

Your Neighbors Are My Spies: Location and other Privacy Concerns in GLBT-focused Location-based Dating Applications

Nguyen Phong HOANG, Yasuhito ASANO, Masatoshi YOSHIKAWA

Department of Social Informatics, Graduate School of Informatics, Kyoto University, Japan

hoang.nguyenphong.jp@ieee.org, asano@i.kyoto-u.ac.jp, yoshikawa@i.kyoto-u.ac.jp

Abstract—These Trilateration is one of the well-known threat models to the user's location privacy in location-based apps; especially those contain highly sensitive information such as dating apps. The threat model mainly bases on the publicly shown distance from a targeted victim to the adversary to pinpoint the victim's location. As a countermeasure, most of location-based apps have already implemented the "hide distance" function, or added noise to the publicly shown distance in order to protect their user's location privacy. The effectiveness of such approaches however is still questionable. Therefore, in this paper, we investigate how the popular location-based dating apps are currently protecting their user's privacy by testing three popular GLBT-focused apps: Grindr, Jack'd, and Hornet. We found that Jack'd has the most privacy issues among the three apps. As one of our findings, we also show how the adversary can still figure out the location of a targeted victim even when the "show distance" function is disabled in Grindr. Without using sophisticated hacking techniques, our proposed model (called colluding-trilateration) is still very effective and efficient at locating the targeted victim, and of course in a so-called "legal" manner, because we only utilize the information that can be obtained just as same as any other ordinary user. In case of Hornet, although it has adopted location obfuscation in its system, we were not only able to discover its noise-adding pattern by conducting empirical analysis, but also able to apply the colluding trilateration used in Grindr to locate the targeted victim regardless of the location obfuscation. Our study thus raises an urgent alarm to the users of those location-based apps in general and GLBT-focused dating apps in particular about their privacy. Finally, the paper concludes by suggesting some possible solutions from the viewpoints of both the LBS provider and the user considering the implementation cost and the trade-off of utility.

Keyword—Location-based Application, GLBT-focused Applications, Location Privacy, User Privacy, Trilateration, Colluding-trilateration, Grindr, Jack'd, Hornet



Nguyen Phong HOANG was born in Tien Giang Province, Vietnam in 1992. He received his undergraduate degree in Business Administration majoring in Information & Communications technology (ICT) from Ritsumeikan Asia Pacific University, Japan. He is presently pursuing his graduate studies at the Graduate School of Informatics, Kyoto University, Japan. His research interests include information security, privacy and anonymous communication. He hopes to advance his research on Tor (The Onion Router), one of the most robust anonymous tools, during his graduate studies. He has participated in annual IEEE International Conference on Advanced Communication Technology (ICACT) since 2014. He also received the Outstanding Paper Award from the Technical Program Committee of the conference in the 16th and 18th ICACT. He has been an IEEE member since 2013, and DBSJ since 2014.



Prof. Yasuhito ASANO received the BS, MS, and DS degrees in information science, the University of Tokyo in 1998, 2000, and 2003, respectively. In 2003-2005, he was a research associate in the Graduate School of Information Sciences, Tohoku University. In 2006-2007, he was an assistant professor in the Department of Information Sciences, Tokyo Denki University. He joined Kyoto University in 2008, and he is currently an associate professor in the Graduate School of Informatics. His research interests include web mining, network algorithms. He is a member of the IEICE, IPSJ, DBSJ, and OR Soc. Japan.



Prof. Masatoshi YOSHIKAWA received the BE, ME, and PhD degrees from the Department of Information Science, Kyoto University in 1980, 1982, and 1985, respectively. From 1985 to 1993, he was with Kyoto Sangyo University. In 1993, he joined the Nara Institute of Science and Technology as an associate professor in the Graduate School of Information Science. From April 1996 to January 1997, he was in the Department of Computer Science, University of Waterloo as a visiting associate professor. From June 2002 to March 2006, he served as a professor at Nagoya University. From April 2006, he has been a professor at Kyoto University. His current research interests include database technologies and their application to medical healthcare domains. He is a member of the ACM, IEICE, IPSJ and DBSJ.