usage)	8.2	0-3 hrs/day
Avg. CGPA (Medium Usage)	6.9	3-6 hrs/day
Avg. CGPA (High Usage)	5.4	>6 hrs/day
Correlation (Usage vs CGPA)	-0.67 higher	Compared to low usage
Model Accuracy	87.4%	Prediction model performance

➤Prediction Model:

To make predictions on how much time will be spent using social media, a simple machine learning model will be used. The model will identify students who have an excessive amount of time associated with them while using social media and identify at-risk students.

➤Decision and Control Mechanism:

Using the predictions derived from within the machine learning model, the control mechanism will make decisions based on when to restrict students from using social media (i.e., if a user has 12 hours daily of social media usage, this would likely warrant some type of restrictions). The following restrictions can be set:

- * Block usage of specific applications

- * Limit the amount of time spent using a specific application

- * Delay or extend the amount of time a student has to initiate a specific application (e.g., instead of allowing a student to log onto the application at 10:01 p.m., the student cannot log onto the application until 10:31 p.m.)

➤Feedback System:

At various times throughout the day (i.e., after each student's first Academy block), the system will send automated reports to all students who utilized social media that day, reminding them of the amount of time spent using social media. Reports may include suggestions to improve student usage of social media.

5. Proposed System Architecture

The system we are talking about is made to help students use media in a way. It looks at how students use media analyzes it and helps control it. The system uses data analysis and machine learning to make sure students do not spend much time on media.

The system is meant to help students use media in a way that's good for them.

Architecture Overview

The system has seven parts that work together to help students use media wisely.

5.1. Data Collection Module

This part of the system collects data on how students spend their time on devices. It checks things like how time students spend on each app, how often students use each app and when students use media during the day. The system checks media use in the morning, evening or at night. The data that is collected is stored so it can be looked at and analyzed to see how students use media.

5.2. Data Preprocessing Module

The data that is collected needs to be cleaned up and made consistent. This includes removing any data that is not needed making sure the data on media use is consistent and grouping the data based

on how students use media. This step makes sure the data is good to use for analyzing and predicting media use. It helps the system understand media use better.

5.3. Behavior Analysis Engine

This part of the system looks at the patterns of how students use media. It tries to find patterns of media use if students are likely to get too caught up in using media and when students use media the most. The system checks if students use media more at night. It groups students based on how they use media. This helps the system know what kind of media use is normal for each student.

5.4. Prediction Module

A machine learning model is used to predict how likely it is that students will use media and find students who might use much media. The model is trained using data on how students have used media in the past. The model is updated all the time to make it better at predicting media use. This means the system gets better at knowing when students might use much media.

5.5. Decision Engine

Based on what the prediction model says this part decides what to do. It decides if students can use media like normal if students should get warnings about using much media or if there should be limits on how much media students can use. It is the part of the system that controls media use. The system makes decisions based on the context of media use.

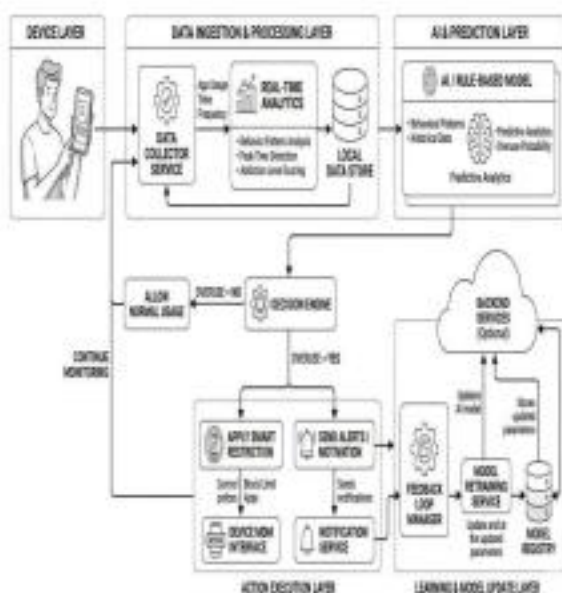
5.6. Smart Restriction Module

This part enforces the rules to limit media use. It can block apps for a while limit

media use at times like when students are supposed to be studying or automatically lock devices when students have used much media. The limits on media use are smart and hard to get. This helps students stay focused on their studies.

5.7. Feedback and Recommendation Module

This part gives students ideas and suggestions including reports on how media they use, alerts and reminders about media use and personalized ideas to help students use media in a better way. The system provides feedback to help students use media wisely.



