

Follow But No Track: Privacy Preserved Profile Publishing in Cyber-Physical Social Systems

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Abstract: Due to the close correlation with individual's physical features and status, the adoption of Cyber-Physical Social Systems (CPSSs) has been inevitably hindered by users' privacy concerns. Such concerns keep growing as our bile devices have more embedded sensors, while the existing countermeasures only provide incapable and limited privacy preservation for sensitive physical information. Therefore, we propose a novel privacy preservation framework for CPSSs. We formulate both the privacy concerns and user expectations in CPSSs based on real-world knowledge. We also design a corresponding data publishing mechanism for users. It regulates the publishing behaviors to hide sensitive physical profiles. Meanwhile, the published data retain comprehensive social profiles for users. Our analysis demonstrates that the mechanism achieves a local maximized performance on the aspect published data size. The experiment results towards real datasets reveal that the performance is comparable to the global optimal one.

I. Introduction

Cyber-Physical Social Systems (CPSSs), as a new extension of social networks, is changing our life according to the recent studies. Users update their physical data collected through pervasive sensors in their mobile devices. They even act as "sensors" themselves by taking photos or making comments. In such systems, the users are the creators and builders . They participate in both the computation and formation of the system. On the other hand, users establish their profiles as they do in a regular social network by publishing their sensed data. They form their own reputations and achieve a self actualization. An typical CPSS is the Local Business Service System (LBSS), where users initially visit some Point of Interests (POIs) in their cities and upload photos and comments like "intellectual sensors". Others who are in favor of these comments would praise or follow them. Unfortunately, while enhancing the functionality of existing Cyber Physical Systems, the CPSS also brings privacy threats to users, since the generated data usually reveal some private information such as locations, motions, and personal habits . The users could suffer physical threats, which are far more harmful than advertisements or spam mails. Therefore, the users face severe challenges when sharing their data in CPSSs. As a solution, this paper studies the privacy preserved data publishing problem in CPSSs . The privacy issues in CPSSs are actually different from the ones in regular social networks or the ones towards physical data. Most previous works focusing on data privacy issues only preserve privacy for single or several records. Take the privacy preservation for geographical locations as an example . The corresponding problems are well-studied ranging from hiding sensitive locations to avoiding inferring locations from public records. The typical techniques include true location obfuscation, anonymity, etc . However, these countermeasures are incapable for CPSSs since users often contribute long-term behaviors and expect their whole physical profiles or patterns to be privacy preserved. More specifically, as in a social network, users establish their profiles via long-term participation. They publish and share numerous records revealing their general physical profiles such as mobility pattern in daily life . The physical profiles are closely related to their behaviors in the physical world. For example, the mobility pattern refers to a user's moving regularity, like appearance possibility in an urban area, visit of abnormal POIs and many more. Adversaries can crawl the published records from the systems and infer the profile to obtain the private information such as working and residential areas, abnormal visiting behaviors, or even potential changes in one's life . Such information may be further used for advertisement delivery or even physical stalking. According to the study on a real-case dataset, users with only a moderate number of published records already reveal some features of their mobility patterns. Therefore, there must be a well-designed tool to help users regulate their publishing behaviors in CPSSs .

II. Overview Of The System

2.1 EXISTING SYSTEM:

- Privacy preservation in cyber-physical systems has been attracting the attention from both academic and industrial communities. This issue draws even more attention in the recent years due to the pervasively embedded sensors in mobile devices.
- Propose an approach based on the virtual reality techniques to bypass face authentication tests and protect user privacy by avoiding the exposure of their real faces.

2.2 DISADVANTAGES OF EXISTING SYSTEM:

Typical studies include exposure of sensitive

- information, privacy preservation of physical
- data, and usage or access to sensor data.
- There work mainly studies the domain-specific
- data privacy, while ignoring the utility in social networks.

2.3 PROPOSED SYSTEM:

- We propose novel definitions on the utility on social profiles and privacy on physical profiles for CPSSs, which are more reasonable for real world scenarios.
- We formulate the record publishing problem in CPSSs and propose a heuristic algorithm to select the published records.
- We analyze and prove that the heuristic algorithm can satisfy all the constraints while publishing a maximal number of records for each user.
- We also propose an adaptive algorithm to support the publishing of novel records.

