



AntiDoomScroll: A Browser Extension for Increasing Productivity

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Abstract : In the wake of the global COVID-19 pandemic, a new behavioral phenomenon known as "doomscrolling", the compulsive and repetitive consumption of distressing or negative online content has emerged as a significant threat to digital wellbeing [1][2]. While modern screen-time tools focus primarily on mobile usage, desktop environments lack engaging, non-restrictive interventions tailored to the specific mechanics of digital newsfeeds. This paper introduces a novel Chrome extension designed to identify doomscrolling behavior through integrated time-tracking, site-specific monitoring, and scroll-pattern analysis.

Unlike purely restrictive blockers, our system implements a visual feedback loop utilizing a digital character whose emotive states change in response to user browsing. We detail the system's architecture, including its tracking engine and usage dashboard, and discuss how such "gentle nudges" provide a necessary psychological buffer against the stress, anxiety, and learned helplessness often cultivated by modern algorithmic delivery [5].

IndexTerms – Doomscrolling, Digital Well-being, Social Media Addiction, Browser Extension, Screen Time Management, Productivity, Mindful Browsing, Social Media Addiction.

I. INTRODUCTION

The rapid growth of digital technology and social media has transformed the way people interact with

information. While online platforms provide instant access to knowledge and entertainment, they have also given rise to unhealthy consumption patterns such as doomscrolling—the excessive and compulsive scrolling of negative or endless online content. This behavior not only impacts mental health, leading to stress and anxiety, but also reduces productivity and time management in daily life. The term "**doomscrolling**" gained widespread public and scholarly attention as individuals increasingly turned to digital devices to navigate the uncertainty of global crises [7][8]. It is defined as the obsessive tendency to continue scrolling through bad news, even when that news is saddening or disheartening [9][10]. Unlike standard internet use, doomscrolling is characterized by a "cycle of engagement" where the search for information originally intended to provide a sense of control over a threatening situation paradoxically results in increased anxiety and emotional drain [11][12]. For

students and working professionals, this behavior often becomes **unconscious and automatic**, leading to "stress hangovers," decreased productivity, and a significant erosion of identity clarity [13][14].

Current digital interventions are often binary, offering only hard site blocks that can trigger "reactance" or frustration in users. There is a pressing need for desktop-based solutions that promote **digital hygiene** without the psychological friction of total disconnection. Our proposed Chrome extension addresses this by tracking not just the sites visited, but the way they are consumed. By monitoring scroll velocity and session duration on high-risk domains,

the extension identifies states of mindless engagement and provides a visual "mirror" through an emotive digital character to help users reclaim their agency over technology.

II. LITERATURE REVIEW

2.1 The Mechanics and Algorithmic Reinforcement

Doomscrolling is fundamentally reinforced by the design features of modern social media platforms, such as infinite scrolling and personalized algorithms. These features are engineered to reduce natural stopping points, creating a self-reinforcing loop where the user is compelled to seek out more content even as they experience a decline in psychological well-being [19][21]. Research indicates a negativity bias in human cognition, where negative news headlines attract more attention and are clicked significantly more often than positive ones. Algorithms leverage this bias by prioritizing emotionally provocative content to maximize engagement, which effectively "hijacks" the user's attention [24][25].

2.2 Mental Health and Psychological Impacts

The psychological toll of excessive doomscrolling is documented as a cascade of negative affect. Frequent exposure to distressing visuals triggers the body's fight-or-flight response, flooding the system with cortisol and adrenaline [26][27]. Long-term impacts include Learned Helplessness, a state where individuals feel they lack control over their circumstances due to repeated exposure to uncontrollable adverse events [6][28]. This is often accompanied by Mean World Syndrome, where

users perceive the world as disproportionately threatening. Furthermore, recent longitudinal studies have confirmed that social media addiction significantly predicts an increase in doomscrolling behavior over time, suggesting that those with existing vulnerabilities are at the highest risk [31][32].

