



Scrutable & Persuasive Push-Notifications

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



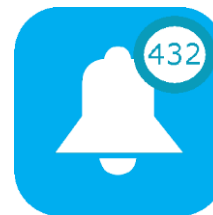
Growing number of notifications **pushed** at users (Pielot, M. et al, 2014).



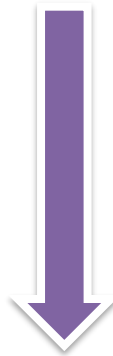
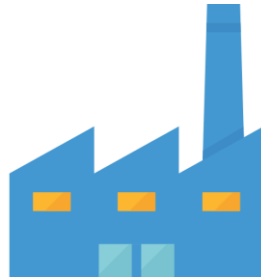
Notification delivery **not smart** (Mehrotra, A. et al, 2016).



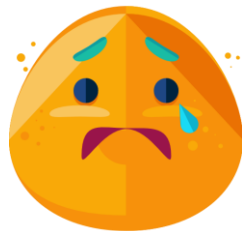
Unnecessary notifications may **dramatically decrease** productivity (Iqbal, S. T. et al, 2010).

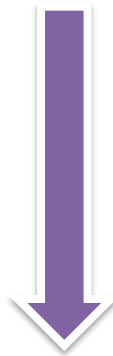
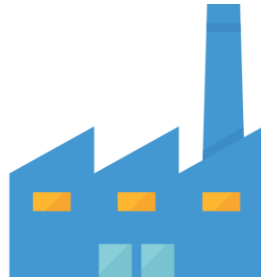


Large no. of incoming notifications = **negative user emotions** (Sahami Shirazi, A. et al, 2014).

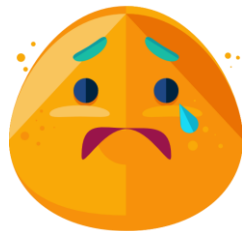


LEANPLUM
pushcrew
braze





Artificial intelligence.
Human language.
Awesome.



