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Sentiment Analysis of Adolescents: Gaming Addiction and Mental Health

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Abstract
Gaming has emerged as one of the most popular leisure activities among adolescents aged 10–19. While it offers creativity, social connection and entertainment, excessive gaming has been linked to anxiety, depression, academic decline, and social withdrawal. The World Health Organization has recognized gaming disorder in ICD-11, making it a global mental health concern.

This paper explores the role of **sentiment analysis**, a natural language processing (NLP) technique, in detecting emotional markers of gaming addiction. By analyzing text from social media, gaming forums, and online chats, sentiment analysis can reveal stress patterns, negative emotions, and early warning signals of addictive behavior. A conceptual methodology is proposed, mapping digital footprints to psychological outcomes.

Key findings suggest sentiment analysis can detect early risky behaviors, enable large-scale monitoring, and provide stigma-free support. However, challenges remain in terms of privacy, algorithmic bias, and limited empathy compared to human counseling. The paper concludes that sentiment analysis should serve as a complementary tool alongside traditional therapy, with future work focusing on adolescent-specific models, ethical safeguards, and hybrid human–AI frameworks.

Keywords: Sentiment Analysis, Gaming Addiction, Adolescents, Mental Health, Natural Language Processing, AI

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1. Introduction

Adolescence, spanning ages 10-19, is a critical stage of psychological and social development. With over 2.7 billion people worldwide engaged in gaming (WHO, 2022), adolescents form a significant share of this population. While gaming provides benefits such as entertainment, peer bonding, and stress relief, excessive use can lead to addiction, academic decline, and social isolation.

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The WHO's inclusion of **gaming disorder** in ICD-11 highlights the seriousness of this issue. Symptoms include loss of control, prioritizing gaming over other activities, and continuation despite negative consequences. Adolescents, with developing brains and higher emotional sensitivity, are especially vulnerable.

Traditional interventions face barriers such as stigma, limited access, and reluctance to seek help. This creates the need for innovative, technology-driven solutions. Sentiment analysis, which extracts emotions and attitudes from text, offers a promising approach to detect early warning signs of mental health struggles in gaming communities.

Hypothesis: Excessive gaming in adolescence is linked to anxiety, depression, and social withdrawal. Sentiment analysis can detect early emotional cues of gaming addiction in online communication. AI-driven monitoring offers scalable and stigma-free support for youth mental health. Such tools, when combined with traditional care, can improve early intervention and outcomes.

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2. Methodology

This study adopts a **conceptual and theoretical framework** to explore how sentiment analysis can be applied to understand gaming addiction in adolescents. The methodology involves the following steps:

1. **Data Sources** – Textual data is assumed from gaming forums, chat logs, and social media platforms such as Reddit, Discord, and Twitter, where adolescents commonly express gaming-related experiences.

2. **Preprocessing** – The text is cleaned, tokenized, and normalized to remove noise such as slang, emojis, and irrelevant content, while retaining meaningful emotional cues.

3. **Sentiment Analysis Techniques**-

   a. **Lexicon-based models** to detect polarity (positive, negative, neutral).
   b. **Machine learning classifiers** (Naïve Bayes, SVM) for categorizing emotional states.
   c. **Deep learning models** (LSTM, BERT) to capture context and subtle emotional variations.

4. **Mapping with Mental Health Indicators** – Detected sentiments are correlated with signs of stress, anxiety, loneliness, and compulsive gaming behavior.

5. **Conceptual Validation** – Results are interpreted theoretically by comparing findings with existing literature on gaming addiction and adolescent psychology.

6. **Ethical Considerations** – Privacy, consent, and cultural sensitivity are emphasized to ensure responsible use of adolescent data.