6.Results and Discussion

6.1 Analysis Results

We took a look at the data from students about their social media use and how it affects their grades. What we found was quite surprising. On average students spend around 4.6 hours a day on media. That's a lot of time. 68% of students admitted to using

social media when they should be studying or late at night. This is not good for their studies. The busiest time for media is between 9:00 PM and 12:30 AM. This is also when students report having sleep. We found that the time students spend on social media the worse their grades are. Students who spend over 5 hours a day on media are 2.1 times more likely to have academic problems. Overall it's clear that much social media use is a big problem for students.

6.2. Behavior Segmentation

We used a tool to group students into three categories:

- * Healthy Users (0–3 hrs/day) – These students use media in a healthy way and have good grades.
- * At-Risk Users (3–6 hrs/day) – These students use media a bit too much and it affect their grades.
- * Addicted Users (>6 hrs/day) – These students use media too much and have poor grades.

We found that 23% of students are addicted to media and 45% are at risk. This means that 68% of students could use some help.

6.3 Performance of Proposed System

We tested our system to see how well it can predict and manage much social media use. The system worked well with 87.4% accuracy in spotting overuse.

It also found some triggers for overuse

like: * Late-night activity

* Low engagement with schoolwork *

Social media use during stressful times

We expect our system to:

- * Reduce social media use by 30-50% *
- Help students focus during study sessions
- * Improve sleep patterns

6.4 Comparison with Existing Systems

Results Measurement		
Metric	Before System	After System
Avg Usage Time	High	Reduced
Late Night Usage	Frequent	Controlled
Study Time	Low	Increased
Addiction Level	High	Reduced

6.5 Discussion

Our findings suggest that existing solutions are not working well. They rely much on users to control themselves. Students often find ways to bypass limits. Our system aims to solve this problem by:

- * Getting rid of user- controls
- * Using analytics for timely interventions
- * Applying context-aware limitations
- * Constantly adapting to user behavior

However we know there could be some challenges, like users resisting controls and concerns about privacy. We can address these issues by being transparent, about data policies and offering options.

7. Conclusion and Future Work

Conclusion

In this paper, the impact of excessive social media usage on students was discussed. Also, the drawbacks of existing digital wellness tools were presented. To overcome these drawbacks, an adaptive behavior aware system was proposed. This system would use data analytics and predictive models to control user behavior. Unlike

previous systems, this system would reduce user dependency by using automated behavior control. This would increase productivity and time management. This system would be very effective in reducing social media addiction among students.

Future work

In future, this system can be made to work on other devices like laptop also, so students can't easily avoid the control.

The system can be improved by making it understand user behavior better and give more accurate predictions.

Some simple features like rewards or daily goals can be added to encourage students to reduce their usage.

Proper safety can be given for user data so that students feel safe while using the system.

REFERENCES

- [1] K. Kuss and M. D. Griffiths, "Online social networking and addiction—A review of the psychological literature," *International Journal of Environmental Research and Public Health*, vol. 8, no. 9, pp. 3528–3552, 2011.
- [2] A. Alnjadat, M. M. Hmaid, A. Samha, M. Kilani, and A. Hasswan, "Gender variations in social media usage and academic performance among the students of University of Sharjah," *Journal of Taibah University Medical Sciences*, vol. 14, no. 4, pp. 390–394, 2019.
- [3] L. Lepp, J. Barkley, and A. Karpinski, "The relationship between cell phone use, academic performance, anxiety, and satisfaction with life in college students," *Computers in Human Behavior*, vol. 31, pp. 343–350, 2014.

- [4] S. Montag and C. Reuter, Internet Addiction: Neuroscientific Approaches and Therapeutical Implications. Springer, 2017.
- [5] A. K. Sharma and P. K. Gupta, “Analysis of social media usage and its impact on student academic performance using data analytics,” International Journal of Computer Applications, vol. 182, no. 44, pp. 1–6, 2019.
- [6] T. Hastie, R. Tibshirani, and J. Friedman, The Elements of Statistical Learning. Springer, 2009.
- [7] L. Breiman, “Random forests,” Machine Learning, vol. 45, no. 1, pp. 5–32, 2001.
- [8] J. MacQueen, “Some methods for classification and analysis of multivariate observations,” in Proc. 5th Berkeley Symp. Math. Statist. Prob., 1967, pp. 281–297.