Overview of this talk

• What are Social Networks?
• Social Networks in an Enterprise
• Verity’s Solution
• Verity in Action
Milgram’s Experiment

- Asked volunteers in Omaha, NE to send a letter to a physician in Boston
- Could only forward to a known person

Result:
- Median path length of delivery was 6
- Led to famous “6 degrees of separation” folklore
Social Networks

Primarily contain:
• a set of entities
• and associations between them
A Social Network model of the Internet

- Represents *web pages* and *users* as entities
- Web pages associated by their hyperlinks
- Access patterns associate users with web pages
- Similar access patterns associate users with other users

*Google, Amazon, ReferralWeb, Phoaks, Yenta*
Applications

• Google exploits the web’s hyperlink structure
• Amazon analyzes buying patterns to recommend products
• ReferralWeb builds a network of researchers from co-authorship to find experts
A Social Network in an Enterprise

• **Entities are:**
  - data objects in various repositories
  - employees, customers and partners of the organization

• **Associations between entities**
  - some relationships between users are natural (organizational), other associations are implicit
  - data across repositories is not linked
The Web, in Context

Online Data in the World

2,500,000+ TB

Web HTML

30+ TB
Enterprise Data

- Content management systems
- Company databases
- Technical manuals
- Group email forums and lists
- Bibliographic databases
- Internal documents
- Individual resumes and home pages
Enterprise level challenges

- Information resides in heterogeneous formats (pdf, word, email...)
- repositories (lotus, databases, exchange..)
- applications (HR, ERP, Siebel, ...)

- Data security
  - document access is governed by ACL’s
Differences

- Most of the valuable data is not found in html pages
- Many formats in heterogeneous repositories
- Most enterprise content has no links
- The implicit links that do exist are inherently different from the web hyperlinks
- Documents have access rights which have to be respected by the Knowledge Management application
Value of Social Networks in an Enterprise

Increase productivity of workers by providing them

• the right information (documents)
• the right people (experts)
Verity has built a scalable generalized framework to represent its Social Network model in the top layer of a 3 tier architecture.
The 3 Tiers of Knowledge Management

**Organize**
- Personalization
- Profiling
- Concept Maps
- Advanced Search
- Parametric Search
- Keyword Search

**Connect**
- Recommendation
- Expert Location
- Concept Maps
- Universal Index
- Universal Viewing
- Languages

**Discover**
- Community
- Peer to Peer
- Relational Taxonomy
- Business Rules
- Federated Search
- Languages
Verity’s Social Network Technology

- Represents users, documents, categories and queries in a dynamic multidimensional Tensor Space
- Entities are seeded from existing enterprise data
- The model continually learns explicit and implicit links between them
User Profile

Seeded from
- documents and public email authored by user
- title, role in the organization

Learned from
- search history
- documents viewed and rated
Is influenced by:

- its content
- co-occurrence with other documents in a category
- membership in a set of documents
- user feedback
  - explicit - rating, voting,...
  - implicit - clickstream analysis,...
Content

• terms in a document
• links between documents
• documents in a taxonomy
• users access patterns
• users profile

Context

• search history
• category in a taxonomy being browsed

Each item is treated as a node ...
... similarity metric between nodes is independent of node type
Verity’s Recommendation Engine

- Recommendations
- Similar Documents
- Query Refine/
- Experts
- Adaptive Ranking
- Community
Transactions capture user interactions with the system:

- user selects or rates a document
- document is added to a category
- user authors a document

A transaction can involve multiple entities, and impact their relationships
// Create a transaction object
VTransaction vt = new VTransaction();

// Create the transaction entities from the HTTP request
// user identifier
String userName = request.getRemoteUser();
// the K2 document identifier
String docKey = request.getParameter("K2DocKey");
// the user’s query
String query = request.getParameter("QueryText");

TxEntity u = new TxUser(userName, false); // don't hide this user
TxEntity d = new TxDoc(docKey); // the document identifier
TxEntity q = new TxQuery(query); // the user's query

Subtransaction s = new Subtransaction();
s addTarget(u); // use the default history for user
s.addSource(d, relDU); // set relevance of document to user
s.addSource(q, relQU); // set relevance of query to user

vt.addSubtransaction(s);
vt.submit(); // send the information to system
Recommendation Engine Import Interface

Mechanism to import data from various sources:

- User Transactions
- CRM systems
- Directories such as LDAP repositories
- Organization Charts
- HR databases
- Web Server Log Files
- E-Commerce Databases
<xaction type="updateEntity">
    ...
    <user id="tom" hide="False">
        <query parser="Simple"><![CDATA[tree]]></query>
        <doc id="../doc/htmldoc/k2entgs/k2gsovr4.pdf@samplecoll">
            </doc>
    </user>
    ...
    <doc id="../doc/htmldoc/k2entgs/k2gsovr4.pdf@samplecoll">
        <query parser="Simple"><![CDATA[tree]]></query>
        </doc>
    </xaction>
• Verity Recommendation Engine
• Builds social networks exploiting enterprise modalities
• Generalized framework to deal with entities of different types, e.g., users, documents,...
• Responds to user interactions
• Discovers implicit relationships
• Interface for importing data from enterprise repositories
• Can be deployed in different enterprise application scenarios
Verity in Action
Sample Applications

- Corporate Intranets
  - Recommendation, finding domain experts,...

- Intellectual Property
  - Finding related research, consultations,...

- Medical Applications
  - Matching patients to doctors, clinical trials,...

- Customer Relationship Management
  - Matching customer problems to internal experts in Technical Support, Development,...

- Recruitment
  - Matching job postings to resumes, creating profiles from resumes,...
Verity Customers and Partners

- 1500+ Corporations
- 200+ OEM
- 175+ ECommerce Sites
- 80% of the Fortune 50
- Brassring
- Boeing
- PWC
- HP
- CSC
- E & Y
- IBM
Personalized Discovery

The personalization feature incorporated in Verity K2 Enterprise automatically connects your users to subject experts within your organization, and recommends documents based on the individual users' past and present queries and/or documents that are similar to selected documents. This highly-advanced technology is based on Verity's proprietary analysis engine that combines business rules with latent patterns in user behavior. It puts simple queries into the context of the social networks created by the interaction of users, information and queries in your organization.

K2 Enterprise's Personalization and Adaptive Ranking features all contribute to personalizing your users' search experience.

Thank you for your feedback tom
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<thead>
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<th>Document</th>
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<tbody>
<tr>
<td>1</td>
<td>Amelie Jacobson</td>
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<td></td>
<td>Phone: 609-555-1279</td>
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<td>John Bishop</td>
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<td>Thomas Hanton</td>
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Thank You