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

Notifications
Logged

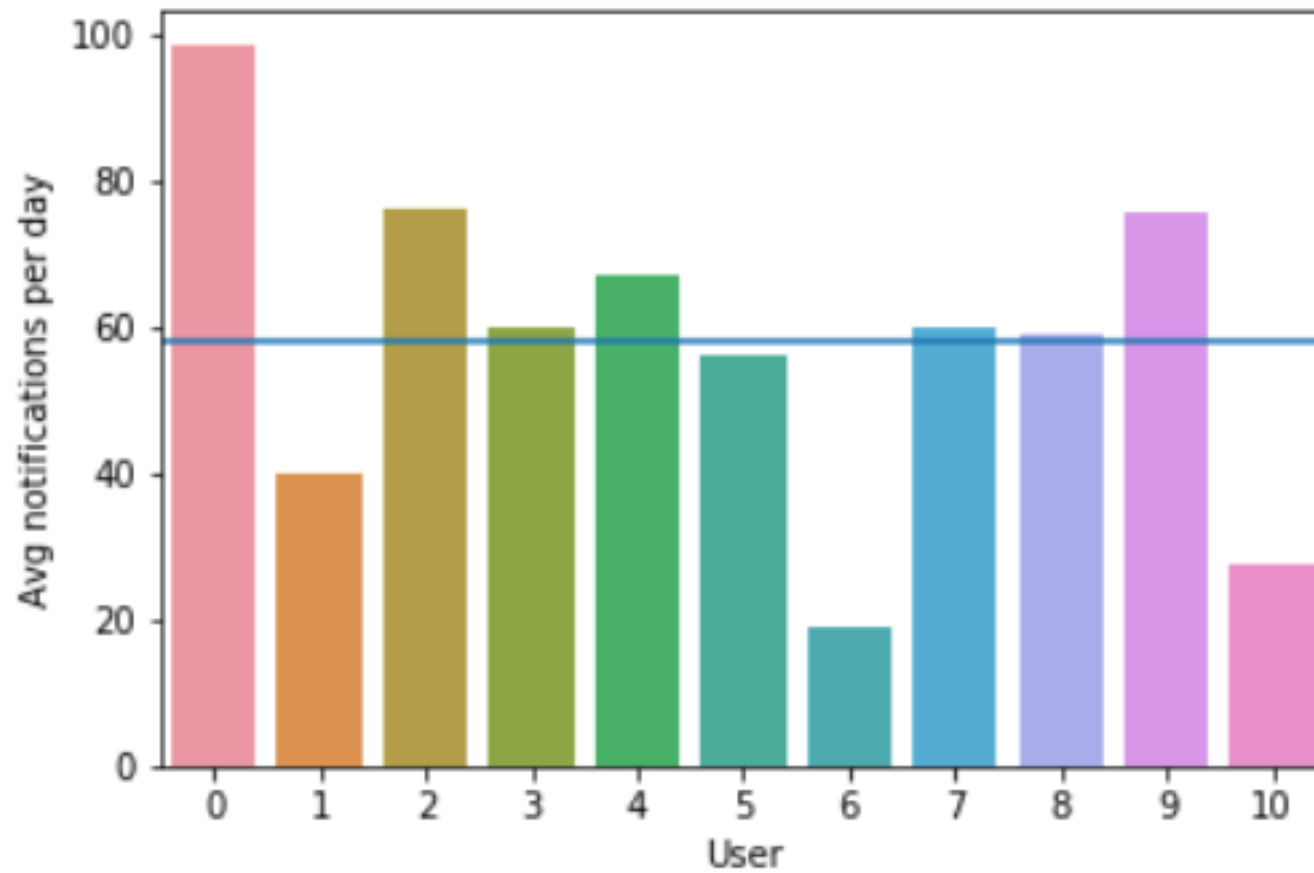
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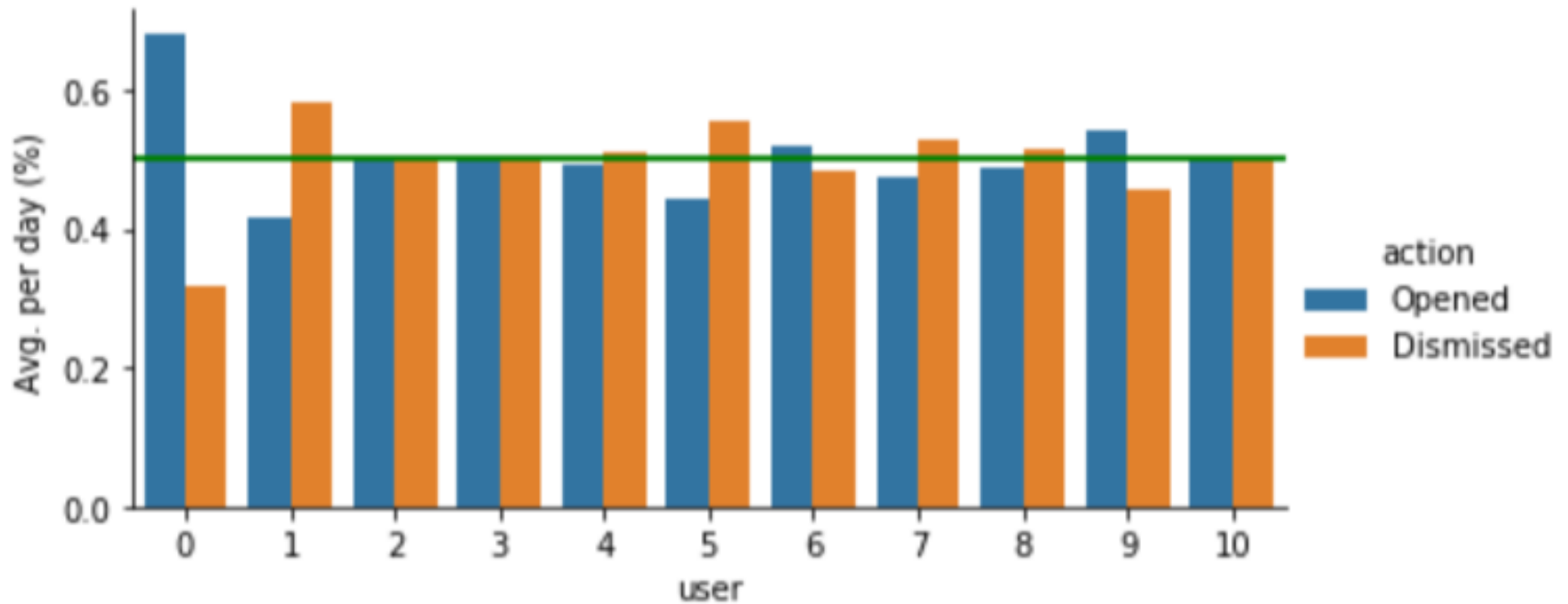
Questionnaire
Responses