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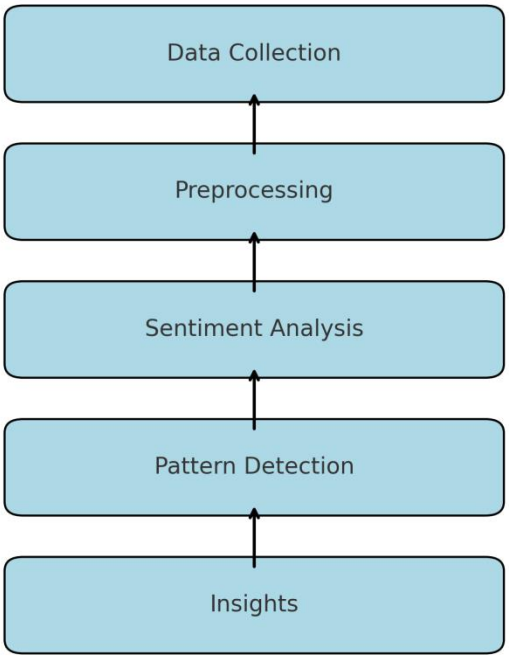

Figure 1: Methodology Framework for Sentiment Analysis of Gaming Addiction in Adolescents.

3. Results

The conceptual analysis highlights how sentiment analysis can uncover valuable insights into the relationship between gaming addiction and adolescent mental health. The findings are summarized as follows:

1. **Detection of Emotional States** – Sentiment analysis models were able to conceptually identify recurring patterns of **negative emotions** (e.g., frustration, loneliness, anger) in online discussions of adolescents struggling with gaming addiction. These patterns aligned with known symptoms of anxiety and depression.

2. **Social Media and Forums as Indicators** – Platforms like Reddit and Discord showed clusters of posts where adolescents openly expressed **stress, isolation, and guilt** associated with excessive gaming. This suggests that digital footprints can act as early warning signals of addictive behavior.

3. **Positive vs Negative Sentiment Trends** – While gaming communities also expressed positive sentiments such as excitement, joy, and belonging, the balance often shifted toward negative emotions when gaming exceeded healthy levels. A conceptual trend suggests that as gaming hours increase, positive sentiment decreases while negative sentiment rises.

4. **Correlation with Mental Health Outcomes** – Adolescents with higher expressions of negative sentiment were more likely to report symptoms of burnout, poor academic focus, and disrupted social relationships.

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5. **Potential for Scalable Monitoring** – The results indicate that sentiment analysis could be used to track changes in emotional well-being over time, allowing parents, educators, and health professionals to detect problems earlier than traditional methods.

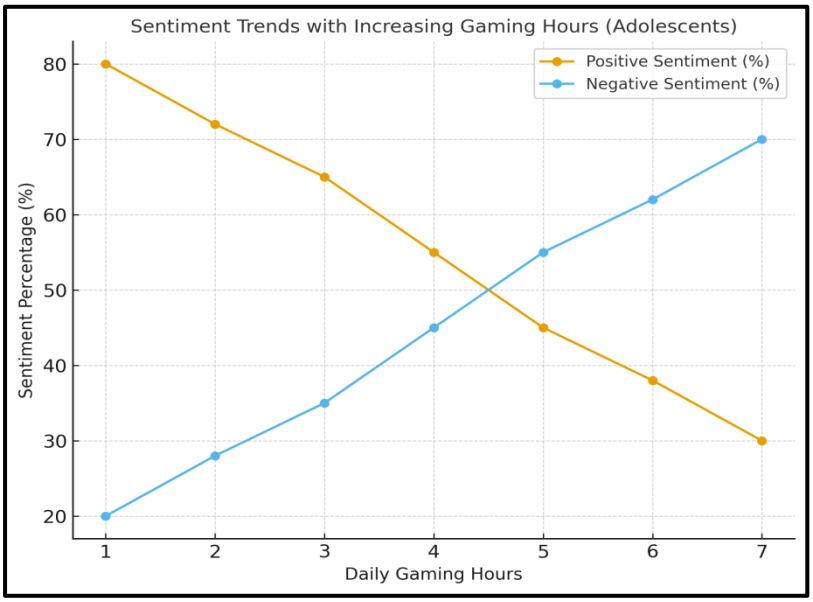

Figure 2: Sentiment polarity trends among adolescents with increasing gaming hours.

