EChat: An Emotion-Aware Adaptive UI for a Messaging App

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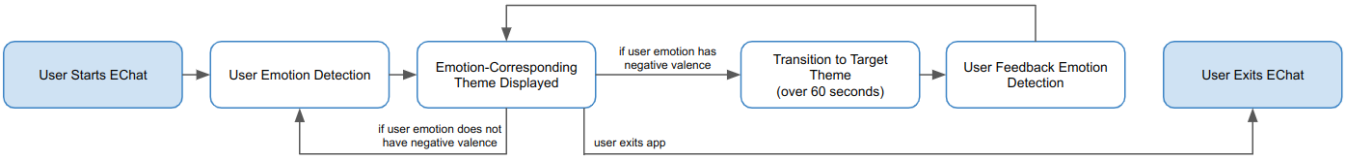

Figure 1: The EChat Pipeline

ABSTRACT

While online forums provide a convenient platform for people to interact anonymously with others who share similar interests, they have to deal with large amounts of hate speech and inappropriate content, often posted by users in the heat of the moment. This can have a negative impact on the psychological state of other forum users and moderators, who are tasked to identify and delete such content. We investigate a preventative approach to this problem with the design of EChat, a proof-of-concept augmentation to online forums that helps users attend to their emotional state. The user's current emotional state is detected using facial emotion recognition, and the aesthetics of the UI are adapted to reflect this emotion. In case of an emotion with negative valence such as anger or sadness, the UI aesthetic is gradually transitioned to one that evokes a more positive emotion. Semi-structured interviews with EChat users confirm the potential of emotion-aware design to reduce hateful content, and also highlight important design considerations.

CCS CONCEPTS

• **Human-centered computing** → **User interface design**.

KEYWORDS

Adaptive Interfaces, Social Media, Facial Emotion Recognition

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1 INTRODUCTION

Social media has brought people closer and has had a widespread influence on how we communicate and engage not only with friends and family, but also strangers and others with shared interests [7, 25]. While the anonymity of discussions on community-centric platforms such as Reddit [11] offers many benefits [31], it is also correlated with increased amounts of hateful content posted on these forums [12, 17, 23, 29]. Currently, most forums use a combination of reactive and participatory solutions to the problem including: 1) automated identification and filtering out of hateful content, 2) reliance on users to flag inappropriate content; and/or 3) employing moderators to parse posts to remove hate speech, misinformation and inappropriate content [6, 10, 15]. Given the challenges with effective and fair automatic moderation of content on online platforms [4, 10, 30], many forums tend to favor human moderators for performing these time-intensive tasks. Content moderators who censor objectionable content have to go through many disturbing posts on a regular basis, making content moderation an intensely stressful job [5] [8]. Additionally, viewing inappropriate content regularly can have a negative impact on their mental health [9, 27].

In this work, we investigate a preventative approach to the problem, i.e., an attempt to prevent people from posting hateful content in the heat of the moment. We attempt this by regulating a user's emotions in real time through manipulations of the user interface, as they participate in conversations on the forum. Our work builds on prior work that has shown the aesthetics of user interface design to have an impact on the user's emotional response [3, 28, 32]. We present EChat (Figure 1), a proof-of-concept augmentation to online discussion forums that aims to put the reader into a more positive emotional state by altering visual elements of the user interface, demonstrated here in a one-on-one messaging app. In

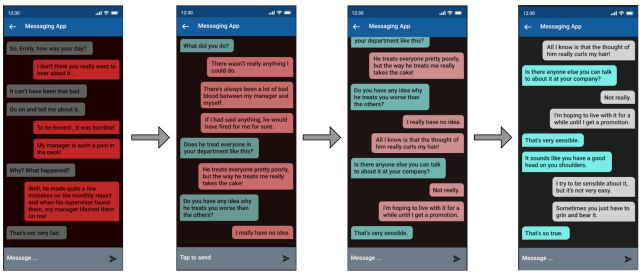

Figure 2: Angry to Neutral Theme Transition

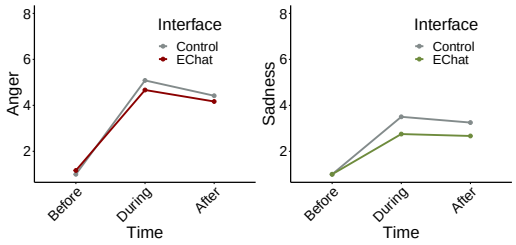

Figure 3: Average self-reported ratings for anger(left) and sadness(right) over time, by 3 users.

