

# Technical Report: A Systematic Mapping Study on the Combination of Information Retrieval and Requirements Traceability: Models, Strategies, Datasets, Measures and Baselines

## 1. Extracted Data

### 1.1. Extracted Data for RQ1

Index	Title	Author	Year	Venue	Publication type
S1	An empirical study on recovering requirement-to-code links	Zhang Yuchen Wan Chengcheng Jin Bo	2016	SNPD	Conference
S2	An Improved VSM-based Post-Requirements Traceability Recovery Approach Using Context Analysis	Jiale Zhou Yue Lu Kristina Lundqvist	2013	Semantic Scholar	Other
S3	Configuring Latent Semantic Indexing for Requirements Tracing	Sebastian Eder Henning Femmer Benedikt Hauptmann Maximilian Junker	2015	RET	Conference
S4	A Context-based Information Retrieval Technique for Recovering Use-Case-to-Source-Code Trace Links in Embedded Software Systems	Jiale Zhou Yue Lu Kristina Lundqvist	2013	SEAA	Conference
S5	Analyzing closeness of code dependencies for improving IR-based Traceability Recovery	Hongyu Kuang Jia Nie Hao Hu Patrick Rempel Jian Lü Alexander Egyed Patrick Mäder	2017	SANER	Conference
S6	An empirical study on the importance of source code entities for requirements traceability	Nasir Ali Zohreh Sharafi Yann-Gaël Guéhéneuc Giuliano Antoniol	2014	ESE	Journal
S7	Analyzing close relations between target artifacts for improving IR-based requirement traceability recovery	Haijuan Wang Guohua Shen Zhiqiu Huang Yaoshen Yu Kai Chen	2021	FITEE	Journal
S8	A semantic relatedness approach for traceability link recovery	Anas Mahmoud Nan Niu Songhua Xu	2012	ICPC	Conference Workshop Papers
S9	Achieving better requirements to code traceability: which refactoring should be done first?	Farina Faiz Rubaida Easmin Alim Ul Gias	2016	QUATIC	Conference
S10	An Empirical Study on Requirements Traceability Using Eye-Tracking	Nasir Ali Zohreh Sharafi Yann-Gaël Guéhéneuc Giuliano Antoniol	2012	ICSM	Conference
S11	An Improved Approach to the Recovery of Traceability Links between Requirement Documents and Source Codes Based on Latent Semantic Indexing	Jianwei Shao Wei Wu Peng Geng	2013	ICCSA	Conference
S12	An IR-Based Artificial Bee Colony Approach for Traceability Link Recovery	Danissa V. Rodriguez Doris L. Carver	2020	ICTAI	Conference
S13	Toward multilevel textual requirements traceability using model-driven engineering and information retrieval	Nicolas Sannier Benoit Baudry	2012	MoDRE	Conference
S14	Code Patterns for Automatically Validating Requirements-to-Code Traces	Achraf Ghabi Alexander Egyed	2012	ASE	Conference
S15	Combining VSM and BTM to improve requirements trace links generation	Bangchao Wang Rong Peng Zhuo Wang	2019	SEKE	Conference

