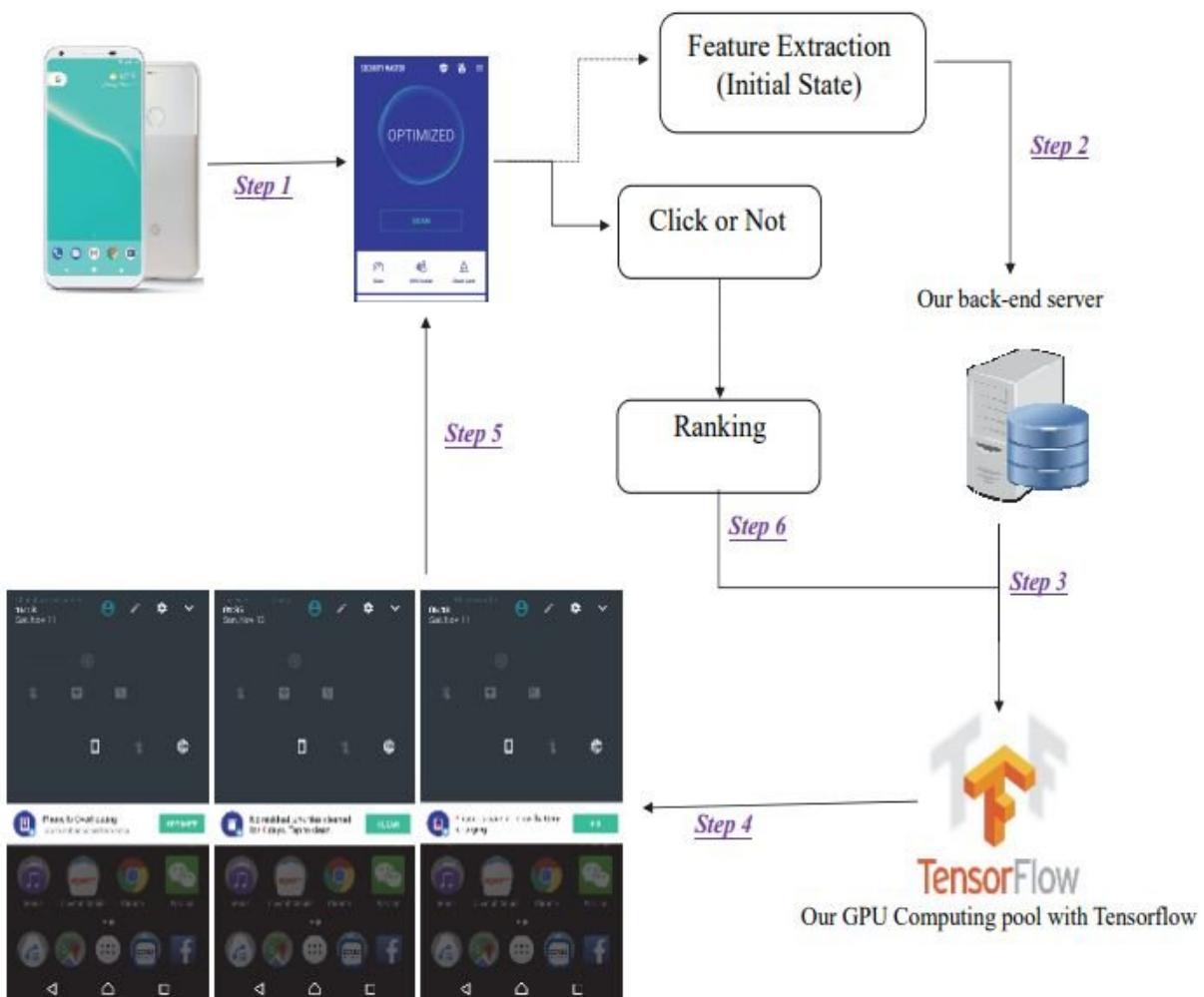


# Using AI to make push-notification apps smarter

March 21 2018, by Bob Yirka



The system architecture and flow chart. Credit: arXiv:1803.00458 [cs.CY]

A pair of researchers in Taiwan has developed an artificial intelligence system to filter smartphone push notifications, thus allowing only those the user wants. In a paper uploaded to the *arXiv* preprint server, TonTon Hsien-De Huang and Hung-Yu Kao describe their system and how it was developed and tested.

Push notifications are messages users receive from applications. The problem is that such apps are not typically imbued with much in the way of intelligence. They send alerts without regard for usefulness or urgency, which causes many users to ignore or disable them. In this new effort, the researchers sought to rectify this problem by introducing AI into the equation, courtesy of an algorithm they developed to run on a deep learning network.

The pair call their system "Clicksequence-aware deeP neural network (DNN)-based Pop-uPs recommendation," which they have wisely reduced to C-3PO. The system was taught how to recognize notification information via data from the Taiwanese-based internet company Leopard Mobile. The system analyzes a user's browsing history, their [shopping habits](#), etc., to learn more about the apps that send notifications. It then looks at the user's history of clicking on notifications to see which they found important enough to read. After that, the system starts filtering notifications based on what it has learned, hopefully allowing through only those that a user actually wants.

In testing the system with several Taiwanese apps, the researchers report that it was able to predict which notifications users wanted to see. They note also that the current system is available for use right now by interested parties, though it is not clear just yet if phone makers are interested.

The researchers plan to continue their work—they want to make their system more efficient by reducing the number of steps required to make

filtering decisions. Also, they plan to look into whether it could be adapted for use by advertisers looking to better target their customers.

**More information:** C-3PO: Click-sequence-aware Deep Neural Network (DNN)-based Pop-uPs RecOmmendation, arXiv:1803.00458 [cs.CY] [arxiv.org/abs/1803.00458](https://arxiv.org/abs/1803.00458)

## Abstract

With the emergence of mobile and wearable devices, push notification becomes a powerful tool to connect and maintain the relationship with App users, but sending inappropriate or too many messages at the wrong time may result in the App being removed by the users. In order to maintain the retention rate and the delivery rate of advertisement, we adopt Deep Neural Network (DNN) to develop a pop-up recommendation system "Clicksequence-aware deeP neural network (DNN)-based Pop-uPs recOmmendation (C-3PO)" enabled by collaborative filtering based hybrid user behavioral analysis. We further verified the system with real data collected from the product Security Master, Clean Master and CM Browser, supported by Leopard Mobile Inc. (Cheetah Mobile Taiwan Agency). In this way, we can know precisely about users' preference and frequency to click on the push notification/pop-ups, decrease the troublesome to users efficiently, and meanwhile increase the click through rate of push notifications/pop-ups.

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