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Resolving semantic heterogeneity in multiperspective requirements traceability using ontology matching

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Abstract
In large-scaled software development projects, different stakeholders may deal with different pieces of software requirements depending on their perspectives or perceptions of their shared problems. Each of the users may define his/her requirements from his/her own point of view using different terminologies. System analysts may express or model the artifacts of the system by using different representation styles and methodologies. However, a group of stakeholders often needs to interact, collaborate or trace requirements among the group in order to achieve common goals in their development process. To resolve the semantic heterogeneity problems arising from requirements tracing among various stakeholders, the enhancement of multiperspective requirements traceability (MUPRET) framework is proposed. The main objective of this paper is to concentrate on tracing multiperspective requirements artifacts represented in the form of the textual requirements and the requirements model, specifically the entity relationship diagram. The requirements ontology is used as a knowledge representation to represent multiperspective requirements artifacts of an individual stakeholder. Ontology matching is applied as a reasoning mechanism in automatically generating traceability relationships without restricting the freedom in expressing requirements differently.

Author Keywords
Knowledge Representation; Multiperspective Software Development; Ontology; Requirements Traceability; Semantic Heterogeneity

References

- Gotel, O.C.Z., Finkelstein, A.C.W.
  An Analysis of the Requirements Traceability Problem

- Ramesh, B., Dhar, V.
  Supporting Systems Development by Capturing Deliberations During Requirements Engineering

- Kaindl, H.
  The Missing Link in Requirements Engineering

- Yu, W.D.
  Verifying Software Requirements: A Requirement Tracing Methodology and Its Software Tool-RADIX

- Pinheiro, F.A.C., Goguen, J.A.
  An Object-Oriented Tool for Tracing Requirements

- Cleland-Huang, J., Chang, C.K., Christensen, M.
  Event-Based Traceability for Managing Evolutionary Change
- Heindl, M., Biffl, S.
  **A Case Study on Value-Based Requirements Tracing**
  In

- Egyed, A.
  **Supporting Software Understanding with Automated Requirements Traceability**

- Antoniol, G.
  **Recovering Traceability Links between Code and Documentation**

- Marcus, A., Maletic, J.I.
  **Recovering Documentation-to-Source-Code Traceability Links using Latent Semantic Indexing**
  In

- Settimi, R.
  **Supporting Software Evolution through Dynamically Retrieving Traces to UML Artifacts**
  In

- Cleland-Huang, J.
  **Utilizing Supporting Evidence to Improve Dynamic Requirements Traceability**
  In

- Lin, J.
  **Poirot: A Distributed Tool Supporting Enterprise-Wide Automated Traceability**
  In

- Hayes, J.H., Dekhtyar, A., Sundaram, S.K.
  **Improving After-the-Fact Tracing and Mapping: Supporting Software Quality Predictions**

- Hayes, J.H., Dekhtyar, A., Sundaram, S.K.
  **Advancing Candidate Link Generation for Requirements Tracing: The Study of Methods**

- Zou, X., Settimi, R., Cleland-Huang, J.
  **Phrasing in Dynamic Requirements Trace Retrieval**
  In

- Spanoudakis, G.
  **Rule-Based Generation of Requirements Traceability Relations**

- Gruber, T.R.
A Translation Approach to Portable Ontology Specifications

- Borst, W.N.
  Construction of Engineering Ontologies for Knowledge Sharing and Reuse, Doctoral Dissertation, Enschede
  (1997) NL-Centre for Telematics and Information Technology,
  University of Twente

- Studer, R., Benjamins, V.R., Fensel, D.
  Knowledge Engineering: Principles and Methods

- Jurisica, I., Mylopoulos, J., Yu, E.
  Ontologies for Knowledge Management: An Information Systems Perspective

- Zhang, Y., Cai, G., Jia, D.
  A Modified Method for Concepts Similarity Calculation

- Hepp, M., Leukel, J., Schmitz, V.
  A Quantitative Analysis of Product Categorization Standards: Content, Coverage, and Maintenance of eCl@ss, UNSPSC, eOTD, and the Rosetta Net Technical Dictionary

- Wei, S.
  Ontology-driven Information Sharing Mechanism in Supply Chain Environment

- Shuang, Q.
  Bioinformatics Database Integration Based on Biomedical Ontology

- Haase, P., Siebes, R., Harmelen, F.V.
  Expertise-Based Peer Selection in Peer-to-Peer Networks

- Jung, J.J.
  Consensus-Based Evaluation framework for Distributed Information Retrieval Systems

- Denny, M.
  Available at

- Mena, E.
  OBSERVER: An Approach for Query Processing in Global Information Systems Based on Interoperation Across Pre-Existing Ontologies

- de Bruijn, J.
  Semantic Integration of Disparate Data Sources in the COG Project

- Fowler, J.
  Agent-Based Semantic Interoperability in Info Sleuth
• Mitra, P., Wiederhold, G.
  *An Algebra for Semantic Interoperability of Information Sources*
  (2001) *Proceedings of the IEEE 2nd International Conference on Bioinformatics and
  Bioengineering*, pp. 174-182.

• Noy, N.F., Musen, M.A.
  (1999) *SMART: Automated Support for Ontology Merging and Alignment,*

• McGuinness, D.L.
  *An Environment for Merging and Testing Large Ontologies*

• Preece, A.
  *KRAFT: An Agent Architecture for Knowledge Fusion*

• Kaiya, H., Saeki, M.
  *Ontology Based Requirements Analysis: Lightweight Semantic Processing Approach*
  (2005) *Proceedings of the Fifth International Conference on Quality Software (QSIC

• Hamdan, K., Khatib, H.E.
  *A Software Cost Ontology System for Assisting Estimation of Software Project Effort for
  Use with Case-Based Reasoning*

• Yang, H., Cui, Z., O'Brien, P.
  *Extracting Ontologies from Legacy Systems for Understanding and Re-Engineering*

• Wongsthongham, P., Chang, E., Cheah, C.
  *Software Engineering Sub-Ontology for Specific Software Development*
  (SEW 2005)*, pp. 27-33.

• Zhang, Y.
  *An Ontology-Based Approach for Traceability Recovery*
  and Ontologies for Reverse Engineering (ATEM 2006)*, pp. 36-43.

• Noll, R.P., Ribeiro, M.B.
  *Enhancing Traceability using Ontologies*

• Noll, R.P., Ribeiro, M.B.
  *Ontological Traceability over the Unified Process*
  (2007) *Proceedings of the 14th Annual IEEE International Conference and Workshops on the
In

- Caralt, J.C., Kim, J.W.
  **Ontology Driven Requirements Query**

In

- Assawamekin, N., Sunetnanta, T., Pluempitiwiriyawej, C.
  **Ontology-Based Multiperspective Requirements Traceability Framework**

Ellson, J.
**Graphviz and Dynagraph-Static and Dynamic Graph Drawing Tools**

In

- Gansner, E., Koutsofios, E., North, S.
Available at

- Miller, G.A.
  **WordNet: An On-line Lexical Database**

- Miller, G.A.
  **WordNet: A Lexical Database for English**

- Patwardhan, S.
Available at

- Rennie, J.
Available at

- Michelizzi, J.
  (2004) *Text-Similarity-0.02*,
Available at

- Berre, D.L.
Available at

- Spanoudakis, G., Finkelstein, A., Till, D.
  **Overlaps in Requirements Engineering**