		Yaxin Zhao			
S16	Trustrac: Mining Software Repositories to Improve the Accuracy of Requirement Traceability Links	Nasir Ali Yann-Gaël Guéhéneuc Giuliano Antoniol	2013	TSE	Journal
S17	Leveraging historical co-change information for requirements traceability	Nasir Ali Fehmi Jaafar Ahmed E. Hassan	2013	WCRE	Conference
S18	Multi-Objective Information Retrieval-Based NSGA-II Optimization for Requirements Traceability Recovery	Danissa V. Rodriguez Doris L. Carver	2020	EIT	Conference
S19	Filtering of false positives from IR-based traceability links among software artifacts	Jyoti Jitender Kumar Chhabra	2017	I2CT	Conference
S20	Quality improvements for trace links between source code and requirements	Paul Hübner	2016	REFSQ	Conference
S21	Recovering Traceability Links between Code and Documentation for Enterprise Project Artifacts	Shouichi Nagano Yusuke Ichikawa Toru Kobayashi	2012	COMPSAC	Conference
S22	Requirements Traceability Through Information Retrieval Using Dynamic Integration of Structural and Co-change Coupling	Jyoti Jitender Kumar Chhabra	2017	ICAICR	Journal
S23	An Automated Hybrid Approach for Generating Requirements Trace Links	Wang Bangchao Peng Rong Wang Zhuo Wang Xiaomin Li Yuanbang	2020	IJSEKE	Journal
S24	Enhancing candidate link generation for requirements tracing: The cluster hypothesis revisited	Nan Niu Anas Mahmoud	2012	RE Conference	Conference and Workshop Papers
S25	Search-Based Requirements Traceability Recovery: A Multi-Objective Approach	Adnane Ghannem Mohamed Salah Hamdi Marouane Kessentini Hany H. Ammar	2017	CEC	Conference and Workshop Papers
S26	Supporting requirements traceability through refactoring	Anas Mahmoud Nan Niu	2013	RE Conference	Journal Articles
S27	SANAYOJAN A framework for traceability link recovery between use-cases in software requirement specification and regulatory documents	Ritika Jain Smita Ghaisas Ashish Sureka	2014	RAISE	Conference
S28	Towards feature-aware retrieval of refinement traces	Patrick Rempel Patrick Mäder Tobias Kuschke	2013	TEFSE	Conference
S29	Interactive recovery of requirements traceability links using user feedback and configuration management logs	Ryosuke Tsuchiya Hironor Washizaki Yoshiaki Fukazawa Keishi Oshima Ryota Mibe	2015	CAiSE	Conference
S30	Supporting requirements to code traceability through refactoring	Anas Mahmoud Nan Niu	2014	RE Conference	Journal
S31	Recovering traceability links between requirements and source code using the configuration management log	Ryosuke Tsuchiya Hironori Washizaki Yoshiaki Fukazawa Tadahisa Kato Masumi Kawakami Kentaro Yoshimura	2015	IEICE	Journal
S32	Exploiting Parts-of-Speech for Effective Automated Requirements Traceability	Nasir Ali Haipeng Cai Abdelwahab Hamou-Lhadj Jameleddine Hassine	2018	IST	Journal
S33	Using Frugal User Feedback with Closeness Analysis on Code to Improve IR-Based Traceability Recovery	Hongyu Kuang Hui Gao Hao Hu Xiaoxing Ma	2019	ICPC	Conference

		Jian Lü Patrick Mäder Alexander Egyed			
S34	Adaptive User Feedback for IR-Based Traceability Recovery	Annibale Panichella Andrea De Lucia Andy Zaidman	2015	SST	Conference
S35	Evolving Software Trace Links between Requirements and Source Code	Mona Rahimi Jane Cleland-Huang	2018	ESE	Journal
S36	Supporting Requirements to Code Traceability Creation by Code Comments	Guohua Shen Haijuan Wang Zhiqiu Huang YaoShen Yu Kai Chen	2021	IJSEKE	Journal
S37	Using code ownership to improve IR-based Traceability Link Recovery	Diana Diaz Gabriele Bavota Andrian Marcus Rocco Oliveto Silvia Takahashi Andrea De Lucia	2013	ICPC	Conference

