Generic User Modeling Systems

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Introduction

• User Modeling
  – HCI
  – Customization and Adaptation
  – Amazon, Google, Ebay, Facebook …

• Generic User Modeling Systems
  – User Modeling Shell Systems
  – User Modeling Servers
Amazon (cont’d)
Introduction (User Model)

- User Model
  - Goal
  - Knowledge
  - Static, Dynamic, Stereotype based

- Black: Insufficient knowledge
- Nested: Conflict!
Introduction (Stereotype)

Stereotype Example: Users
Outline

• Introduction
• GUM Systems
• UM Trends
• Novel Approach (TUMS)
• Conclusion
Outline (GUM Systems)

• GUM Systems
  – User Modeling Shells
    » Historical Development
    » Examples
  – User Modeling Servers
    » Characteristics
    » Issues
    » Requirements
    » Examples
User Modeling Shell

- Part of an application system
- Software component
  - Maintainable
  - Reusable
Historical Development

• Inherited from User Adaptive Systems
• General User Modeling System ’86
• Term: “User Modeling Shell”
UM Shell Examples

• UMT (User Modeling Technology)
  – Hierarchical stereotypes
• PROTUM (A Prolog based tool for UM)
  – UM is a list of constants
  – More sophisticated retraction than UMT
• TAGUS
  – Diagnosis of unexpected behavior
• um
• Toolkit for user modeling
• Stores attribute-value pairs
• Stores evidence and its source
• Infers from the evidence
Outline (GUM Systems)

- GUM Systems
  - User Modeling Shells
    - Historical Development
    - Examples
  - User Modeling Servers
    - Characteristics
    - Issues
    - Requirements
    - Examples
User Modeling Servers

- Similar to user modeling shells
- Serves many applications
- Not part of an application system
Characteristics

• Information maintained in a repository
• Information is not redundant
• Information is gathered from many apps
• Methods for security can be applied (e.g. encryption)
Issues

- Design: Central vs Distributed
- Performance
- Scalability
- Availability
Required Services

• Assumptions about types of user characteristics
• Common characteristics of sub-groups
• Classification of users
• Recording user behavior
Required Characteristics

• Support for quick adaptation
• Extensibility
• Import user-related information
• Management of distributed information
Required Characteristics (cont’d)

- Support for open standards
- Scalability
- Privacy
- Failover strategies
- Transactional consistency
Academic Examples

- BGP-MS
- DOPPELGANGER
- CUMULATE
- PERSONIS
BGP-MS

- Represents assumptions in first-order predicate logic
- Subset of assumptions stored in terminological logic
- Inferences among different types
- Can be used as a nw server with multi-user
BGP-MS Internal View
BGP-MS Communication

```
application

bgp-ms-tell
(bgp-ms-tell BS(BU(all x(-> (inkjet-printer x)(printer x)))) )

d-act
(d-act PRINT-COMMAND (userdoc))

bgp-ms-ask
(bgp-ms-ask :id 116 (BS(WU(printed-on userdoc lw+))))

bgp-ms-answer
(bgp-ms-answer :id 116 :answer yes)

BGP-MS
```
DOPPELGANGER

- Collects information from HW and SW
- Extrapolates the collected data
  - Linear prediction
  - Markov models
  - Clustering
- Users can inspect and modify
Commercial Examples

- Group Lens
- ATG Adaptive Scenario Engine
- enQuire Identity Server
Group Lens

- Applies collaborative filtering algorithms
- Stores user ratings in database
- Stores a correlation matrix in main memory
- Collects data from forms and by monitoring
ATG Adaptive Scenario Engine

- Users are assigned to groups
  - Demographics, system usage, SW, HW, NW
- Inferring rules can be defined
- External data can be integrated
  - SQL, XML, and Web Services
- Acquired by ORACLE
Why ORACLE acquired ATG?

• Unified CRM
  – Same brand experience with
    » Mobile, online, in store channels etc..
  – Personalized experience

• ORACLE
  – Data management
Companies Must Interact with Customers Across More Channels
enQuire Identity Server

- Multi-functional server
  - Security policies, access control
  - Federates and filters information
- Embedded virtual directory engine
  - LDAP, ODBC or an API
- Static and dynamic binding
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User Modeling Trends

- Mobile User Models
- User Models for Smart Appliances
- Agent-Based User Modeling Systems
- Multiple-Purpose Usage
- Diverse GUM Systems
Mobile User Models

- Increasing usage of mobile devices
- HCI in a sensor equipped environment
- Limited computation power
- Limited bandwidth
- Example: Mobile recommender systems
UM for Smart Appliance Examples

- Car radios
- Electronic car keys
- Ford Microsoft Sync
Microsoft – Ford Sync

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- 911 Assist
- Voice/Touch Climate Control
- Command Center
- Track Driving Efficiencies
- Color-Coded Touch Screen
- Video Player
- Vehicle Health Report
- Audible Text Messaging
- Internet Connectivity
Pandora (Radio Recommender)
Agent-Based UM Systems

• Automation of UM servers
  – Ubiquitous computing
  – Communities of computer users
Multiple-Purpose Usage

- Organizational directory services
- Skill inventory systems
- Global expert-finding
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TUMS: Twitter-based User Modeling Service

- Public web application
- Topic detection
- Entity extraction
- Structured
TUMS (cont’d)

Overview of a User Profile
Conclusion

• User Modeling
  – User models, stereotypes
• GUM Systems
• Smart Appliances of UM
Questions
References