

Investigating the Influence of Social Media Usage on Students

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Abstract—This research investigates how social media usage and study hours influence students' academic performance and psychological well-being. Using multiple student-submitted datasets, we analyze behavioral patterns and academic outcomes through structured preprocessing, scoring, and visualization. The study finds that while social media correlates moderately with mental health indicators like anxiety and distraction, its direct relationship with grades remains weak and inconclusive due to self-reporting limitations. Our findings highlight key trends and offer insights for promoting balanced digital behavior.

Index Terms—Social Media, Academic Performance, Mental Health, Student Behavior, Regression, Anxiety, Sleep, Distraction

I. Introduction

Social media is an integral part of modern student life. While it supports communication and collaboration, prolonged or unregulated use may be linked to distraction, sleep issues, and anxiety [1]. Research has shown that social media platforms like Instagram have significant effects on mental health indicators, including self-reported well-being, depression, anxiety, stress, and indicators of body image and disordered eating [2]. The relationship between social media use and adolescent mental health has been described as complex and influenced by several intervening factors [3], [4].

This paper explores the relationship between daily screen time, academic outcomes, and psychological indicators based on self-reported student data. In this context, psychological indicators refer to measurable self-reported symptoms or traits reflecting students' mental well-being. These include stress levels, anxiety symptoms, depressive moods, sleep disturbances, and self-esteem. Such indicators are derived from survey responses and are commonly used in psychological and behavioral research to quantify mental health trends in non-clinical populations. Studies have demonstrated that screen time, represented by daily time spent using digital technology, has been increasing and shows associations with mental health in adults [5]. All insights are drawn directly from the data without assumptions or generalizations beyond what is observed.

II. Literature Review

Recent systematic reviews have examined the relationship between social media use and various psychological factors. O'Day and Heimberg [6] found that both socially anxious and lonely individuals engage online more problematically and seek out social support on social media, potentially to compensate for lack of in-person support. Zhao [7] demonstrated that different types of social media use have varying effects on social media addiction and subjective well-being, with entertainment use being more likely to lead to addiction while social use tends to improve subjective well-being.

The study is conceptually framed by the Uses and Gratifications Theory (UGT), which posits that individuals use media to fulfill specific psychological needs such as socialization, entertainment, or information-seeking. In the context of student behavior, UGT helps explain why some students may turn to social media for stress relief or social connection, while others may experience negative outcomes like distraction or anxiety. Additionally, Cognitive Load Theory supports the idea that multitasking and information overload from digital platforms can impair academic concentration and well-being.

Research has also shown that attachment styles influence social media usage patterns. Shorter et al. [8] found that individuals with anxious attachment styles were significantly more motivated to use social networking sites to decrease loneliness. Additionally, studies have highlighted the complex relationship between social media use and mental health, particularly regarding fatigue and problematic usage patterns [9].

III. Methodology

Dataset Overview

The following datasets were used in this study:

Student Academic Data: Included social media hours, study time, sleep, grades, and other academic features related to student performance and social media engagement [10].

Mental Health Survey: Assessed distraction, anxiety, depression, and sleep quality using question-based scoring methodologies similar to those used in previous studies [11], [12].

Preprocessing Steps

The data preprocessing involved several key steps to ensure data quality and consistency:

Categorical encoding of grades (A=4 to D=1) following standard academic grading systems.

IQR method to cap outliers in numerical columns, ensuring robust statistical analysis.

Deriving distraction, anxiety, depression scores using survey question averages based on validated psychological assessment methods.

Social media usage bucketed into six bins from "<1 hr" to "5+ hrs" for categorical analysis.

The preprocessing methodology draws from established practices in social media research and psychological assessment [13], [14].