4,940

Smartphone
Usage Logs

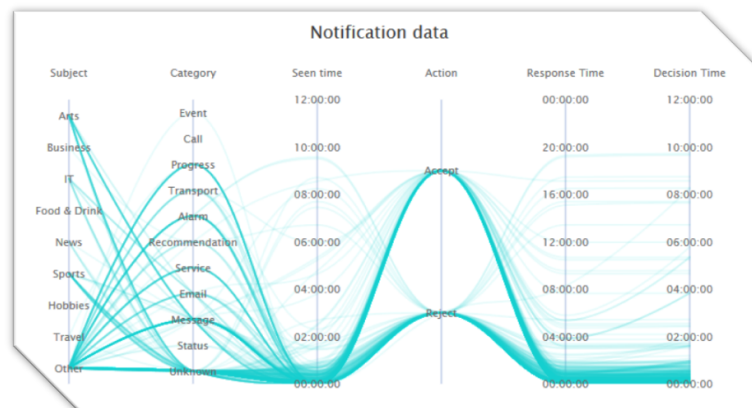
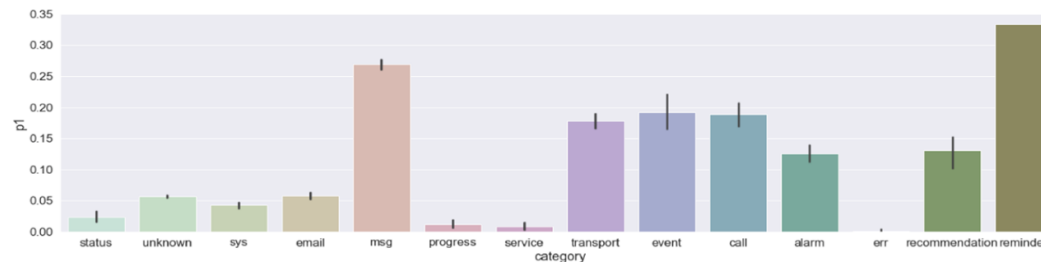






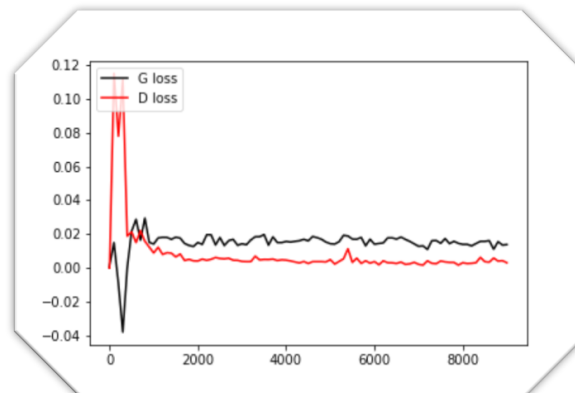
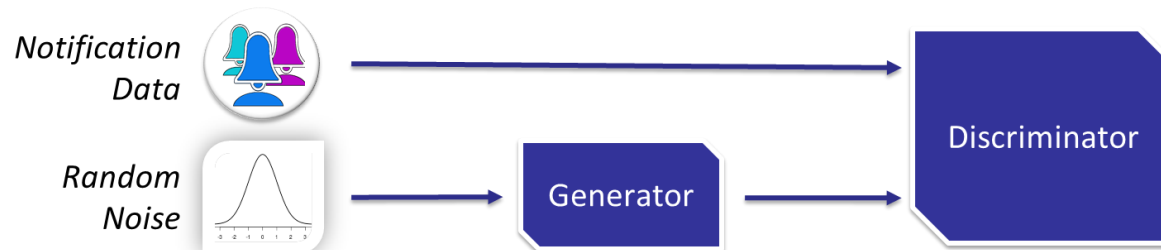
2. Scrutable & Persuasive