2.4 Advantages of Proposed System:

- For the utility in social networks, our mechanism maintains the consistency with the original social profile and publishes a maximum number of records.
- It guarantees that users can attract the same type of followers and show their activeness

III. Modules

Admin

In this module, the Admin has to login by using valid user name and password. After login successful he can do some operations such as --- Login, View all users and authorize, give click option to view all users locations in GMap using Multiple Markers, View all Friend Request and Response, View all users Visited places details and give click option to view all users visited locations in GMap using Multiple Markers, View all users hidden sensitive information's and Visited places details to their Friends, View all users shared photos with comments and ranking, ratings, List number of users hidden sensitive info and number of users hidden visited places and give link to show in Chart, List number of users visited same place and give link to show in Chart, List no of users located same place and give link to show in Chart, View Photos ranks in chart

View and Authorize Users

In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

User

In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like Register with Location, Sensitive Info(Blood Group, Spouse Name, Company Name, Current Living Location) and Login and View your profiles ,Search Friend Track and Find Friend Request and give privileges (while accepting) like to access Sensitive info, Visited Locations, access on photos, View all Your Friends Tracked and give click option to view all users locations in GMap using Multiple Markers show Route path using GMAP, Set All your Visited Locations using GMap lat and long with famous place details like place name, place desc (enc), Specialty, Address, Timings, visited Data and Time, View all Your friends visited locations details with famous place details like place name, place desc (enc), Specialty, Address, Timings and give click option to view all users visited locations in GMap using Multiple Markers, Share your photos to your friends with photo name, photo desc, photo uses, add photo image, View all your shared photos with comments, rank and rating, View all your friends shared photos (Give rank while viewing) and give comment, Rating.

IV. Output Screens

Home:



Admin Login:



Admin Home:



Registration:



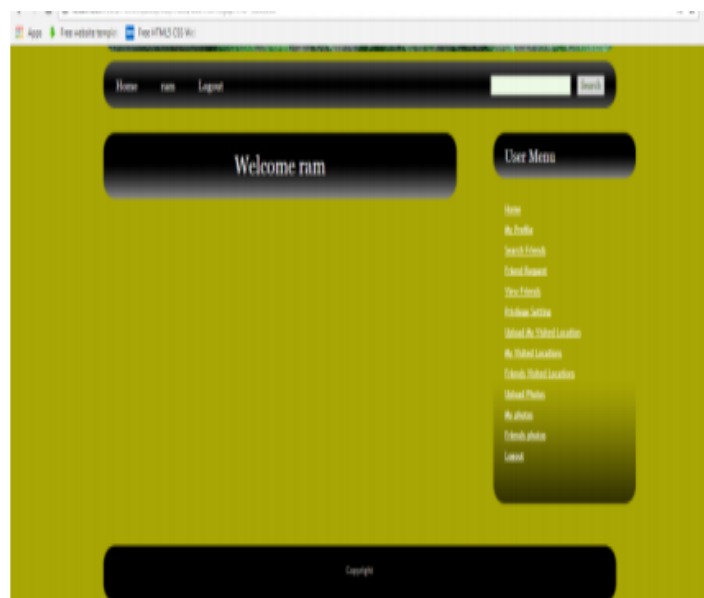
The registration form is titled "Registration" and is set against a green background. It contains several input fields: "User Name", "Password", "Email ID", "Date of Birth" (with a date picker), "Select Gender" (a dropdown menu), "Address", and "Mobile". There is also a "Select Profile Picture" section with "Choose File" and "No file chosen" options. A "Register" button is located at the bottom of the form.

User Login:



The login page features a header with the title "Follow But No Track Privacy Preserved Profile Publishing in Cyber Physical Social Systems" and a background image of moss-covered tree trunks. Below the header is a navigation bar with "Home", "Admin", and "User" links. The main content area says "Welcome User" and includes a login form with "User Name" and "Password" fields, a "Submit" button, and a "Forgot" link.

User Home:



The user home page displays a personalized welcome message "Welcome ram" in a large, rounded button. To the right is a "User Menu" button that opens a vertical list of navigation options: Home, My Profile, Search Friends, Friend Request, User Friends, Profile Settings, Update My Current Location, My Friend Location, Friends, Friend Location, My Photo, Friends photos, and Logout. The page also includes a search bar at the top and a footer with the word "Copyright".

V. Conclusion

In this paper, we investigate the problem of privacy preservation in CPSSs which inherit features from both cyber-physical systems and social networks and face novel privacy issues. A thoroughly designed countermeasure is expected to handle the privacy issues for physical data, while maintaining a good utility as in social networks. We prove that the proposed algorithm can achieve a maximal number of published records. The evaluation on real dataset validates the effectiveness of the algorithm on both physical privacy and social utility. Our study could work as a general tool in preserving users' privacy when they share their physical data with others in CPSSs.

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