Renotify: Never Miss an Important Notification

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1 INTRODUCTION

A survey conducted by CleverTap [4] in 2021 estimates that an average smartphone user in the US receives around 46 daily push notifications and that a user checks his phone about 63 times a day. These notifications consist of texts, promotions, reminders and social media notifications. It is difficult for users to manage all these notifications and much of it is usually cleared or ignored. Further, another survey by AirShip [1, 5] titled "Push Notifications & Mobile Engagement: 2021 Benchmarks" reported that the overall average push notification reaction rate for Android is around 4.6% and 3.4% for iOS. Interacting with and keeping track of a high volume of notifications can be an overwhelming task for users, as evident from our initial user interviews and observations.

Today, users are bombarded with notifications from social media apps, promotions, instant messaging and payment portals. Our user interviews revealed that users are prone to clearing notifications en masse, leading to loss of valuable notifications hidden among lesser critical notifications. To manage notifications from preferred apps, users are required to traverse multiple applications to engage with notifications and take appropriate actions, resulting in a cognitive overload. It also makes it a challenge to keep track of promotional notifications like discount coupons and avail them while shopping online, often leading to wastage of deals.

To propose an optimal solution, we sought the average user opinion towards notifications and engagement. Accordingly, we came up with some key research questions to be addressed to users during initial user interviews. These include factors affecting the engagement rate of notifications, influence of promotional notifications on buying behavior, factors that affect the relevance of notifications to users in terms of the timing and appeal, and user behavior around reading and clearing notifications. User reactions and feedback on our research questions helped us to formulate and refine designs to capture user requirements.

Our proposed solution is Renotify, a combination of a mobile application and widget offering, which captures notifications in a non-intrusive way keeping in mind the privacy of personal messages. This is the first application of its kind which reimagines the notification interaction experience as a widget over just a conventional app. Our initial prototype offering focuses on promotional notifications. These include coupons, store opening deals and special delivery times. Renotify was designed based on the outcome of our initial user interviews and observations after identifying user behavior, preferences and bottlenecks.

One of the guiding design principles was to give the user control of how they access notifications instead of being inundated with notifications leading to many users resorting to suppressing notifications or activating the Do Not Disturb mode for their devices, undermining the very purpose of a notification.

Our aim with Renotify is to deliver users with notifications that are relevant and in a way that puts the user in control of the experience of dealing with notifications.

2 USERS

Our target audience consists of people who receive more than the average number of daily push notifications (46 per day) [2]. For this project we sampled user demography in the age range of 16 – 30 years. The potential users were identified among classmates, acquaintances, friends and family in the US who fall within this demography.

Accordingly, we involved participant users early on in the initial stages of our project to gather their perspectives on the current notification experience and to seek feedback on our proposed solution. We recruited diverse participants representing a cross-section of educational backgrounds, cultural affiliations and gender identities.

Our users were generous in sparing time for user interviews and usability tests [6]. We incorporated the initial feedback received during the research goal evaluation process and user observations to iteratively refine the design for our prototype. These were then included in our high-fidelity prototype which was validated by users during the usability tests.

3 PROPOSED APPROACH AND UI

Our objective is to display notifications in a prominent way to promote engagement while reducing user frustration at the same time. Users complained about an overflowing notification panel during our user interviews. In order to tackle these issues, we adopted widgets. Accordingly, our solution consists of two widgets: a calendar and a list view. These widgets display promotional notifications in an accessible manner and allow the user to browse notifications on demand.

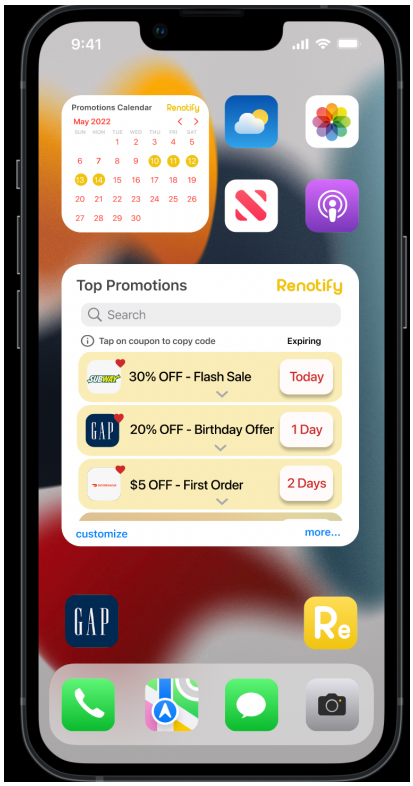

Figure 1. Widgets on the homescreen

The above image shows the list widget on the home screen (see Figure 1). The user can scroll through the list widget that displays the expiring date and select the desired coupon from the list. Once clicked, the coupon code is copied onto the clipboard, which can then be pasted during the checkout. This prevents the user from having to open a separate application or search through their past notifications to track promotions, thus saving time and money. Additionally, users can set various preferences on their widget across multiple categories such as clothing, food and so on. The widget design idea was well received and evaluated to be successful as users were able to complete each of the tasks assigned within a microsession.

