Scrubtable & Persuasive Push-Notifications

Kieran Fraser, Bilal Yousuf, Owen Conlan
ADAPT Centre, Trinity College Dublin
Content

- Motivation
- Problem Statement
- Design
- Implementation
- Results
- Conclusion
- Future Work

Unnecessary notifications may dramatically decrease productivity (Iqbal, S. T. et al, 2010).


Large no. of incoming notifications = negative user emotions (Sahami Shirazi, A. et al, 2014).
Motivation
Motivation

LEANPLUM
swerve
braze
Motivation

1. How can we make persuasive push-notifications **scrutable**?

2. How can we **transparently** generate persuasive push-notifications that benefit the end-user, but also maximise **Click-Through-Rate**?
Authority (P1)
People follow and respect requests made by an authority

- Priority
- App
- Contact relevant to context

e.g. RyanAir offers at the airport
**Scarcity (P2)**
People will place higher value on something which is rare

- Notification features which appear less frequently rank higher e.g. subject, category
Liking (P3)
People will follow what they like

- Previously liked feature content, taking the action ‘opened’ as an indicator of ‘liking’
Social Proof (P4)
People will do what they see their peers doing

- Similar notifications opened by all other users
Commitment & Consistency (P5)
People tend to follow through on their word and uphold behaviours associated with their own self-image

• Habits toward notifications by individual user
Reciprocity (P6)
People feel obliged to return a favour

- App last used

e.g. if content was recently consumed in an app, the user acknowledges they received value and are more likely to be persuaded to open a notification from it.
Implementation

1. Data Collection

<table>
<thead>
<tr>
<th>15</th>
<th>31,239</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants over 3 months</td>
<td>Notifications Logged</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>291</th>
<th>4,940</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire Responses</td>
<td>Smartphone Usage Logs</td>
</tr>
</tbody>
</table>

WeAreUs (Unreleased)

This app is in development. It may be unstable.
This app is compatible with all of your devices.

Add to Apple
Install

A World Leading SFI Research Centre
Implementation

![Chart showing average notifications per day for different users. The chart includes bars for users 0 to 10, with varying heights indicating different notification counts.](www.adaptcentre.ie)
Implementation

The diagram shows a bar chart with two categories: 'Opened' and 'Dismissed'. The x-axis represents 'user' from 0 to 10, and the y-axis represents 'Avg. per day (%)' from 0.0 to 0.6. The chart compares the average daily percentage of actions opened and dismissed across different users.
2. Scrutable & Persuasive

- *Cialdini’s Principle's of Persuasion* extracted and visualised empowering user awareness of design hooks within notifications (e.g. P1 = Authority Principle)
3. Synthesis

- **Generative Adversarial Network** training converges using the *WeAreUs* data set. Then used for generating synthetic notification samples.
Authority (P1)
People follow and respect requests made by an authority
Scarcity (P2)
People will place higher value on something which is rare
Social Proof (P4)
People will do what they see their peers doing
Feature Importance

*Mean Decrease Impurity* to identify features best when predicting CTR
Train on Real, Test on Synthetic RMSE F1 scores differ in range 0.02 – 0.07 indicating *synthetic data imitates real world data.*
Personalised & Persuasive Push-Notifications
Using the Generative Model to create persuasive push-notifications on demand & at scale
Novel Contribution

1. Method of extracting & scrutinizing persuasiveness of push-notifications using Cialdini’s 6 principles of behaviour

2. Method of generating synthetic personalized & persuasive push-notifications, on-demand, and at scale
Future Work

1. *OpenAI Gym* environment (Gym-Push)
2. Notification Entity Embeddings
3. Improved persuasive transparency and control
Thank you.

Questions?

Email:
kieran.fraser@adaptcentre.ie