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



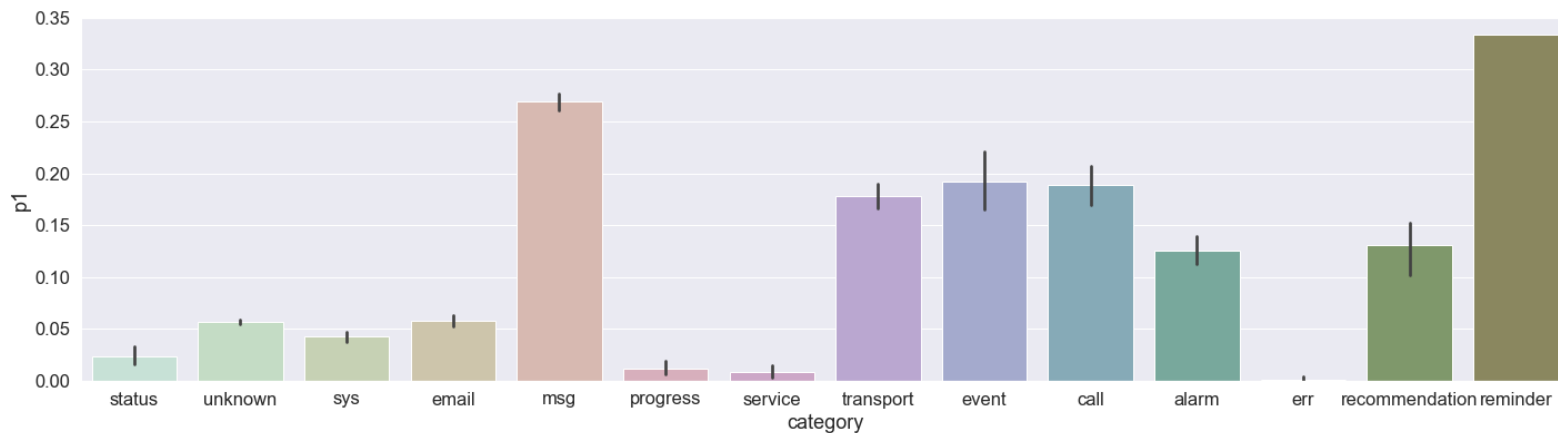
3. Synthesis

- *Generative Adversarial Network* training converges using the *WeAreUs* data set. Then used for generating synthetic notification samples