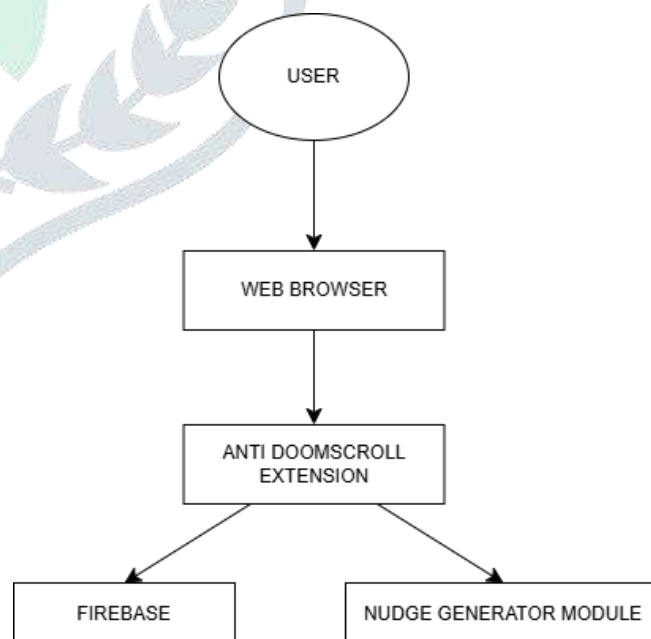
2.3 Existing Mitigation Strategies

Proposed strategies for managing this behavior range from "kindness-scrolling" (viewing uplifting content) to the adoption of "dumb phones" to eliminate the portal to the internet entirely [33][34]. While "cold turkey" methods can be effective, they often lead to relapses because they fail to build sustainable self-regulation skills. Research suggests that incremental progress and "small wins" are more effective for behavioral change. Tools that provide "data-driven mirrors," such as usage trackers and mindful reminders, are prioritized by experts to help users deprogram addictive habits without demanding complete abstinence [38][39].

III. SYSTEM ARCHITECTURE

The proposed Chrome extension is built on a modular architecture designed to balance real-time monitoring with low system overhead.

Fig.3.1: System Architecture



The system comprises four primary components:

1. Tracking Engine:

This module continuously monitors the active browser tab by recording visited URLs and capturing scrolling behavior, including scroll depth, velocity, and interaction patterns. It analyzes user activity in real time and distinguishes between normal reading behavior (slow scrolling with pauses) and doomscrolling behavior (rapid, continuous scrolling with minimal interaction).

2. Logic Layer:

Implemented as a background service worker, this module processes the raw data collected by the tracking engine. It evaluates session metrics and compares them against predefined or user-defined thresholds, such as prolonged time spent on specific domains or continuous scrolling duration. Based on this analysis, it identifies potentially problematic usage patterns and determines whether an intervention should be triggered.

3. Visual Feedback Module:

This module serves as the primary user interface of the system. It includes a digital avatar displayed within the extension popup or as a subtle on-screen overlay. The avatar dynamically changes its emotional state based on the user's browsing behavior, providing real-time, non-intrusive feedback that encourages mindful usage without disrupting the browsing experience.

4. Usage Dashboard:

The dashboard is a dedicated web interface that retrieves and visualizes stored user data. It presents insights such as browsing duration, scrolling patterns, and behavioral trends through charts and activity logs. It also incorporates features like "zombie usage" metrics and "mindful streak" rewards, motivating users to reflect on their habits and gradually adopt healthier digital behaviors.

IV. METHODOLOGY

4.1 Identification of Doomscrolling Behavior

The extension identifies doomscrolling through a multi-factor approach. It monitors sessions on a "blacklisted" directory of news and social media sites known for high-arousal content. Identification is triggered when:

- **Time Spent:** The session duration exceeds a preset limit, typically associated with emotional drain.
- **Scroll Patterns:** The engine detects a lack of meaningful "pauses-for-reading," signifying a state of mindless engagement rather than active information seeking.

4.2 Emotive Visual Feedback System

Drawing on Emotion Contagion Theory, which suggests that observing emotional cues can influence one's own affective state, the extension uses a digital character to provide non-intrusive alerts.

- **Neutral/Happy:** Displayed during productive sessions or within the first 10 minutes of browsing.
- **Sad/Anxious:** As the user enters a doomscrolling state, the character begins to look distressed. This serves as a gentle nudge, making the "invisible" habit visible.
- **Exhausted/Sleepy:** Specifically triggered during late-night usage to discourage "stress hangovers" and blue-light-induced sleep disruption.

4.3 Behavioral Nudges and Stricter Mode

The methodology prioritizes agency over restriction. The extension issues popup messages such as "Give your thumb a break" or "Consider a 5-minute walk." For users struggling with low self-control, a "Stricter Mode" is implemented. When enabled, this mode converts character mood changes into hard blocks or mandatory site-cooling periods, providing a safety net for those who find "voluntary" limits difficult to maintain.

