RMiner: A Tool Set for Role Mining

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Role Engineering

- The goal of role engineering is
  - configuring a role-based access control (RBAC) system

- Role engineering process includes
  - generating roles
  - assigning roles to users
  - updating role states
Motivation for Role Mining Tools

- The role mining ecosystem
  - There are many algorithms have been proposed to mine the roles.
  - The role mining algorithms discover roles from the real world data set that is usually with noise.
  - The role mining algorithms will not completely solve the role configuration problem.
  - The administrators usually need to correct some inappropriate roles generated by role mining algorithms.

- A possible solution may be …
  - Developing a platform to implement the role mining algorithms and providing a tool set to aid the administrators to update the role states.
Contributions

- **RMiner** provides a visual tool set platform for role mining, role state updating and role assignment.

  - Users can use RMiner to build an RABC system or carry out experiments to analyze the differences among different role mining algorithms, as well as the self-defined algorithms.
  - RMiner is a unified verification platform that simplifies the process of role mining research and experiments.
Collecting the Data Sets

- americas_large.ass
- americas_small.ass
- apj.ass
- domino.ass
- emea.ass
- firewall1.ass
- firewall2.ass
- gen_orca_role_permission.ass
- healthcare.ass
- orca_role_permission.ass
- orca_user_permission.ass
- university_large.ass
- university_runningexample.ass
## Parts of the Data Sets

| DataSet    | |U| | |P| | |UPA| | Density |
|------------|---|---|---|---|---|---|---|---|---|
| Healthcare | 46 | 46 | 1486 | 70% |
| APJ        | 2044 | 1164 | 6841 | 0.3% |
| Domino     | 79 | 231 | 730 | 4% |
| EMEA       | 35 | 3046 | 7220 | 6.8% |
| Firewall 1 | 365 | 709 | 31,951 | 12.3% |
| Firewall 2 | 325 | 590 | 36,428 | 19% |
| Americas   | 3477 | 1587 | 105,205 | 1.9% |
Framework of RMiner

Data Pre-processing Module
- Generate ARAF Format File
- Transform to ARAF Format File
- Remove the Redundancy Or Noise
- Select the Subject Or Object In Assignment
- Remove Redundancy Attributes In Subject Or Object
- Save the Modified Results

Role Mining Module
- Select Role Mining Algorithm
- Configure Algorithm Parameter
- Run Role Mining Algorithm

Visualization Module
- Scatter Plot
  - Show Permission Similarity Information
- Histogram
  - Show User Similarity Information
- Line Chart
  - Show Assignment Relationship Information
  - Show Object Attribute Information
  - Show Subject Attribute Information

Log Module
- Record Exception Information
- Record Status Information
- Record Time Information
- Record Space Information

Role Assignment Module
- Save Result To File
- Assign Roles To Users
- Select Role Assignment Algorithm
- Save Role State
- Edit Role Forest
- Edit Role-Permission Relationship
- Generate Role Forest
- Get Role State
- Load Role-Permission File

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DEMO
Source code can be downloaded from
http://code.google.com/p/rminer/

RMiner is based on the core of WEKA, an open source data mining tool. RMiner implements most of the classic and latest role mining algorithms and provides interactive tools for administrator to update role states.

In this demonstration, we show a role mining platform, namely RMiner. In RMiner, we implement most of the classical role mining algorithms, such as GPCA, HierarchicalMiner, CompleteMiner, FastMiner, StateMiner, GraphOptimization, MinimalPerturbation, and WeightedRoleWinning and so on. RMiner also provides a role state editor for updating the role state generated by the role mining algorithms. In addition, RMiner offers some abstract interfaces that the users can easily add new role mining algorithms and discover the difference of the new algorithms compared with others using the visualization tools.
Open-sourced

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Questions?

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