IV. Visual Analysis and Findings

Grade Distribution

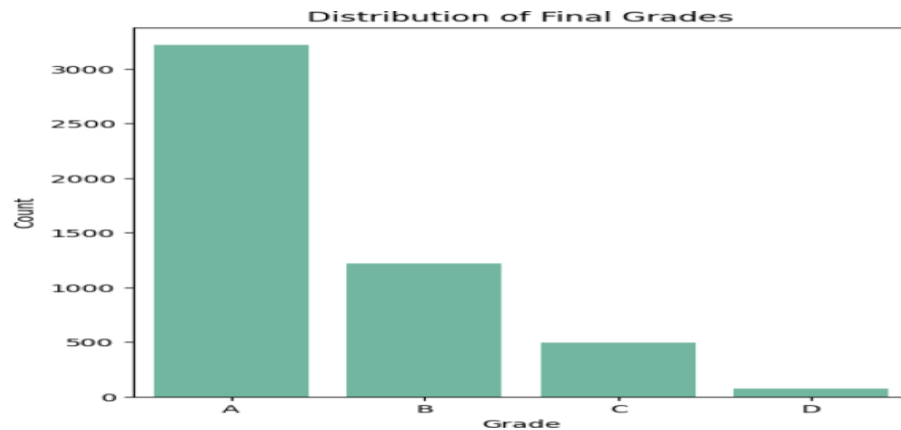


Fig. 1. Distribution of Final Grades

The majority of respondents reported receiving a Grade A, followed by B and C. Very few reported D. This trend suggests a potential sampling bias—high-performing students may be more inclined to participate or overestimate their academic standing, which aligns with findings from previous studies on student self-reporting [1], [15].

Social Media vs Grades

The boxplot indicates that median social media hours slightly increase from Grade A to D. However, the distribution overlaps significantly between grades. Thus, while a weak trend is visible, no strong or definitive relationship can be established between social media hours and academic performance, consistent with findings from other studies that show weak or inconsistent associations [3], [11].

This suggests that social media use alone may not be a strong determinant of academic success, pointing to the influence of other mediating factors such as time management skills or motivation.