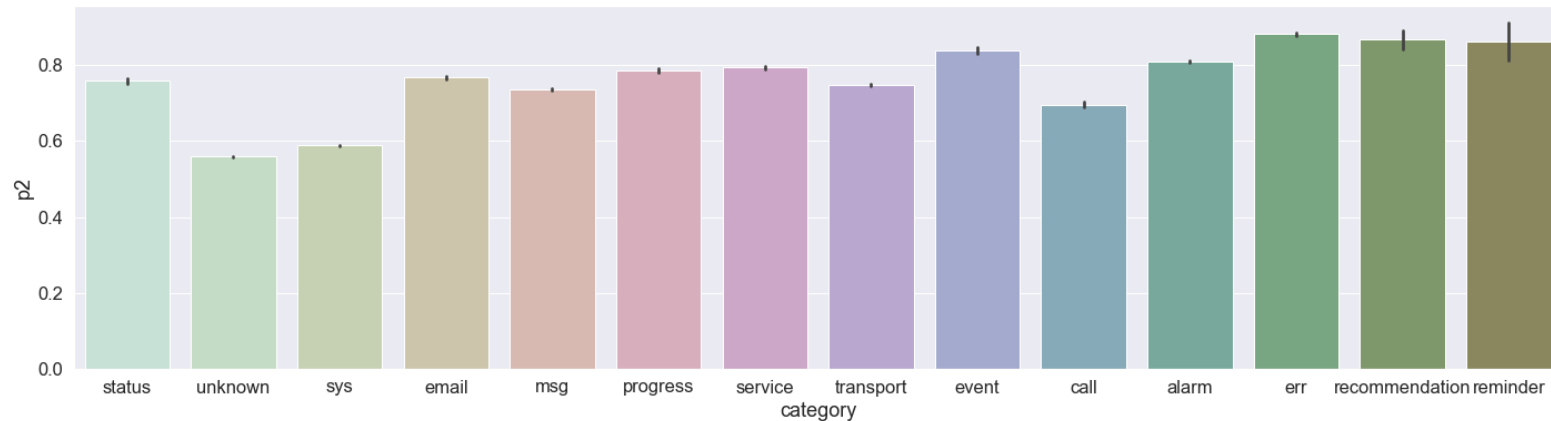
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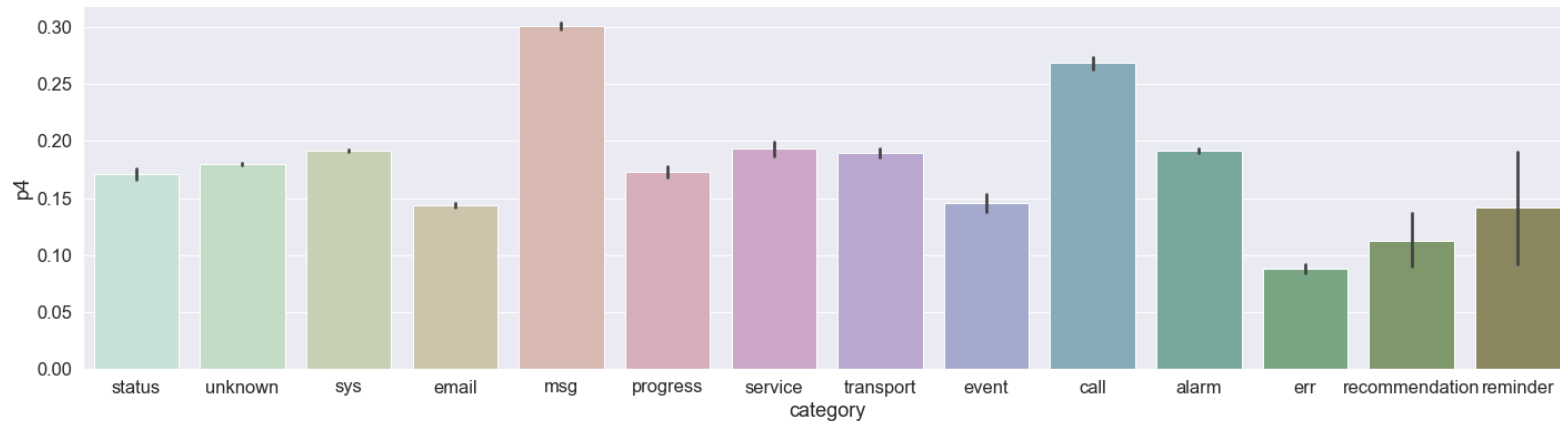
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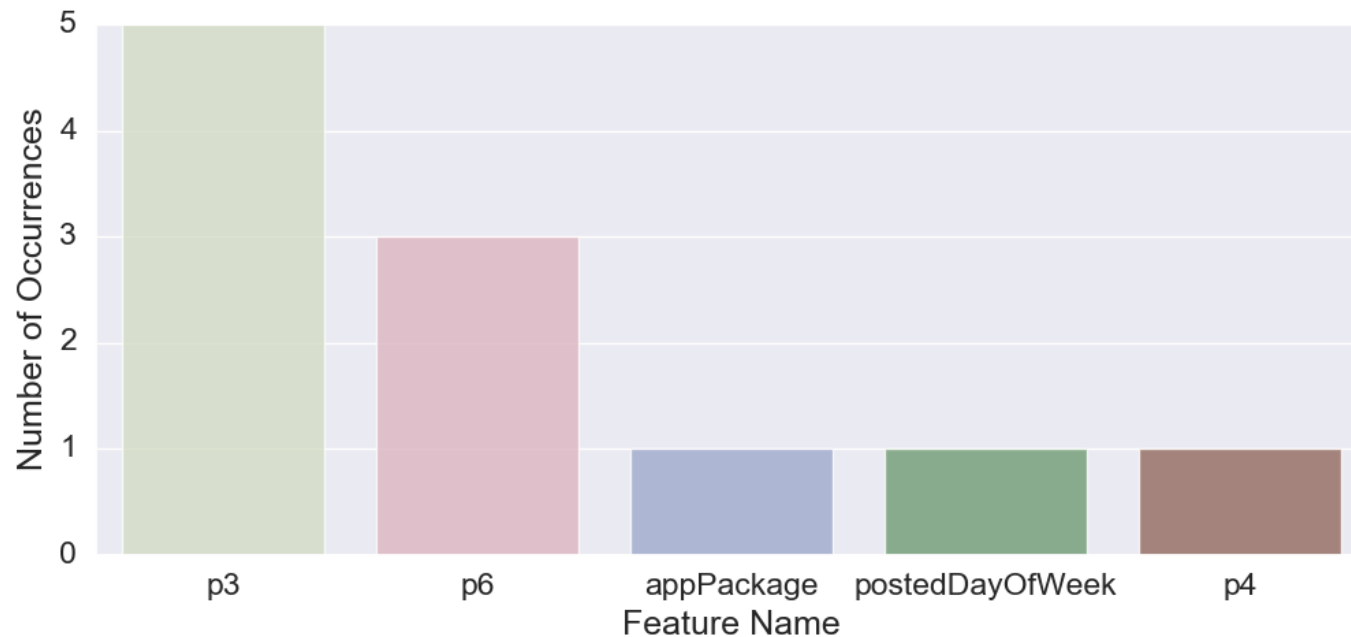
Social Proof (P4)

