Prevent Privacy Leakage in Mobile Social Networks
--- A Privacy Policy Conflict Detection Framework

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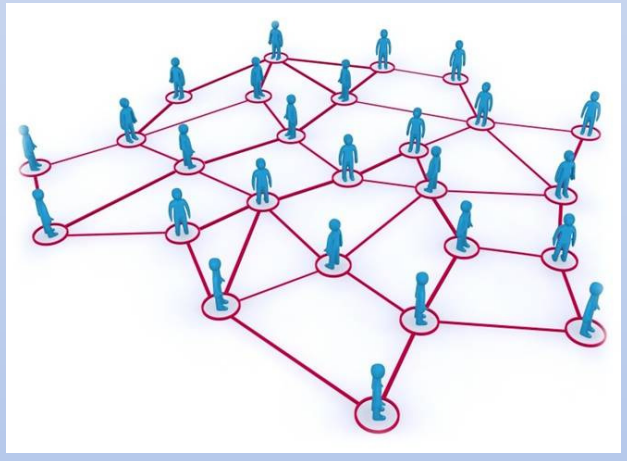
Abstract

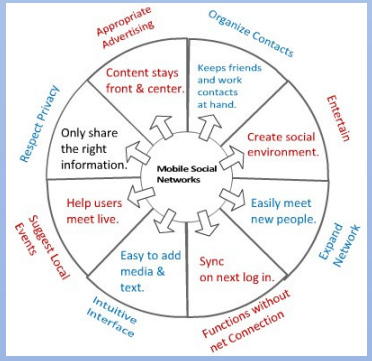
Mobile social networks give online social networking sites the abilities to extend their services to mobile device users. Smart phones and tablets allow users to interact with others when they are moving. Policy-based management simplifies the management of interaction functionalities by establishing policies to control various activities involved in these functionalities. To detect and resolve potential dynamic conflicts between the rules and configurations from different administrative domains, a knowledge-based policy analysis framework is proposed this paper. It incorporates relationships between different elements in policy rules into temporal logic using a semantic extension, which makes dynamic policy conflict analysis more accurate. A prototype system for mobile social networks is implemented to illustrate the capability of this framework.

Introduction

Online social networking sites become more and more popular and exciting. People can make friends and groups, follow entertainment stars and become their fans, collaborate with others and etc.



With support from cellular networks, online social networking sites have put their services on mobile devices, such as Facebook client application for iPhone. Users' information has moved from traditional carrier to mobile devices. One unique mobile social networking service, location service, use GPS functionality built in mobile devices to provide location information applications to users. Through location services, mobile social network can provide more customized services to users. However, location information is personal. Misuse of personal information is an issue in social networking services. Although users can set up privacy policies to protect their personal information from this issue, there may be conflicts within these policies, because general users are not information security experts.



Policy Model & Policy Conflict Type

A: attribute	A: the attribute that limit subjects and objects
s = {A}	s: the subject of a segment
o = {A}	o: the object of a segment
A(c) = s × o	A(c): the action of a segment
Context: information	Context: the information that hide in the system
Segment ={ s × o × A(c) × Context}	segment: a part of policy

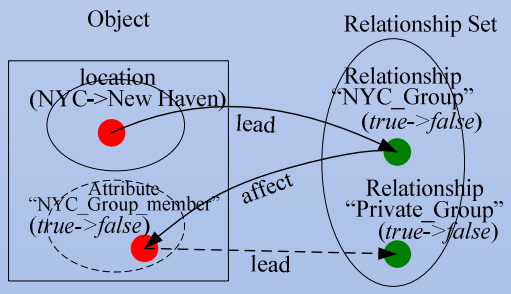
Temporal Logic

Temporal Logic is attached with an extension of knowledge base. The reasoning of a temporal logic with knowledge base formula is based on the knowledge extension in the formula. Because of dynamic attributes, the constraints cannot cover all of semantic information from different domains. We need a knowledge support to store information we will use in logic reasoning. In this framework, the semantic knowledge contains entities, attributes and relationships.

Definition 1:Attribute is a piece of information that describes an aspect of an object.
Definition 2:Entity is an object represented by a set of attributes.
Definition 3:One relation is a subset of Cartesian product of two entities (attribute sets).
If R is a relationship between entity A and entity B, then R is a subset of A□B. For example, R is a relationship between Sam and Bill.

$$R=\{(a,b)|\ a\in \text{Sam AND } b\in \text{Bill}\}$$

Definition 4: Explicit attributes define a set of attributes that is an attribute that cause a relationship change.
Definition 5: Implicit attributes define a set of attributes that are created after relationships, and these attribute are affected by these relationships.



Current Stage

The logic representation and reasoning functionalities are used in conflict analysis area. However, these temporal logics do not include domain information. In this project, we build a temporal logic based on a knowledge extension. The knowledge extension contains structural information of an information domain. And this knowledge extension is flexible and extendable. The next step is to build a well structured knowledge base for knowledge training and learning. The good knowledge learning process could find abnormal activities from user inputs.