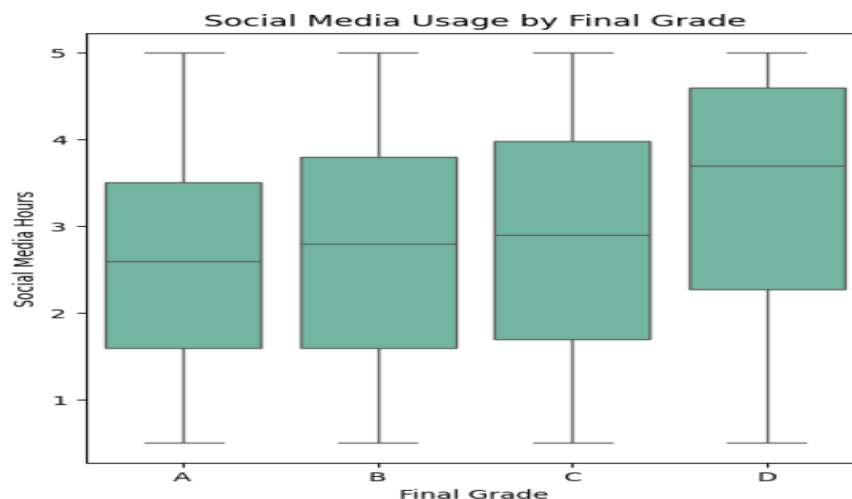


Fig. 2. Social Media Hours vs Final Grade

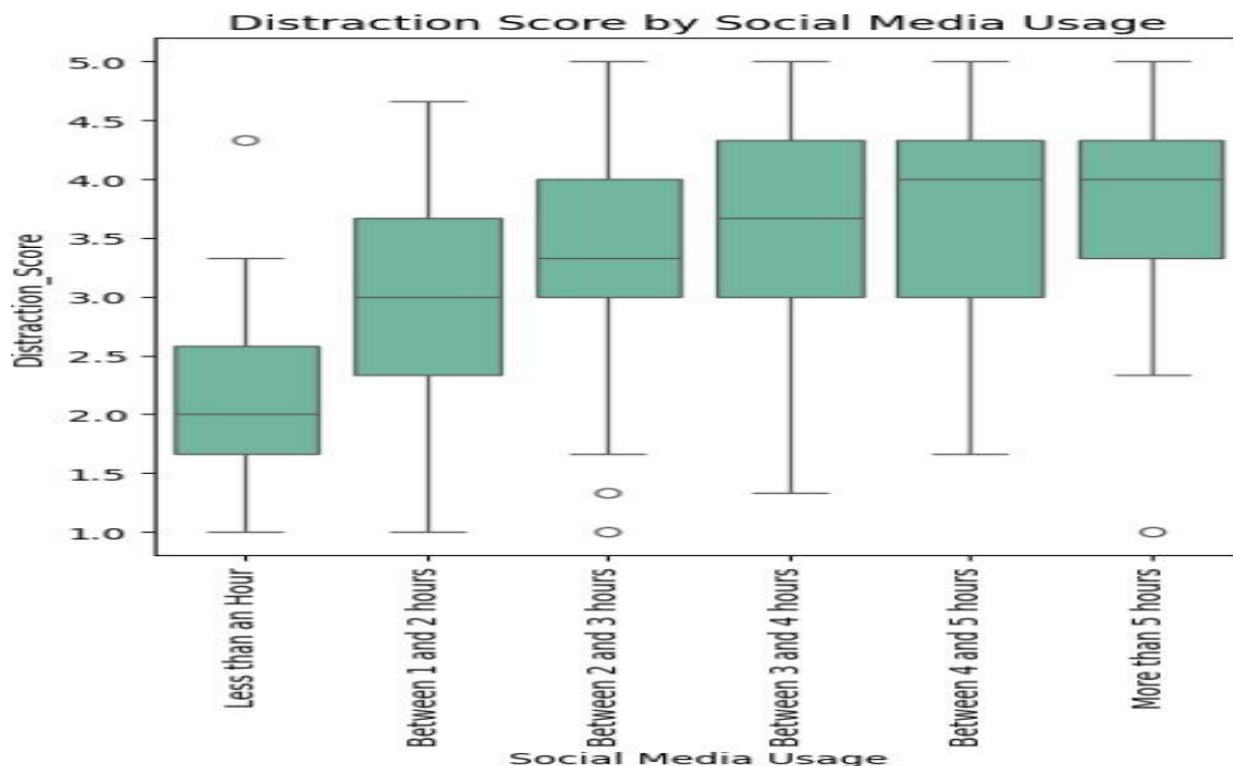


Fig. 3. Distraction Score by Social Media Usage

Distraction Trends

Distraction score increases steadily with more time spent on social media, showing a clearer correlation than with grades [11]. This suggests that high screen time can impair focus, even if grades remain stable short-term. This finding aligns with research showing that social media use can create stress through feeling overwhelmed by constant demands [15].

The clear rise in distraction scores with increased usage implies that frequent social media engagement may impair students' sustained attention and cognitive control, affecting their learning efficiency.