## 1.2. Extracted Data for RQ2

Index	Title	IR Model	Stage
S1	An empirical study on recovering requirement-to-code links	VSM	Links Generation Stage
S2	An Improved VSM-based Post-Requirements Traceability Recovery Approach Using Context Analysis	VSM	Preprocessing Stage
S3	Configuring Latent Semantic Indexing for Requirements Tracing	LSI	Links Generation Stage
S4	A Context-based Information Retrieval Technique for Recovering Use-Case-to-Source-Code Trace Links in Embedded Software Systems	VSM	Preprocessing Stage
S5	Analyzing closeness of code dependencies for improving IR-based Traceability Recovery	VSM LSI JS	Links Refinement Stage
S6	An empirical study on the importance of source code entities for requirements traceability	LSI TM(LDA)	Preprocessing Stage
S7	Analyzing close relations between target artifacts for improving IR-based requirement traceability recovery	VSM	Links Generation Stage
S8	A semantic relatedness approach for traceability link recovery	VSM LSI	Preprocessing Stage
S9	Achieving better requirements to code traceability: which refactoring should be done first?	VSM LSI	Preprocessing Stage
S10	An Empirical Study on Requirements Traceability Using Eye-Tracking	LSI TM(LDA)	Preprocessing Stage
S11	An Improved Approach to the Recovery of Traceability Links between Requirement Documents and Source Codes Based on Latent Semantic Indexing	LSI	Preprocessing Stage Links Generation Stage
S12	An IR-Based Artificial Bee Colony Approach for Traceability Link Recovery	IR-based+	Links Generation Stage
S13	Toward multilevel textual requirements traceability using model-driven engineering and information retrieval	VSM	Links Generation Stage
S14	Code Patterns for Automatically Validating Requirements-to-Code Traces	TM(RTM)	Links Generation Stage
S15	Combining VSM and BTM to improve requirements trace links generation	VSM TM(BTM)	Links Generation Stage
S16	Trustrac: Mining Software Repositories to Improve the Accuracy of Requirement Traceability Links	VSM JS	Links Generation Stage
S17	Leveraging historical co-change information for requirements traceability	VSM JS	Links Generation Stage
S18	Multi-Objective Information Retrieval-Based NSGA-II Optimization for Requirements Traceability Recovery	IR-based+	Links Generation Stage
S19	Filtering of false positives from IR-based traceability links among software artifacts	VSM	Links Refinement Stage

S20	Quality improvements for trace links between source code and requirements	IR-based+	Links Generation Stage
S21	Recovering Traceability Links between Code and Documentation for Enterprise Project Artifacts	LSI	Preprocessing Stage
S22	Requirements Traceability Through Information Retrieval Using Dynamic Integration of Structural and Co-change Coupling	VSM	Links Refinement Stage
S23	An Automated Hybrid Approach for Generating Requirements Trace Links	VSM TM(BTM)	Links Generation Stage
S24	Enhancing candidate link generation for requirements tracing: The cluster hypothesis revisited	VSM	Links Refinement Stage
S25	Search-Based Requirements Traceability Recovery: A Multi-Objective Approach	IR-based+	Links Generation Stage
S26	Supporting requirements traceability through refactoring	VSM	Preprocessing Stage
S27	SANAYOJAN A framework for traceability link recovery between use-cases in software requirement specification and regulatory documents	TM(LDA)	Preprocessing Stage, Links Generation Stage
S28	Towards feature-aware retrieval of refinement traces	VSM LSI	Links Refinement Stage
S29	Interactive recovery of requirements traceability links using user feedback and configuration management logs	VSM	Links Generation Stage Preprocessing Stage
S30	Supporting requirements to code traceability through refactoring	VSM LSI	Preprocessing Stage
S31	Recovering traceability links between requirements and source code using the configuration management log	VSM	Links Generation Stage Preprocessing Stage
S32	Exploiting Parts-of-Speech for Effective Automated Requirements Traceability	VSM JS	Links Refinement Stage
S33	Using Frugal User Feedback with Closeness Analysis on Code to Improve IR-Based Traceability Recovery	VSM LSI JS	Links Refinement Stage
S34	Adaptive User Feedback for IR-Based Traceability Recovery	VSM	Links Refinement Stage
S35	Evolving Software Trace Links between Requirements and Source Code	VSM LSI	Links Generation Stage
S36	Supporting Requirements to Code Traceability Creation by Code Comments	VSM	Preprocessing Stage
S37	Using code ownership to improve IR-based Traceability Link Recovery	VSM BM	Links Generation Stage