The solution also provides an application which enables users to search and filter promotional notifications so that users can view the relevant data and avoid anxiety about getting overwhelmed with a large number of notifications.

Users can apply filters like discount range, date range, category, brands and also leverage the sort by function which includes discount range, expiry and featured.

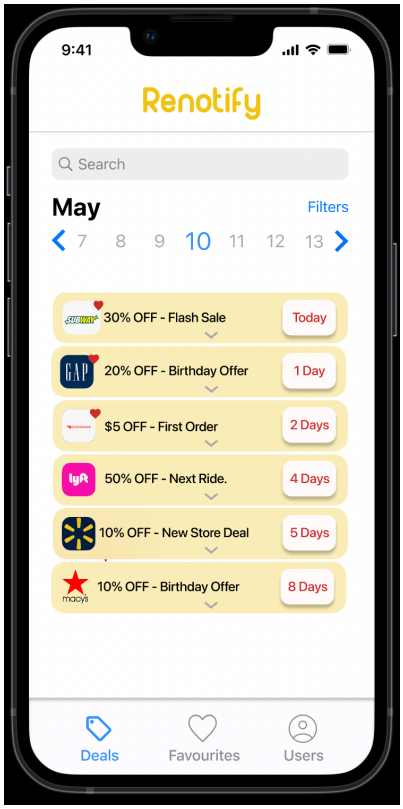

Figure 2. Renotify app view

We interviewed 4 participants from various ethnicities, age groups and regional demographics. We also included participants using both Android and iOS smartphone devices for a more reliable evaluation.

Based on the positive reviews and feedback from our usability test subjects, we made iterative improvements to our widget prototypes and came up with a version that was favorably received. Users appreciated the *aesthetic and minimalist design* [3, 7, 8] of the application and how conveniently they were able to figure out their way through the widgets and app. Users were able to efficiently complete all the assigned tasks and thus attributed to the *flexibility and efficiency of use* [3, 7, 8]. The app was well-received by all the participants as they found a genuine need for such an app that manages promotional notifications centrally. The

key takeaways from the session were that the need for an app like Renotify was evident, the users felt that the app saves a lot of time and money, and the user interface worked flawlessly with a participant having visual impairment (color blindness).

4 ITERATION

The most important fix we would implement is to improve the readability of promotional notifications which includes information about the deals and the expiry date. This is based on consistent feedback received from all our users and the instructor. Further, we are planning to tackle the problem of information overload in the widgets by providing an expandable card so that the collapsed view contains only important information. This expand and collapse feature will allow the users to manage the content that is displayed, thereby providing more control over the information they need to read. We will also work on adding a search feature to the list widget which will aid the user in looking up a specific promotion without opening the application. This will allow users to tap into their knowledge of a familiar feature. Lastly, we plan to use annotated help text as signifiers wherever users felt the next step was ambiguous. This is expected to go a long way in improving the usability of the application with some additional effort.

5 USAGE SCENARIO

Our app has two widgets: a calendar and a list view. Also we have a full-fledged mobile application which lists out all the promotional notifications. For the purpose of this example we consider a scenario for the usage of the list widget. The following setup is assumed - the user has installed the app, configured the widget on the home screen, set preferences for the app and marked GAP, Subway and DoorDash apps as favorites. The scenario is as follows - it is the user's birthday week. Their notification panel, emails, messages are swarmed with exclusive birthday promotions. The user decides to buy a pair of jeans for their birthday. The user unlocks their phone and checks the Renotify list widget. The widget has a list of all the promotions based on their preferences, favorites and ranked based on their expiry. The user finds a deal from GAP which is their preferred brand of clothing. They tap on the arrow which expands the deal to display more information about the deal. The user likes the deal and proceeds to tap on the promotion. The coupon code is copied onto the clipboard. The user pastes the copied code on GAP's checkout screen to avail the offer.

