Positive and Negative Impact of Social Media on Students using Machine Learning: A Study

Poonam Vadekar
Assistant Professor, School of Computer Science and Engineering
Madhyanchal Professional University, Bhopal

Abstract— The use of social media is incomparably on the rise among students, influenced by the globalized forms of communication and the post-pandemic rush to use multiple social media platforms for education in different fields of study. Though social media has created tremendous chances for sharing ideas and emotions, the kind of social support it provides might fail to meet students' emotional needs, or the alleged positive effects might be short lasting. In recent years, several studies have been conducted to explore the potential effects of social media on students' affective traits, such as stress, anxiety, depression, and so on. The present paper reviews the findings of the exemplary published works of research to shed light on the positive and negative potential effects of the massive use of social media on students' emotional well-being. This review can be insightful for teachers who tend to take the potential psychological effects of social media for granted. They may want to know more about the actual effects of the over-reliance on and the excessive (and actually obsessive) use of social media on students' developing certain images of self and certain emotions which are not necessarily positive. Also, we predicted the studied of impact of Social Media on Students using a predictive framework based on machine learning algorithms.

Keywords: - Positive Impact, Negative Impact, Social Media, Machine Learning

I. INTRODUCTION

Social media are computer-mediated technologies. It facilitate the sharing and creation of ideas, information and other forms of expression via virtual communities and network. Users access social media services via web-based technologies. Some of the most popular social media websites are Facebook, Google+, Instagram, Snapchat, Twitter, Whatsapp, You Tube, WeChat, Viber, and Wikia. Social media is a term that is used to describe any number of technological system related to collaboration and community, while it appears that a specific definition may be elusive. 'Social Media' is a multipurpose platform with web-based technology [1]. It incorporates text, sound, video and images with the purpose of making communication more interactive, appreciative and enjoyable. It is a means of interaction among people in which they create, share and comment on contains among themselves in virtual communities and networks. It introduces substantial and pervasive changes to communication between organizations, communities and individuals [2, 3]. Social media have two effects. These are positive effect and negative effect.

Discuss educational topics, increase a person's quality of life, communicate and remain in contact with persons etc. are the positive effect of social media. Another side, reduce the amount of face socialization with other people, reduce focus on learning and retaining information, privacy issues like posting personal information on online sites etc. are the negative effects of social media. In some scenario there are many in appropriate educational information posted which may lead the students to the wrong side. Social media encourages the development of technical, social skill and transferable of value in formal and informal learning. Most of the negative aspect can be overcome by reducing the amount of time spent on social media.

Social media has increased the quality and rate of collaboration on education for student. Social media has become essential but it could ruin the future of teenagers and it has a very bad impact on education [4]. In absence of real social life, technology mediated interaction does not teach healthy social skill. Academic performance is the extent to which a student, teacher or institution has achieved their short or long-term educational goals. It is measured by the final grade in the course. Positive effects of social media in case of education, increases the academic performance of the students. It is clear that social media does not impact schools student academic performance. Another side, negative effects of social media in case of education, decreases the academic performance of the students. Students, who checking social media while studying, reduce their academic performance. Social media has an inverse relationship with academic performance [5, 6]. Student divert from school activities to social media usage largely affect their academic performance [7].

II. AFFECTIVE INFLUENCES OF SOCIAL MEDIA ON STUDENTS

Vygotsky's mediational theory can be regarded as a main theoretical background for the support of social media on learners' affective states. Based on this theory, social media can play the role of a mediational means between learners and the real environment. Learners' understanding of this environment can be mediated by the image shaped via social media. This image can be either close to or different from the reality. In the case of the former, learners can develop their self-image and self-esteem. In

the case of the latter, learners might develop unrealistic expectations of themselves by comparing themselves to others. As it will be reviewed below among the affective variables increased or decreased in students under the influence of the massive use of social media are anxiety, stress, depression, distress, rumination, and self-esteem. These effects have been explored more among school students in the age range of 13–18 than university students (above 18), but some studies were investigated among college students as well. Exemplary works of research on these affective variables are reviewed here. In a cross-sectional study is explored the impact of online interactions of social networks on the psychological distress of adolescent students. These researchers found a negative correlation between the time spent on social networking and mental distress [9]. It's explored the relations between depression and the identity associated with the use of the popular social media, the Facebook. This study showed significant associations between depression and the number of identity-related information pieces shared on this social network [10].