### 1.3. Extracted Data for RQ3

Index	Title	Enhancement strategy
S1	An empirical study on recovering requirement-to-code links	Verb-object Phrases
S2	An Improved VSM-based Post-Requirements Traceability Recovery Approach Using Context Analysis	Context-based
S3	Configuring Latent Semantic Indexing for Requirements Tracing	None
S4	A Context-based Information Retrieval Technique for Recovering Use-Case-to-Source-Code Trace Links in Embedded Software Systems	Context-based
S5	Analyzing closeness of code dependencies for improving IR-based Traceability Recovery	Analyzing Close Relations of Code Dependencies
S6	An empirical study on the importance of source code entities for requirements traceability	Improved Term Weighting Scheme
S7	Analyzing close relations between target artifacts for improving IR-based requirement traceability recovery	Analyzing Close Relations
S8	A semantic relatedness approach for traceability link recovery	None
S9	Achieving better requirements to code traceability: which refactoring should be done first?	Refactoring
S10	An Empirical Study on Requirements Traceability Using Eye-Tracking	Term weighting scheme
S11	An Improved Approach to the Recovery of Traceability Links between Requirement Documents and Source Codes Based on Latent Semantic Indexing	Term Classification Class Clustering
S12	An IR-Based Artificial Bee Colony Approach for Traceability Link Recovery	None
S13	Toward multilevel textual requirements traceability using model-driven engineering and information retrieval	Model-Driven Engineering (MDE)
S14	Code Patterns for Automatically Validating Requirements-to-Code Traces	Code Calling Relationships
S15	Combining VSM and BTM to improve requirements trace links generation	Hybrid Method
S16	Trustrac: Mining Software Repositories to Improve the Accuracy of Requirement Traceability Links	Mining Software Repositories

S17	Leveraging historical co-change information for requirements traceability	Historical Co-change Information
S18	Multi-Objective Information Retrieval-Based NSGA-II Optimization for Requirements Traceability Recovery	None
S19	Filtering of false positives from IR-based traceability links among software artifacts	Correlation Among Classes
S20	Quality improvements for trace links between source code and requirements	None
S21	Recovering Traceability Links between Code and Documentation for Enterprise Project Artifacts	Syntax Tree
S22	Requirements Traceability Through Information Retrieval Using Dynamic Integration of Structural and Co-change Coupling	Dynamic Integration of Structural Co-change Coupling
S23	An Automated Hybrid Approach for Generating Requirements Trace Links	Hybrid Method Genetic Algorithm
S24	Enhancing candidate link generation for requirements tracing: The cluster hypothesis revisited	Cluster hypothesis
S25	Search-Based Requirements Traceability Recovery: A Multi-Objective Approach	None
S26	Supporting requirements traceability through refactoring	Refactoring
S27	SANAYOJAN A framework for traceability link recovery between use-cases in software requirement specification and regulatory documents	None
S28	Towards feature-aware retrieval of refinement traces	Graph Clustering
S29	Interactive recovery of requirements traceability links using user feedback and configuration management logs	Configuration Management Log User Feedback
S30	Supporting requirements to code traceability through refactoring	Refactoring
S31	Recovering traceability links between requirements and source code using the configuration management log	Configuration Management Log Commonality and Variability Analysis (CVA) Classification
S32	Exploiting Parts-of-Speech for Effective Automated Requirements Traceability	ConPOS approach
S33	Using Frugal User Feedback with Closeness Analysis on Code to Improve IR-Based Traceability Recovery	Frugal User Feedback with Closeness Analysis on Code
S34	Adaptive User Feedback for IR-Based Traceability Recovery	Adaptive User Feedback
S35	Evolving Software Trace Links between Requirements and Source Code	Trace Link Evolver
S36	Supporting Requirements to Code Traceability Creation by Code Comments	Code Comments
S37	Using code ownership to improve IR-based Traceability Link Recovery	code Ownership

#### 1.4. Extracted Data for RQ4

Index	Title	Source Artifact	Target Artifact	Datasets
S1	An empirical study on recovering requirement-to-code links	Requirements	Code	eTour iBooks SMS EasyClinic
S2	An Improved VSM-based Post-Requirements Traceability Recovery Approach Using Context Analysis	Use Cases	Code	eTour iTrust
S3	Configuring Latent Semantic Indexing for Requirements Tracing	Requirements Defect Reports Use Cases Change Requests	Requirements Use Cases Test Cases Use Cases	MODIS CM-1 EasyClinic MR0 MR1 MR2
S4	A Context-based Information Retrieval Technique for Recovering Use-Case-to-Source-Code Trace Links in Embedded Software Systems	Use Cases	Code	iRobot iTruck iSudoku
S5	Analyzing closeness of code dependencies for improving IR-based Traceability Recovery	Requirements	Code	iTrust GanttProject jHotDraw
S6	An empirical study on the importance of source code entities for requirements traceability	Requirements	Code	iTrust Lucene Pooka
S7	Analyzing close relations between target artifacts for improving IR-based requirement traceability recovery	Use Case Requirements	Test Case Design	EasyClinic CM1-NASA