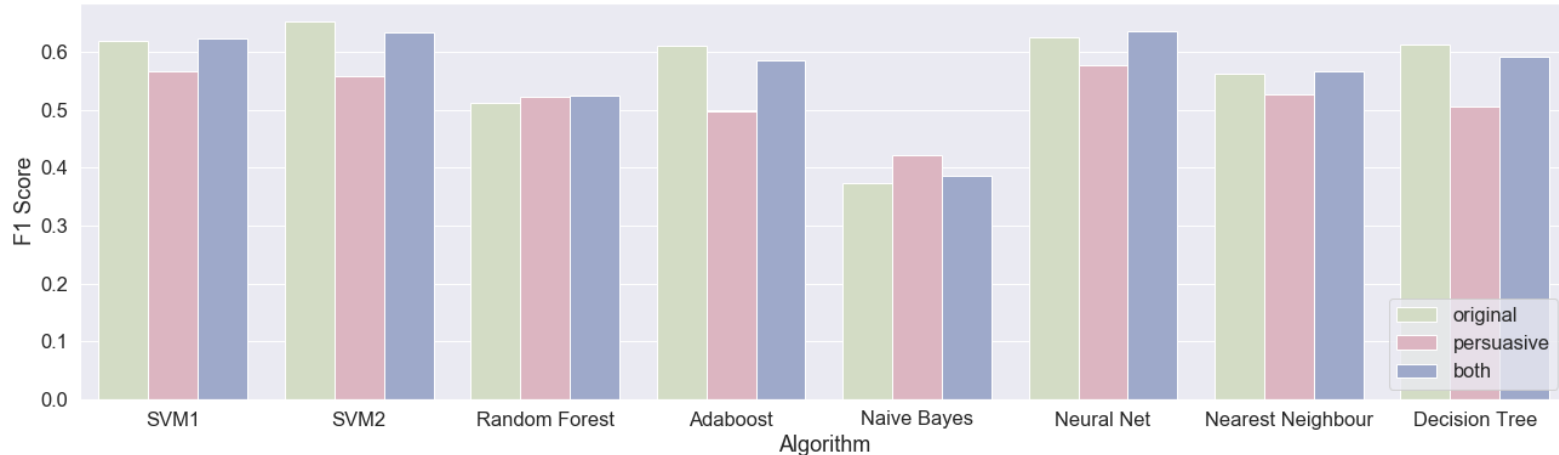
People will do what they see their peers doing