The video demonstration for the above mentioned scenario is available at
https://media.oregonstate.edu/media/t/1_ar9no6uy

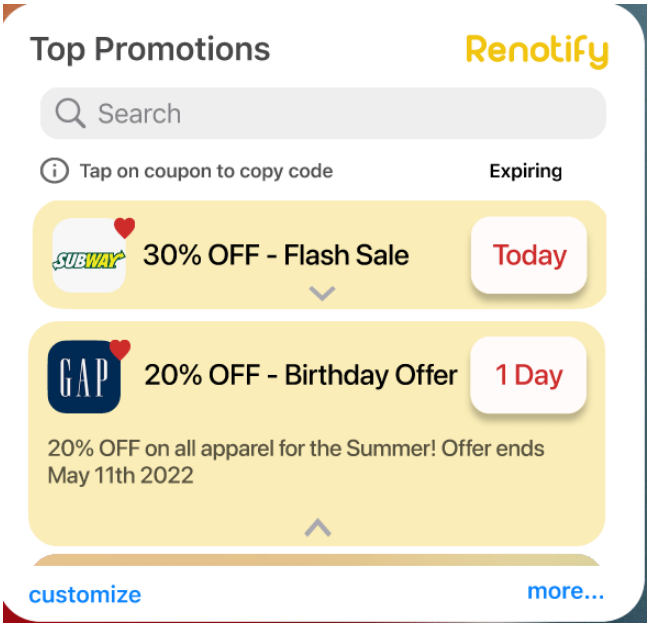

Figure 3. List Widget

Figure 3 shows the expanded view of the coupon on the widget.

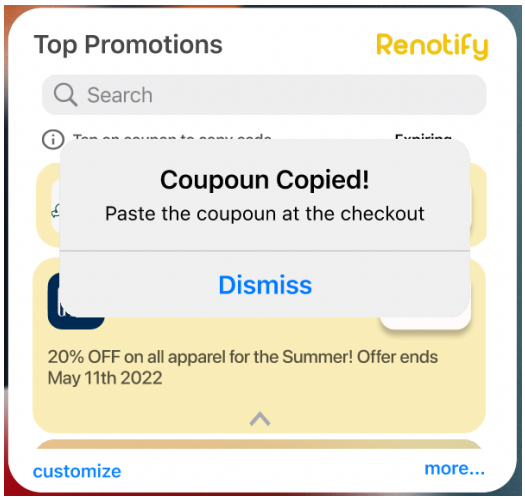

Figure 4. User feedback on selecting a coupon.

Figure 4 shows feedback given to the user in the form of a dialog box after the user taps a coupon.

6 DISCUSSION

Notifications are very insightful since they describe a lot about a user's smartphone usage patterns. For instance,

users receiving a lot of promotional notifications indicates that they are likely to be active online shoppers. Another use case involves payment related notifications from bank and credit applications. Using these notifications, we can provide a holistic view of a user's expenditure across their accounts and analyze spending habits. In the process of developing Renotify, we understood that users prefer to be reminded rather than recall. One of our aims is to make the process of finding exclusive promotions as quickly as possible. To achieve speed, we introduced widgets that help achieve user goals in a microsession [2]. To enhance speed further, we will need to implement machine learning to identify individualized user preference in order to present users with more customized and relevant information.

In retrospect, we realized that the calendar widget was not able to achieve the same engagement as the list widget. There is scope for the calendar view to be included in the application itself. With regard to user observation and evaluation, we want to extend our sample user set further to record how senior citizens engage with notifications. Expanding the target population to a larger audience can bring more insights about the usage patterns of notifications.

For the scope of this project, we worked on promotional notifications only. We learnt that users demonstrate different behavior towards different categories of notifications as they accord different levels of importance to each category of notifications. One advice to future developers of Renotify is that it is important to prioritize notifications based on their ranking of importance. We are aware of the growing concerns of Artificial Intelligence (AI) with regard to user privacy. Notifications sometimes can contain sensitive information, such as payment notifications, personal messaging and even social media notifications. We need to be able to develop features which prioritize user privacy and preferences with their data.

We want to reimagine the way users engage with notifications. We envision Renotify to replace the traditional notification center, with the smartphone becoming more powerful and supporting more applications. The existing notification center needs to be updated with growing usage of applications. In future, Renotify will be able to handle all categories of notifications and have a provision to be tailored to users' preferences using machine intelligence for a more personalized experience.

7 CONTRIBUTION STATEMENT

Post the usability testing phase, the team has been working on enhancements and oral presentation. The consolidation of feedback and evaluations as well as documentation were taken up by Anush Kumar and Apoorva Mahale, and changes were implemented by Supreeth Avadhani. The presentation was drafted by Anush Kumar and Apoorva Mahale. The demonstration was worked on by Supreeth Avadhani and Tejashree Rajkarne. The final presentation was delivered by Anush Kumar and Supreeth Avadhani during class. We as a team have worked on this final report. We want to thank our instructor and TA for their continuous guidance and feedback throughout the course and this project.

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