Follow My Recommendations : A Personalized Privacy Assistant for Mobile App Permissions

Bin Liu, Mads Schaarup Anderson, Florian Schaub, Hazim Almuhimedi, Shikun Zhang, Norman Sadeh, Yuvraj Agarwal, Alessandro Acquisti

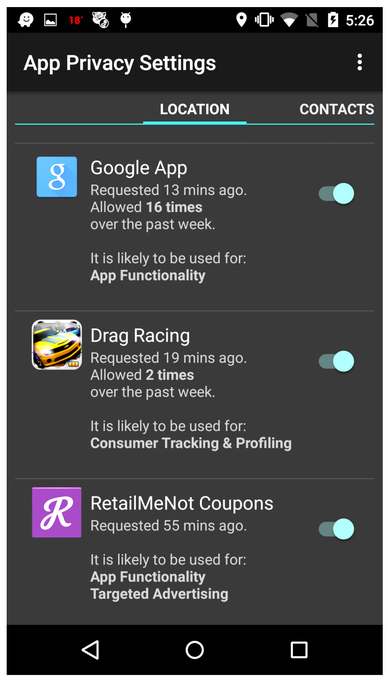
{bliu1, manderse, fschaub, hazim, shikunz, sadeh, yuvraj.agarwal}@cs.cmu.edu, acquisti@cmu.edu

Motivations

- Smartphone users need app privacy controls
- The number of permissions can be so **overwhelming** that many users are unable to adequately manage their permission settings
- Users' app privacy preferences are quite **diverse**.
- A personalized privacy assitant could help by recommending permission settings to the users.

Privacy Settings Data Collection

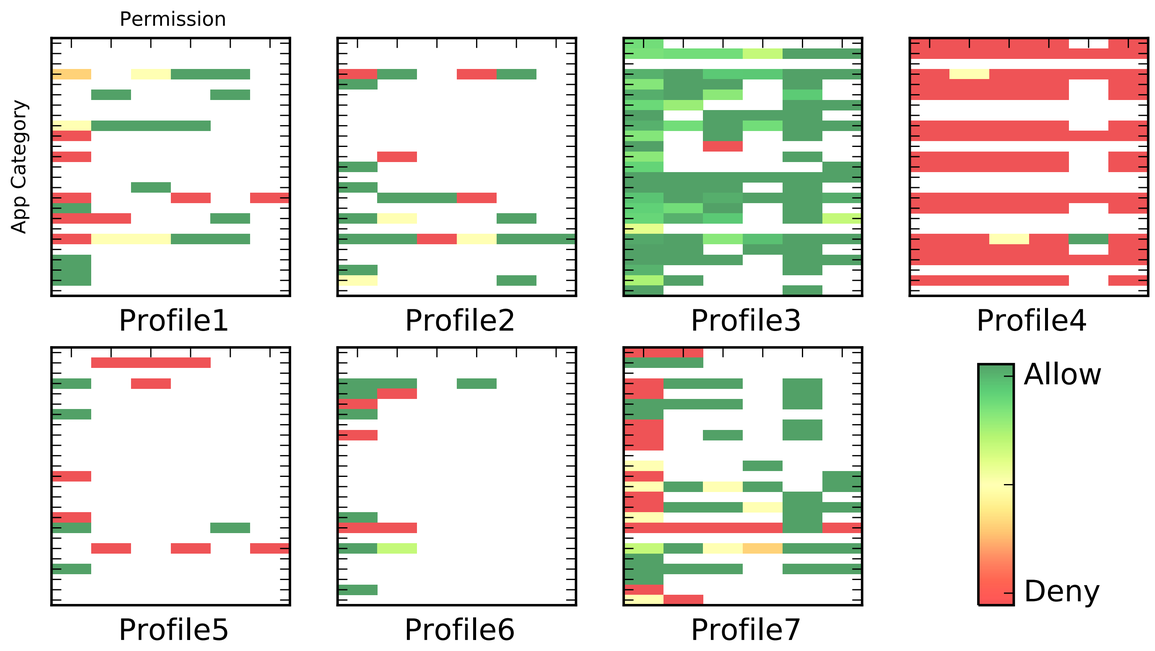
- We conducted a field study (n=84) to collect privacy preferences.
- We modified and extended the Android permission manager App Ops. The manager additionally shows actual frequency and the potential purposes of permission accessed by an app.
- We designed an enhanced privacy nudge to increase privacy awareness and motivate users to review and adjust their privacy settings



Personalized Privacy Assistant

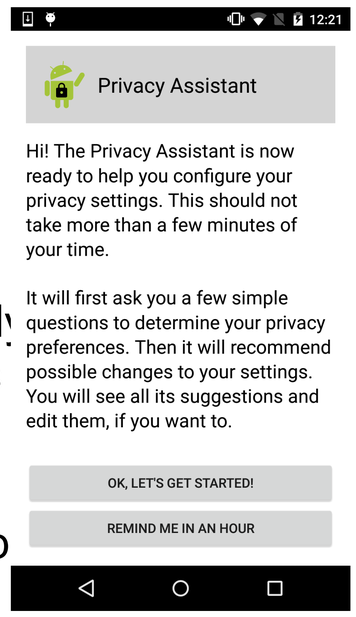
Generating Privacy Profiles from the training data