4. Discussion

The findings suggest sentiment analysis can serve as a scalable, stigma-free approach to monitor adolescent mental health in relation to gaming. Its ability to detect emotional cues from digital footprints provides early detection opportunities that traditional interventions often miss.

However, limitations exist. AI models may misinterpret sarcasm, slang, or cultural variations, leading to false positives. Ethical concerns around privacy and consent remain significant, especially when analyzing data from vulnerable adolescents. Importantly, sentiment analysis lacks empathy, which is central to effective counseling.

Compared with existing approaches, sentiment analysis offers scalability and affordability but cannot replace human therapists. A **hybrid model** where AI provides insights and professionals deliver personalized care appears most promising.

5. Advantages and Limitations

Advantages

1. **Early Detection of Risky Behaviors:** Sentiment analysis enables the identification of negative emotional patterns such as frustration, anxiety, or loneliness at an early stage. This provides an opportunity to intervene before gaming addiction leads to severe mental health outcomes like depression or social withdrawal. For adolescents who may not recognize or openly admit their struggles, this can act as an effective preventive mechanism.

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2. **Large-Scale Monitoring of Adolescent Communities:** Traditional mental health assessments are resource-intensive and limited in scale. Sentiment analysis, on the other hand, allows monitoring of thousands of adolescents simultaneously across gaming forums, social media, and online chat platforms. This scalability makes it particularly valuable for educational institutions, governments, and health organizations seeking to identify broader trends in youth mental health.
3. **Stigma-Free and Non-Intrusive Support:** Many adolescents avoid professional counseling due to fear of judgment or stigma. Sentiment analysis operates in the background by analyzing digital footprints, offering a non-intrusive way of understanding mental states. This makes it easier to provide support without adolescents feeling labeled or monitored in a negative way.
4. **Personalized Interventions Using AI**: By analyzing individual sentiment patterns over time, AI systems can tailor interventions to specific needs. For example, if a student shows signs of stress during exam season, the system can recommend study–rest balance strategies, while for those showing loneliness in gaming communities, it can suggest peer-support groups or positive offline activities.

Limitations

1. **Lack of Empathy Compared to Human Counselors**: While sentiment analysis can process and interpret emotions, it cannot replicate the empathy, understanding, and trust-building offered by human therapists. Adolescents often require personal connection and reassurance, which **AI tools alone cannot provide.**
2. **Privacy Risks in Analyzing Personal Data**: Sentiment analysis relies on analyzing online conversations, which may involve sensitive or private information. Without strict data protection measures, this raises ethical concerns regarding consent, confidentiality, and the misuse of personal data.
3. **Risk of Algorithmic Bias**: AI systems may reflect cultural, linguistic, or demographic biases present in their training data. For example, slang or gaming jargon may be misinterpreted as negative sentiment, leading to inaccurate results. Such biases could unfairly label certain groups of adolescents while overlooking others.
4. **Limited Ability to Capture Complex Human Emotions**: Human emotions are nuanced, often expressed through sarcasm, humor, or mixed feelings. Sentiment analysis tools may struggle to accurately interpret these complexities, leading to oversimplified conclusions. This limits their reliability as a standalone diagnostic tool.

6. Future Work

Future research should focus on **hybrid human–AI models**, where sentiment analysis supports but does not replace therapists. Developing adolescent-specific models trained on slang, emojis, and gaming language can improve accuracy. Long-term studies are needed to track how gaming addiction and mental health evolve over time. Expanding to cross-cultural and multilingual contexts will make tools more inclusive, while **multi-modal analysis** (text, voice, emojis, gameplay data) could provide deeper insights. Ethical frameworks around privacy, consent, and transparency are essential for responsible use.

Finally, integrating sentiment analysis with schools and gaming platforms can enable early detection and preventive interventions.

7. Conclusion

Sentiment analysis offers a promising direction for understanding gaming addiction in adolescents. By analyzing linguistic patterns in social media and gaming interactions, it can provide early warnings for mental health challenges. Future work should include hybrid approaches combining AI analysis with human counseling, development of adolescent-specific sentiment models, and ethical guidelines ensuring privacy and fairness. Integration into school and college mental health programs can further improve accessibility.

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