They explored the relationship between students' social media use and depressed mood at teenage. No significant correlation was found between these two variables. In the same year, explored the associations between excessive uses of social media and internalizing emotions. These researchers found a positive correlation between more than 2-h a day use of social media and anxiety and depression. It reported a statistically significant positive correlation between addiction to Facebook and depression among about a thousand high school students in wealthy populations of Thailand and warned against this psychological threat. He examined the relationship between social media use and psychological distress. These researchers found that the use of social media for more than 2 h a day was correlated with a higher intensity of psychological distress [11, 12].

The tested the relationship between too much use of social networking and depression, yet found no statistically significant correlation between these two variables. They examined the relationships between different forms of Facebook use, perceived social support of social media, and male and female students' depressed mood. These researchers found a positive association between the passive use of the Facebook and depression and also between the active use of the social media and depression. Furthermore, the perceived social support of the social media was found to mediate this association. Besides, gender was found as the other factor to mediate this relationship. They explored change in negative investment in social networking in relation to change in depression and externalizing behavior. These researchers found that increased investment in social media predicted higher depression in adolescent students, which was a function of the effect of higher levels of disrupted sleep.

These researchers also found that this mediating effect was moderated by self-esteem. It means that the effect of addiction on depression was compounded by low self-esteem through rumination. In another work of research, is showed that though social media is expected to act as a form of social support for the majority of university students, it can adversely affect students' mental well-being, especially for those who already have high levels of anxiety and depression. In their research, the social media resources were found to be stress inducing for half of the participants, all university students. The higher education population was also studied. These researchers investigated the emotional effects of social media in higher education and found that the socially supportive role of social media was overshadowed in the long run in university students' lives and, instead, fed into their perceived depression, anxiety, and stress [13, 14].

III. MATERIALS AND METHODS

We adopted a quantitative research method, and questionnaires were used to acquire the study data. Obtaining primary data through questionnaires best suits research work based on experiments, surveys, and observation. Therefore, using the survey method gave the researchers' data on participants' beliefs, attitudes, feelings, and expected behavior. The questionnaire design consisted of 2 parts (demographic data, social media usage). A 5-point {1, 2… 5} Likert scale was used where appropriate participants expressed their consent ranging from not-at-all to very often. In addition, students log details on Facebook were obtained with participant permission to ascertain the actual time on social media. Lastly, the student's actual grade point average (GPA) was collected from their department and used as their performance rate.

3.1 Research model

Figure 1 shows the conceptual framework of the study. Social media's independent variables are broken into the level of exposure, time duration, usage nature, usage in class, and rate of use as input and dependent variable academic performance as output. Note that we are examining the direct associations of social media usage on academic achievement in this study.

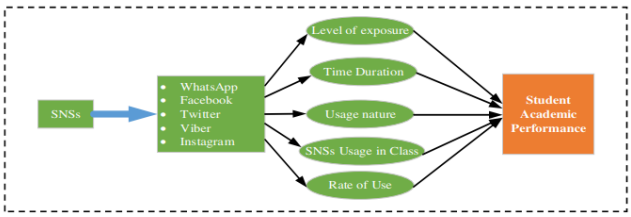

Fig. 1: Research conceptual framework

3.2 Machine Learning

Uproarious information is available in the heap of substance that will be identified through the anomaly strategies. The information can be spatial or can be a transient method spatial connected with the geological conditions and worldly connected with the time perspectives [14, 15]. The principle point of exception identification is to deal with the loud information that is introduced in the heap of text. Different methods for recognizing abnormalities in Text are specified in below:

Learning
The main property of an ML is its capability to learn. Learning or preparing is a procedure by methods for which a neural system adjusts to a boost by making legitimate parameter modifications, bringing about the generation of wanted reaction. Learning in an ML is chiefly ordered into two classes as [16].

- Supervised learning
- Unsupervised learning

Supervised Learning
Regulated learning is two stage forms, in the initial step: a model is fabricated depicting a foreordained arrangement of information classes or ideas. The model developed by investigating database tuples portrayed by traits. Each tuple is expected to have a place with a predefined class, as dictated by one of the qualities, called to have a place with a reclassified class, as controlled by one of the traits called the class name characteristic. The information tuple are dissected to fabricate the model all things considered from the preparation dataset [17].

Unsupervised learning
It is the kind of learning in which the class mark of each preparation test isn't knows, and the number or set of classes to be scholarly may not be known ahead of time. The prerequisite for having a named reaction variable in preparing information from the administered learning systemmay not be fulfilled in a few circumstances.
Data mining field is a highly efficient techniques like association rule learning. Data mining performs the interesting machine-learning algorithms like inductive-rule learning with the construction of decision trees to development of large databases process. Data mining techniques are employed in large interesting organizations and data investigations. Many data mining approaches use classification related methods for identification of useful information from continuous data streams.

