Scrubtable & Persuasive Push-Notifications

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Growing number of notifications **pushed** at users (Pielot, M. et al, 2014).

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

Notification delivery **not smart** (Mehrotra, A. et al, 2016).

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

- 15 Participants over 3 months
- 31,239 NotificationsLogged
- 291 Questionnaire Responses
- 4,940 Smartphone Usage Logs
Implementation

![Bar chart showing average notifications per day for different users. The x-axis represents User numbers from 0 to 10, and the y-axis represents Avg notifications per day ranging from 0 to 100. The chart includes bars in red, orange, green, blue, and purple colors.]
Implementation

The chart shows the average per day (%) for different users. The y-axis represents the percentage of actions opened or dismissed. The x-axis represents the user number. The chart compares the number of actions opened to the number of actions dismissed for each user.
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
Results

Scarcity (P2)
People will place higher value on something which is rare

![Bar chart showing values for different categories.]

- status
- unknown
- sys
- email
- msg
- progress
- service category
- transport
- event
- call
- alarm
- err
- recommendation reminder
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?

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