		Requirements Requirements Use Case	Use Case Requirements Code	Pine GANNT iTrust
S8	A semantic relatedness approach for traceability link recovery	Use Cases Requirements	Code Design	iTrust eTour CM-1
S9	Achieving better requirements to code traceability: which refactoring should be done first?	Use Cases	Code	iTrust eTour
S10	An Empirical Study on Requirements Traceability Using Eye-Tracking	Requirements	Code	iTrust Pooka
S11	An Improved Approach to the Recovery of Traceability Links between Requirement Documents and Source Codes Based on Latent Semantic Indexing	Requirements	Code	Labor Market Monitoring Software Product Line (LMMSPL) engineering
S12	An IR-Based Artificial Bee Colony Approach for Traceability Link Recovery	Requirements Use Cases	Code	EBT Albergate eTour
S13	Toward multilevel textual requirements traceability using model-driven engineering and information retrieval	Requirements(not detail)	Requirements(not detail)	None
S14	Code Patterns for Automatically Validating Requirements-to-Code Traces	Requirements	Code	VideoOnDemand (VoD) Chess GanttProject jHotDraw (JHD)
S15	Combining VSM and BTM to improve requirements trace links generation	Use case Requirements Requirements	Test Case Test Case Requirements	WARC EasyClinic EBT
S16	Trustrac: Mining Software Repositories to Improve the Accuracy of Requirement Traceability Links	Requirements	Code	jEdit Pooka Rhino SIP Communicator
S17	Leveraging historical co-change information for requirements traceability	Requirements	Code	iTrust Pooka SIP Communicator
S18	Multi-Objective Information Retrieval-Based NSGA-II Optimization for Requirements Traceability Recovery	Requirements	Code	EBT Albergate eTour
S19	Filtering of false positives from IR-based traceability links among software artifacts	Use Cases	Code	iTrust
S20	Quality improvements for trace links between source code and requirements	Requirements Use Cases	Code	Mylyn iTrust
S21	Recovering Traceability Links between Code and Documentation for Enterprise Project Artifacts	Function Specification	Code	The experiment used actual enterprise project, the project was the NTT search system "i-mage"
S22	Requirements Traceability Through Information Retrieval Using Dynamic Integration of Structural and Co-change Coupling	Use Cases	Code	iTrust
S23	An Automated Hybrid Approach for Generating Requirements Trace Links	Use Case Requirements Requirements Use Cases	Test Case Test Case Requirements Code	WARC subset 1 WARC subset 2 EBT subset EasyClinic eTour
S24	Enhancing candidate link generation for requirements tracing: The cluster hypothesis revisited	Requirements Requirements	Code Design	iTrust eTour CM-1
S25	Search-Based Requirements Traceability Recovery: A Multi-Objective Approach	Requirements	Code	LEDA Albergate ETOUR

S26	Supporting requirements traceability through refactoring	Requirements	Code	iTrust eTour WDS
S27	SANAYOJAN A framework for traceability link recovery between use-cases in software requirement specification and regulatory documents	Use Cases	Regulatory Documents	The experiments on real-world data obtained from software projects of a large global Information Technology (IT) services company
S28	Towards feature-aware retrieval of refinement traces	Requirements Use Case	Use Case Test Case	EasyClinic CM-1 Waterloo
S29	Interactive recovery of requirements traceability links using user feedback and configuration management logs	Requirements	Code	Author carried out experiments targeting an enterprise system developed by a Japanese company
S30	Supporting requirements to code traceability through refactoring	Requirements	Code	iTrust eTour WDS
S31	Recovering traceability links between requirements and source code using the configuration management log	Requirements	Code	CUnit Network Control System
S32	Exploiting Parts-of-Speech for Effective Automated Requirements Traceability	Requirements	Code	iTrust Lynx Pooka SIP Communicator
S33	Using Frugal User Feedback with Closeness Analysis on Code to Improve IR-Based Traceability Recovery	Requirements	Code	iTrust Maven Pig GanttProject Infinispan
S34	Adaptive User Feedback for IR-Based Traceability Recovery	Use Cases Test Cases Code UML Interaction Diagram Requirements	Code Code JSP Code Requirements	Easy-Clinic i-Trust Modis
S35	Evolving Software Trace Links between Requirements and Source Code	Requirements	Code	Domain Analysis App DOTS File Generator Apache Cassandra Database System Dronology system
S36	Supporting Requirements to Code Traceability Creation by Code Comments	Use Cases	Code	eTour iTrust
S37	Using code ownership to improve IR-based Traceability Link Recovery	Use Cases	Code	eTour SMOS