Nearest Neighbors Algorithm
The Nearest Neighbor (NN) rule differentiates the classification of unknown data point because of closest neighbor whose class is known. The nearest neighbor is calculated based on estimation of k that represents how many nearest neighbors are taken to characterize the data point class. It utilizes more than one closest neighbor to find out the class where the given data point belong termed as KNN. The data samples are required in memory at run time called as memory-based technique. The training points are allocated weights based on their distances from the sample data point. However, the computational complexity and memory requirements remained key issue. For addressing the memory utilization problem, size of data gets minimized. The repeated patterns without additional data are removed from the training data set [18].

Naive Bayes Classifier
Naive Bayes Classifier technique is functioned based on Bayesian theorem. The designed technique is used when dimensionality of input is high. Bayesian Classifier is used for computing the possible output depending on the input. It is feasible to add new raw data at runtime. A Naive Bayes classifier represents presence (or absence) of a feature (attribute) of class that is unrelated to presence (or absence) of any other feature when class variable is known. Naïve Bayesian Classification Algorithm was introduced by Shinde S.B and Amrit Priyadarshi that denotes statistical method and supervised learning method for classification. Naive Bayesian Algorithm is used to predict the heart disease. Raw hospital dataset is employed. After that, the data gets preprocessed and transformed. Finally by using the designed data mining algorithm, heart disease was predicted and accuracy was computed.

Support Vector Machine
SVM are used in many applications like medical, military for classification purpose. SVM are employed for classification, regression or ranking function. SVM depends on statistical learning theory and structural risk minimization principal. SVM determines the location of decision boundaries called hyper plane for optimal separation of classes as described in figure 3. Margin maximization through creating largest distance between separating hyper plane and instances on either side are employed to minimize upper bound on expected generalization error. Classification accuracy of SVM not depends on dimension of classified entities. The data analysis in SVM is based on convex quadratic programming. It is expensive as quadratic programming methods need large matrix operations and time consuming numerical computations.

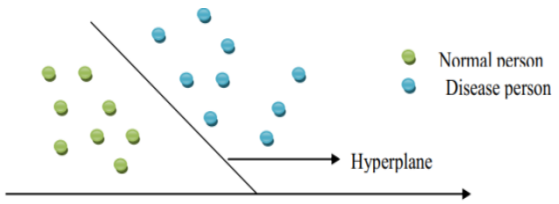

Fig. 2: Support Vector Classification

IV. CONCLUSION

The current study examines students' use of social networking sites and their effect on their academic performance. Nonetheless, much work has been carried out in this area. However, academic findings on social media use and its effects on students' academic performance are not settled; some studies have found positive effects, others contrary, and some have found no effects. Thus, research has not made it clear to what extents do social media nature of the application, rate-of-use, and period-of use predicts students' academic performance. The results obtained from this study revealed disagreement with some sections of the literature. Thus, while some literature sees social media use as a bad influence on students' academic performance, this study's outcomes showed otherwise.

Furthermore, we observed that the time spent on social media does not matter but how students use social media to improve their academic performance. The nature of social media use by the student is a good predictor of their academic performance. This outcome suggests that education on the usage of nature and when to use social media must be intensified among students by counsellors and school authorities and not promote the notion that social media use is wrong, as seen in some literature sections. Random forest classier performed better, with higher accuracy in predicting students' academic performance than decision tree classifiers. The use of these DT and RF algorithms in this study has brought sufficient clarity as to what extent social media use predicts students' academic work.

V. SUGGESTIONS FOR FURTHER RESEARCH

The majority of studies on the potential effects of social media usage on students' psychological well-being are either quantitative or qualitative in type, each with many limitations. Presumably, mixed approaches in near future can better provide a comprehensive assessment of these potential associations. Moreover, most studies on this topic have been cross sectional in type. There is a significant dearth of longitudinal investigation on the effect of social media on developing positive or negative emotions in students. This seems to be essential as different affective factors such as anxiety, stress, self-esteem, and the like have a developmental nature. Traditional research methods with single-shot designs for data collection fail to capture the nuances of changes in these affective variables. It can be expected that more longitudinal studies in future can show how the continuous use of social media can affect the fluctuations of any of these affective variables during the different academic courses students pass at school or university.

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