Anxiety Indicators

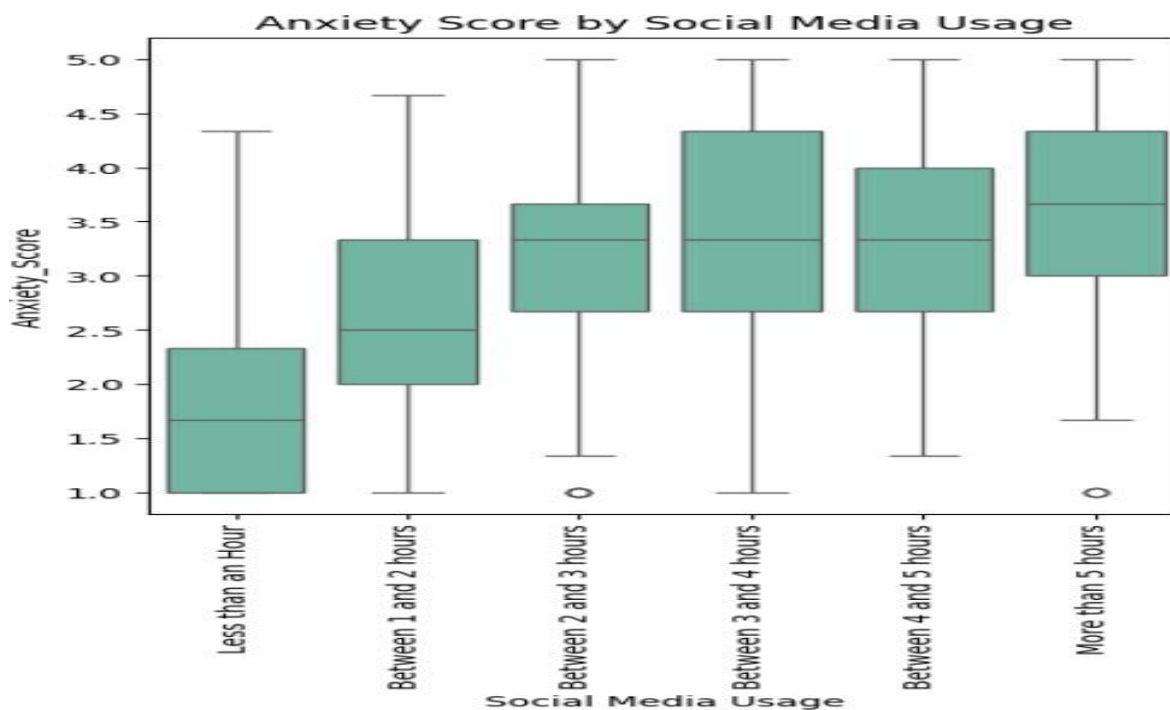


Fig. 4. Anxiety Score by Social Media Usage

Students using more than 3 hours of social media per day reported noticeably higher anxiety levels [9]. This aligns with global findings that extended social scrolling may elevate restlessness and overthinking, and is consistent with research showing associations between fear of missing out and problematic social media use [9].

The increased anxiety levels support theories that excessive online interaction, particularly passive consumption and comparison, may heighten psychological distress among young adults.

Mood and depression scores

Depression scores slightly increase with usage, although the relationship is not as strong as distraction or anxiety. Still, a trend of declining mood with increased time online is present, which supports findings from cross-cultural studies examining the correlation between social media usage and mental health [16].

Though the trend is weaker, it highlights the emotional toll of prolonged social media exposure, warranting further exploration into the content and contexts of use.