Feature Importance

Mean Decrease Impurity to identify features best when predicting CTR

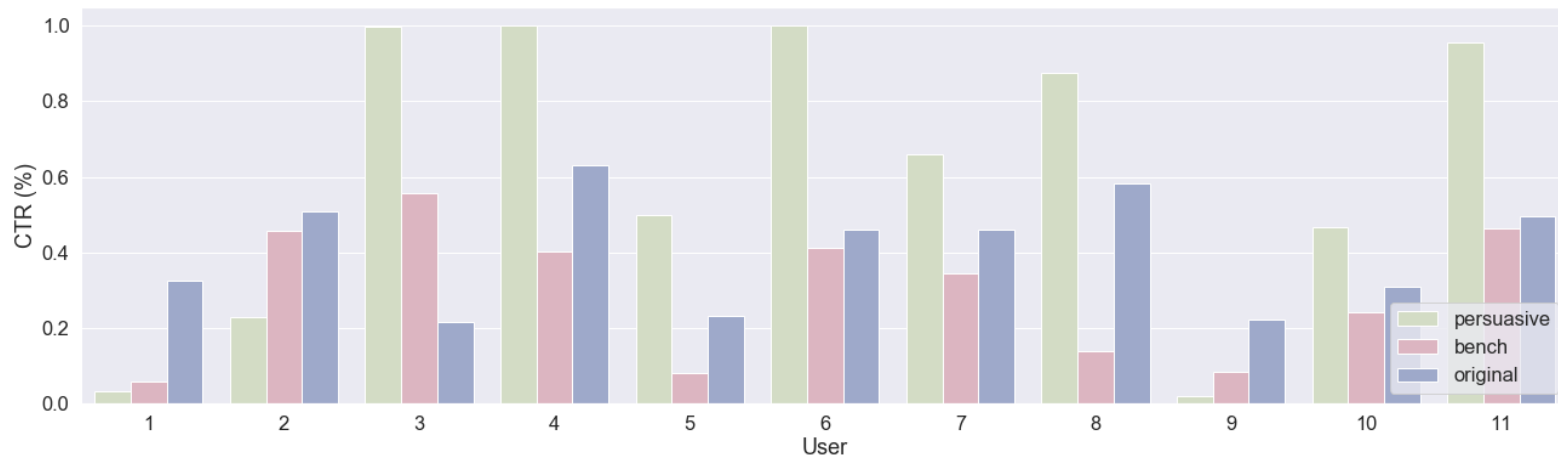




Train on Real, Test on Synthetic RMSE F1 scores differ in range 0.02 – 0.07 indicating **synthetic data imitates real world data.**

Personalised & Persuasive Push-Notifications

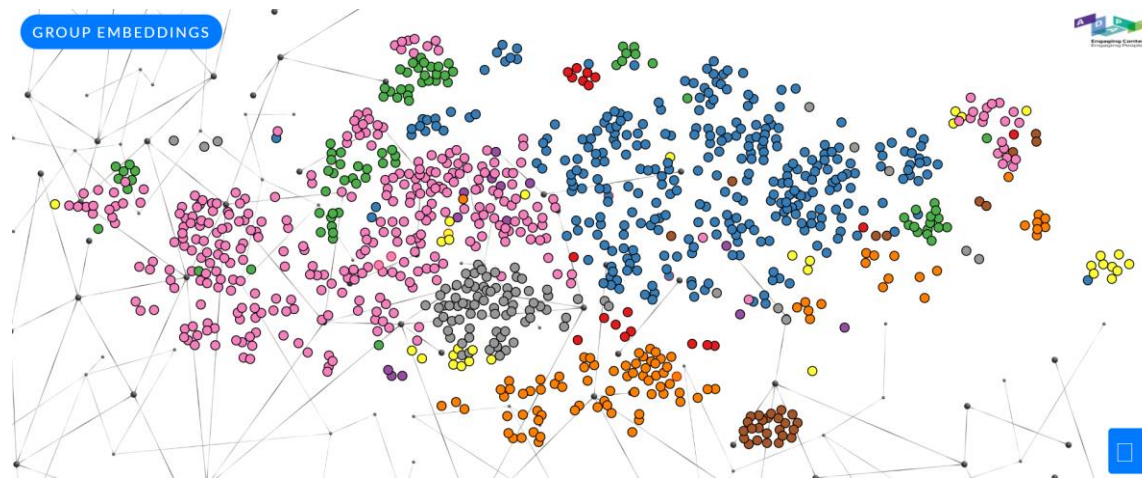
Using the Generative Model to create persuasive push-notifications on demand & at scale



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

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



Thank you.

Questions?

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