V. RESULTS AND DISCUSSION

Theoretical analysis of this system suggests that by transforming a digital addiction into a social-emotional interaction (through the use of a character), the extension can disrupt the habitual feedback loops reinforced by algorithm-driven platforms. Instead of passively consuming content, the user becomes emotionally engaged with a responsive entity whose state reflects their behavior.

This shift introduces a layer of accountability and awareness, making the experience more reflective rather than purely consumptive.

By externalizing the consequences of excessive scrolling into a visible and relatable form, the system encourages users to reconsider their actions in real time. Additionally, by providing a visual representation of otherwise “hidden” cognitive and emotional costs—such as fatigue, reduced attention span, and stress—the tool directly addresses the phenomenon of learned helplessness that is often induced by continuous exposure to negative news cycles. In doing so, it empowers users with a sense of control and agency over their digital habits.

Unlike mobile applications, which can be easily dismissed or ignored through habitual gestures such as swiping or closing, a desktop extension operates within the user’s primary professional or academic environment, making it more persistent and contextually integrated. The Usage Dashboard further enhances this effect by functioning as a “data-driven mirror,” presenting users with clear, quantifiable insights into their browsing patterns, time allocation, and engagement levels. By visualizing progress over time, the system reinforces positive behavior through measurable improvement in what can be termed “digital hygiene.” This continuous feedback loop supports self-regulation and gradual habit formation.

VI. FUTURE SCOPE

The Anti-DoomScroll system can be further enhanced by integrating advanced technologies and expanding its functionality across multiple platforms. Future developments may include the incorporation of machine learning algorithms to provide more personalized and adaptive detection of user behavior, improving the accuracy of identifying doomscrolling patterns. The system can also be extended to support multiple browsers and mobile devices, ensuring a seamless cross-platform experience. Additionally, deeper sentiment analysis of content using natural language processing techniques can help in identifying emotionally triggering content more effectively. Social and community-based features, such as shared progress tracking or group challenges, may be introduced to

encourage collective digital well-being. Integration with wearable devices could also enable the system to consider physiological signals such as stress or screen fatigue for more context-aware interventions. Furthermore, enhancing data visualization and providing more detailed insights can help users better understand and manage their digital habits.

VII. CONCLUSION

The Anti-Doomscroll web extension project effectively tackles the increasing problem of excessive, unproductive, and often anxiety-inducing scrolling on digital platforms. By integrating features such as content filtering, time management, customizable alerts, and detailed usage analytics, the system guides users toward more mindful and controlled browsing habits. Unlike traditional browsing environments that often contribute to prolonged screen time and mental fatigue, the proposed extension prioritizes both productivity and mental well-being. The project demonstrates how technology can be designed not just for engagement, but for promoting healthier digital behavior. Through its user-friendly interface and actionable insights, the Anti-Doomscroll extension empowers users to regain control over their online activity, reduce exposure to negative content, and develop sustainable browsing habits, making it a valuable contribution toward improving overall digital health. Additionally, the system highlights the potential of combining behavioral insights with real-time interventions to create more responsible and human-centered digital tools.

VIII. APPENDIX

Draw.io

Draw.io was used to design the UML diagrams for the project.

Data Flow Diagrams (DFDs): Showed how user interactions, content monitoring, and alerts flow within the extension.

Use Case Diagrams: Illustrated the roles of users and the system in managing browsing behavior.

Entity-Relationship Diagrams (ERDs): Represented the database structure for storing user preferences,

scroll history, and alerts.

Visual Studio Code (VS Code)

Used as the development environment to write, debug, and test the extension's code efficiently, including front-end scripts and backend logic.

JavaScript: Main language for building the web extension, handling DOM manipulation, notifications, and timers.

Python 3.6: Used for backend tasks like analyzing user scroll data and generating usage insights.

Chrome Extension API

Provided the framework to build and deploy the Anti-Doomscroll extension on web browsers, enabling interaction with browser tabs, storage, and notifications.

Firebase

Used for cloud storage and real-time synchronization of user preferences, scroll logs, and analytics data across devices.

Libraries & Tools for Alerts and Analytics

Chart.js / D3.js: For visualizing user scrolling behavior and daily usage patterns.

Moment.js: For managing time-based notifications and reminders.

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