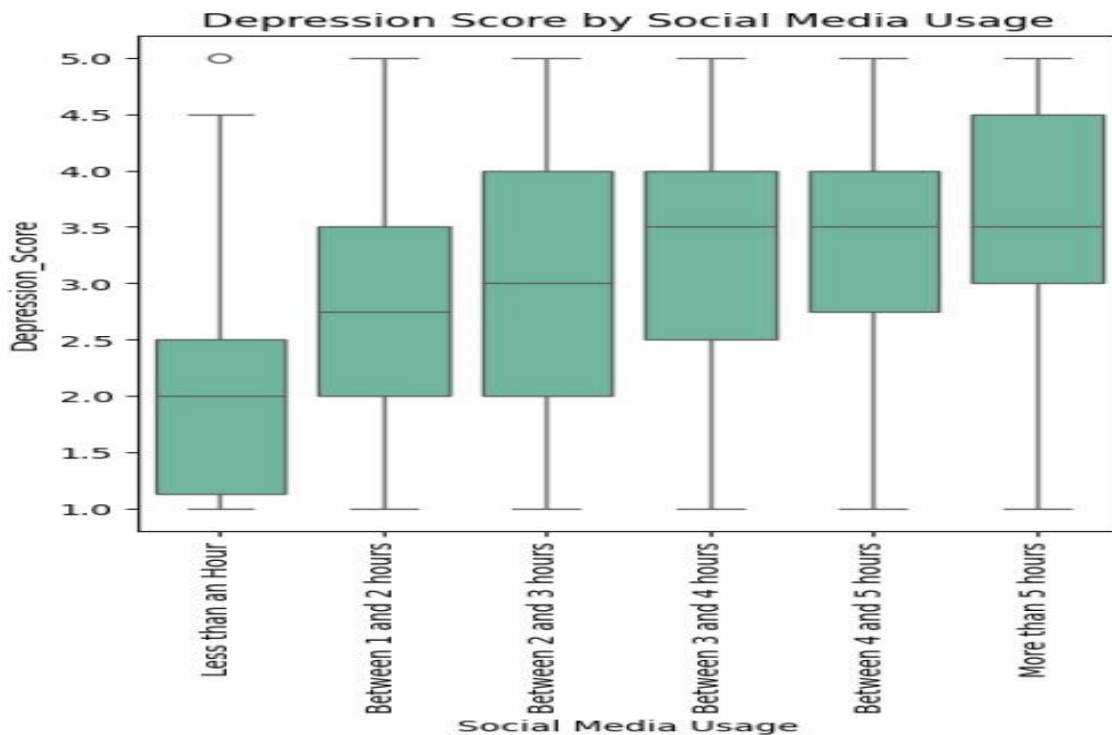


Fig. 5. Depression Score by Social Media Usage

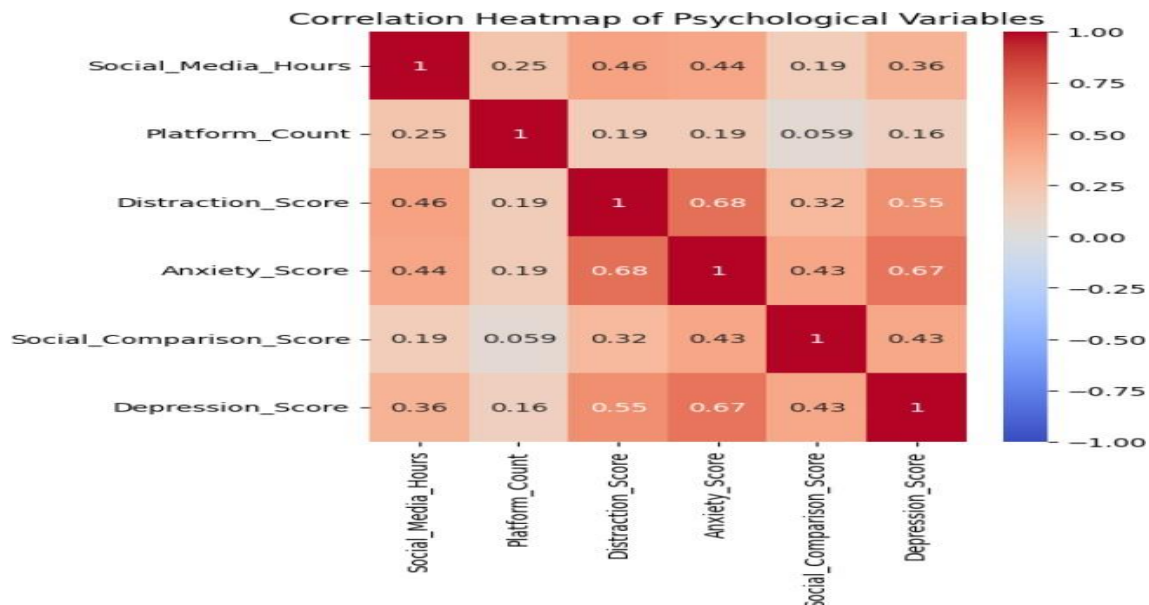


Fig. 6. Correlation Between Psychological Indicators

Psychological Correlation Overview

The heatmap shows a strong to moderate correlation between distraction, anxiety, and depression. Social media hours show the strongest link with distraction, and weaker yet positively with anxiety and sleep issues [11]. This pattern recognition aligns with machine learning approaches used to identify relationships in social media and mental health data [17].

V. Discussion

This study highlights that while direct academic performance may not strongly correlate with reported social media use, mental health factors do show clearer associations. Distraction and anxiety rise notably with usage, suggesting that cognitive and emotional well-being may be the first affected domains [1]. These findings are consistent with research showing that the relationship between social media use and mental health is influenced by individual demographic and psychosocial characteristics, individual use patterns, and social media content and design [4].

Importantly, the dataset is not exhaustive and relies on subjective self-reporting. The trends reflect perceptions, not clinical diagnoses or verified screen logs. Future research should consider incorporating more sophisticated data analysis techniques, including support vector machine optimization and random forest algorithms, to better understand these complex relationships [13].

Limitations and Future Work

Several limitations should be acknowledged in this study. The reliance on self-reported data introduces potential bias, as participants may over- or under-report their social media usage and academic performance. Additionally, the cross-sectional nature of the study limits our ability to establish causal relationships between social media use and the observed outcomes.

Future studies should include passive data tracking, time-series metrics, and diverse demographics for stronger insights. Incorporating machine learning techniques for pattern recognition and data analysis could provide more robust findings [17], [18]. Longitudinal studies would be particularly valuable for understanding the temporal dynamics of social media use and its effects on student well-being.

VI. Conclusion

This paper presents an exploratory analysis of how social media usage and study time affect students' mental and academic metrics. The most consistent insight is the rise in distraction, anxiety, and sleep issues with greater online activity. Direct grade decline is not conclusively proven, though slight patterns emerge.