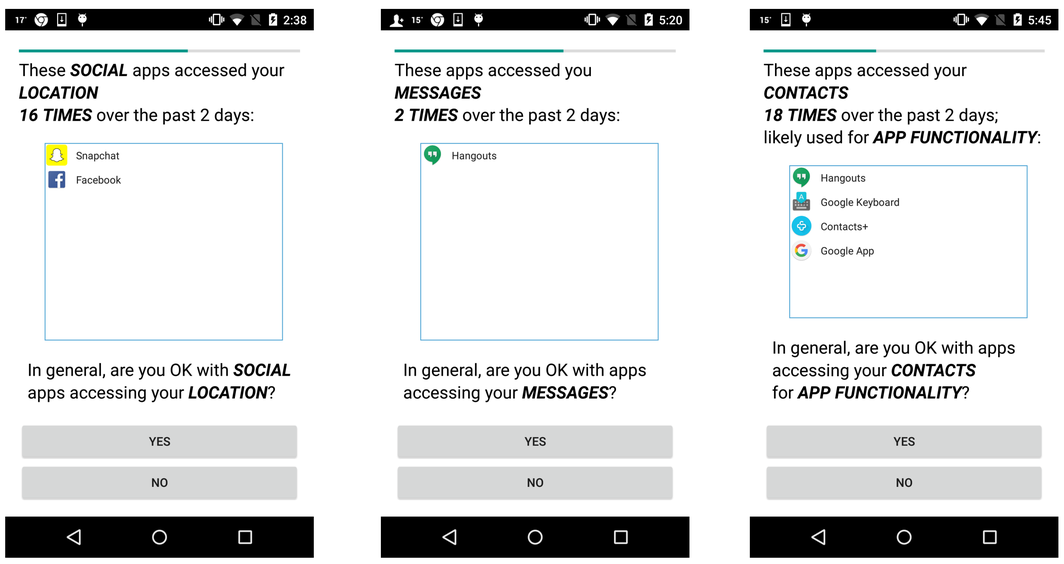
- We quantify each users' preference as a 3-dimensional tensor of aggregated preferences (app category, permission, purpose). We applied weighted PARAFAC Tensor factorization to impute the tensor using know data. Then we generated the profiles using hierarchical clustering (K=7, Complete Linkage, Cosine distance)



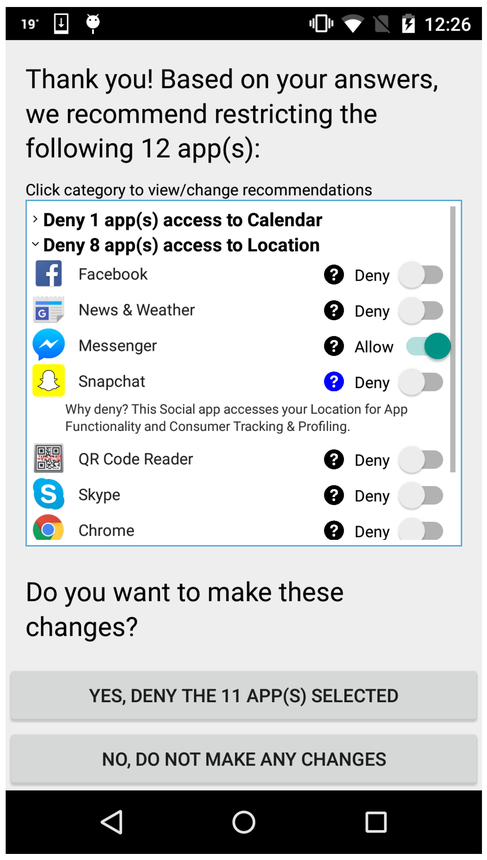
Interactive Profile Assignment Dialog

- We generate questions for users in order to capture their app privacy preference and estimate their privacy profile assignment.
- The questions are generated on-the-fly by context, which is the installed apps on the specific device.
- There are 3 types of questions about users' aggregated preferences on app permissions.



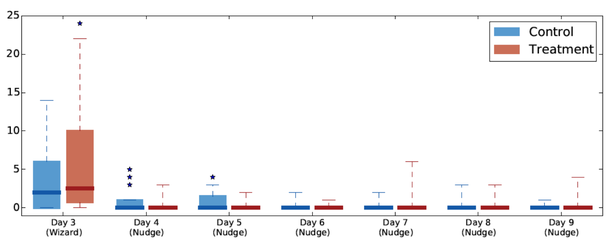


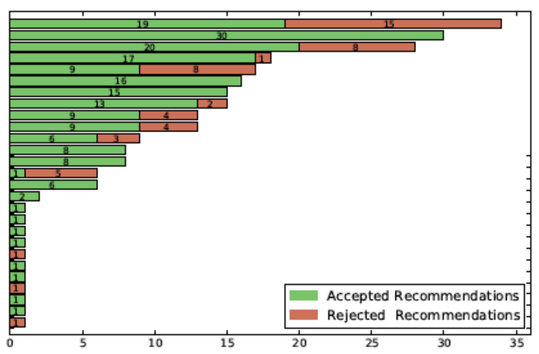
Recommendation Screen



Field Study

- We conducted a second field study (n=72) with android users to evaluate the effectiveness of our privacy profiles and the PPA.
- We found that **78.7%** of the recommendations are accepted. After further interactions with PPA to further review and modify their settings with daily nudges, participants only modified **5.1%** of the accepted recommendations.





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