contrast to work that focuses on conveying the sender's emotions to the recipient of the message [1, 24], EChat enables the reader to attend to their emotions, which could help with emotion regulation [2] and by extension, cause them to pause and breathe before posting content. The idea of keeping emotions in check while using social media can be vital for reducing the amount of hurtful content posted and helping manage moderator stress levels. We did a pilot study through semi-structured interviews with three users. Feedback indicates potential of adaptive interfaces to reduce hateful content online, and also highlights some design considerations.

2 SYSTEM DESIGN AND PILOT STUDY

EChat adaptively changes the aesthetics of a messaging interface in four stages as described in this section.

Initial Emotion Detection. Images captured from the device's front-facing camera at regular intervals are used as input to Deepface [20]. Although Deepface outputs one of six emotion classes, for the purpose of our system we only consider images that belong to any of four classes - angry, happy, sad and neutral. The emotion with the highest frequency among recent images is considered to be the user's current emotional state.

UI Adaptation to Reflect Emotion. Prior work has shown that users' emotions are impacted by colors [19, 33] and shapes [13, 14, 18, 26] of the interface they interact with. We use this in our design of the EChat themes corresponding to each emotion, with more rounded chat boxes for emotions with lower arousal, and colors for each theme chosen based on Plutchik's mapping[21].

User Interface Transition. If the user's detected emotion shows negative valence [22] (e.g., anger or sadness), the aesthetics of the interface are gradually transitioned to the target emotion (neutral) over 60 seconds (Figure 2), during which time user emotion is recorded but not acted upon. For the purposes of this poster, which focuses on negativity reduction, we currently only transition from negative emotion to neutral.

Emotional Feedback. On completion of transition to the target theme, the adaptation is considered successful if the user's emotion matches the target emotion.

In the pilot study, three users provided feedback on our system in an exploratory investigation. They experienced a conversation taken from the DailyDialog [16] dataset in two interfaces - the EChat interface, and a similar interface which did not change based on emotion (i.e., stayed in the neutral theme for the entire conversation). The chosen conversation had one of the conversation partners feeling angry during the conversation, and pilot users were asked to embody this person's emotional state. This approach was used to ensure consistency in the emotions induced, since free-form conversations and their emotion elicitation would have been more difficult to control. After using both interfaces, semi-structured interviews were conducted to obtain feedback on the concept of theme transitions based on emotion, as well as the EChat system.

3 DISCUSSION AND FUTURE WORK

All users indicated that EChat changed their awareness of their emotional state and how they would respond in a conversation, because the interface aesthetic influenced their emotional state (*"The EChat interface felt more empathetic because of the color changes, and that is more likely to calm me down faster, so my responses would probably be more friendly too"*, U3). Self-reports of emotion over time also indicate a similar trend (Figure 3). Two users preferred EChat to the static interface, because *"The color of the user interface can represent my emotion"*, (U1), and *"It felt more personal, more human and less robotic"*, (U3). This suggests that aesthetic changes have the potential to influence emotional state, and that emotion-aware and responsive interface design could help improve user experience and also prevent strongly negative content on social media. Given the recent rise of LLMs potentially trained on hateful speech content from public forums, we believe EChat offers an option to help improve the overall quality of training data for LLMs.

There are, however, important considerations in this design paradigm. First, an emotionally responsive design lowers user agency, which could alter overall user experience (*"I didn't like the color changing automatically without control (over the adaptation)"*, U2). The agency-intelligence trade-off is a concern in many intelligent systems, and a possible solution is to let users decide the level of agency they want EChat to have. Next, with regards to the aesthetic adaptation of interfaces, some people might associate certain colors/aesthetics with specific applications (*"I associate specific colors with specific (social media) apps, changed colors (within the same app) is confusing"*, U2). Making aesthetic choices for different emotional themes that conform to the application's main theme could reduce this dissonance. Future studies will be needed to determine the optimal duration of each theme transition, as well as the emotional impact of changes in the UI when users communicate their own emotional state rather than just embodying emotional states.

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