This study contributes to the growing literature on the psychological effects of social media by demonstrating that while academic performance may not show strong associations, mental health dimensions—especially distraction and anxiety—are more sensitively linked to daily screen time. From a practical standpoint, these findings emphasize the need for targeted interventions in educational institutions that focus not only on reducing screen time but also on improving students' digital literacy and emotional self-regulation. This research underscores the importance of addressing psychological impacts in digital behavior management, especially in academic settings. [3], [4]

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References

1. J. Cain, "It's time to confront student mental health issues associated with smartphones and social media," *American Journal of Pharmaceutical Education*, vol. 82, pp. 738–741, 2018.
2. L. Faelens, K. Hoorelbeke, R. Cambier, J. van Put, E. V. de Putte, R. D. Raedt, and E. H. Koster, "The relationship between instagram use and indicators of mental health: A systematic review," 2021.
3. P. M. Valkenburg, A. Meier, and I. Beyens, "Social media use and its impact on adolescent mental health: An umbrella review of the evidence," 2022.
4. Sala, L. Porcaro, and E. Go'mez, "Social media use and adolescents' mental health and well-being: An umbrella review," 2024.
5. R. M. S. Santos, S. de Alcantara Ventura, Y. J. de Almeida Nogueira,
6. G. Mendes, J. J. de Paula, D. M. Miranda, and M. A. Romano-Silva, "The associations between screen time and mental health in adults: A systematic review," *Journal of Technology in Behavioral Science*, 2024.
7. E. B. O'Day and R. G. Heimberg, "Social media use, social anxiety, and loneliness: A systematic review," *Computers in Human Behavior Reports*, vol. 3, 2021.
8. L. Zhao, "The impact of social media use types and social media addiction on subjective well-being of college students: A comparative analysis of addicted and non-addicted students," *Computers in Human Behavior Reports*, vol. 4, 2021.
9. P. Shorter, K. Turner, and J. Mueller-Coyne, "Attachment style's impact on loneliness and the motivations to use social media," *Computers in Human Behavior Reports*, vol. 7, p. 100212, 8 2022.
10. U. Tugtekin, E. B. Tugtekin, A. A. Kurt, and K. Demir, "Associations between fear of missing out, problematic smartphone use, and social networking services fatigue among young adults," *Social Media and Society*, vol. 6, 2020.

11. D. Giancola, R. Travers, and S. Coulombe, "Scrolling through the covid-19 pandemic: Exploring the perceived effects of increased social media use on the mental health of undergraduate university students," *Social Media + Society*, vol. 9, 4 2023. [Online]. Available: <https://journals.sagepub.com/doi/10.1177/20563051231177970>
12. L. Ferris, E. E. Hollenbaugh, and P. A. Sommer, "Applying the uses and gratifications model to examine consequences of social media addiction," *Social Media and Society*, vol. 7, 2021.
13. J. Iqbal, M. Z. Asghar, M. A. Ashraf, and M. Rafiq, "Social media networking sites usage and depression among university students during the covid-19 pandemic: The mediating roles of social anxiety and loneliness," *Social Media and Society*, vol. 8, 2022.
14. M. Ahmad, S. Aftab, M. S. Bashir, N. Hameed, I. Ali, and Z. Nawaz, "Svm optimization for sentiment analysis," *International Journal of Advanced Computer Science and Applications*, vol. 9, pp. 393–398, 2018.
15. C. Y. J. Peng, K. L. Lee, and G. M. Ingersoll, "An introduction to logistic regression analysis and reporting," *Journal of Educational Research*, vol. 96, pp. 3–14, 2002.
16. E. C. Hurley, I. R. Williams, A. J. Tomin, and L. Sanci, "Social media use among australian university students: Understanding links with stress and mental health," *Computers in Human Behavior Reports*, vol. 14, 5 2024.
17. B. Alwuqaysi, A. Abdul-Rahman, and R. Borgo, "Cross-cultural study on social media usage and its correlation with mental health and family functioning," *Computers in Human Behavior Reports*, vol. 16, p. 100513, 12 2024.
18. T. D. Adugna, A. Ramu, and A. Haldorai, "A review of pattern recognition and machine learning," pp. 210–220, 1 2024.
19. S. Raschka, J. Patterson, and C. Nolet, "Machine learning in python: Main developments and technology trends in data science, machine learning, and artificial intelligence," 4 2020.