#### 1.5. Extracted Data for RQ5, RQ6, RQ7 and RQ8

Index	Title	Intercept points	Measure	Baseline	Evidence level
S1	An empirical study on recovering requirement-to-code links	Threshold	Recall Precision F-Measure	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S2	An Improved VSM-based Post-Requirements Traceability Recovery Approach Using Context Analysis	Unclear	MAP Precision	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S3	Configuring Latent Semantic Indexing for Requirements Tracing	Unclear	MAP AP	None	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S4	A Context-based Information Retrieval Technique for Recovering Use-Case-to-Source-Code Trace Links in Embedded Software Systems	Unclear	Recall, Precision, MAP	VSM	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S5	Analyzing closeness of code dependencies for improving IR-based Traceability Recovery	Thresholds	Recall Precision F-Measure, MAP AP	VSM LIS JS	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S6	An empirical study on the importance of source	Threshold	Recall	LSI	Level 4. Evidence obtained from

	code entities for requirements traceability		Precision F-Measure		industrial studies (e.g., causal case studies in an industrial setting).
S7	Analyzing close relations between target artifacts for improving IR-based requirement traceability recovery	Threshold	Recall Precision MAP AP	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S8	A semantic relatedness approach for traceability link recovery	Threshold	Recall Precision F-Measure, MAP DiffAR Lag	VSM LSI	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S9	Achieving better requirements to code traceability: which refactoring should be done first ?	Threshold	None	VSM LIS	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S10	An Empirical Study on Requirements Traceability Using Eye-Tracking	Threshold	Recall, Precision F-Measure	LSI	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S11	An Improved Approach to the Recovery of Traceability Links between Requirement Documents and Source Codes Based on Latent Semantic Indexing	Threshold	Recall Precision	LSI	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S12	An IR-Based Artificial Bee Colony Approach for Traceability Link Recovery	Iteration	Recall Precision F-Measure	IR-based+	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S13	Toward multilevel textual requirements traceability using model-driven engineering and information retrieval	None	None	None	Level 1. Evidence obtained from demonstration or working out with toy examples.
S14	Code Patterns for Automatically Validating Requirements-to-Code Traces	None	Recall Precision	TM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S15	Combining VSM and BTM to improve requirements trace links generation	Threshold	Recall Precision	VSM TM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S16	Trustrac: Mining Software Repositories to Improve the Accuracy of Requirement Traceability Links	Threshold	Recall Precision F-Measure	VSM JS	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S17	Leveraging historical co-change information for requirements traceability	Threshold	Recall Precision	VSM JS	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S18	Multi-Objective Information Retrieval-Based NSGA-II Optimization for Requirements Traceability Recovery	Iteration	Recall Precision F-Measure	VSM LSI JS TM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S19	Filtering of false positives from IR-based traceability links among software artifacts	Iteration	Recall Precision F-Measure	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S20	Quality improvements for trace links between source code and requirements	Threshold	Recall Precision	IR-based+	Level 1. Evidence obtained from demonstration or working out with toy examples.
S21	Recovering Traceability Links between Code and Documentation for Enterprise Project Artifacts	Threshold	Recall Precision F-Measure	LIS	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S22	Requirements Traceability Through Information Retrieval Using Dynamic Integration of Structural and Co-change Coupling	Threshold	Recall, Precision F-Measure	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S23	An Automated Hybrid Approach for Generating Requirements Trace Links	Selectivity	Recall Precision F-Measure Selectivity	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S24	Enhancing candidate link generation for requirements tracing: The cluster hypothesis revisited	Threshold	Recall Precision MAP	VSM	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S25	Search-Based Requirements Traceability Recovery: A Multi-Objective Approach	Iteration	Recall Precision	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S26	Supporting requirements traceability through refactoring	Threshold	Recall Precision MAP DiffAR	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S27	SANAYOJAN A framework for traceability link recovery between use-cases in software requirement specification and regulatory documents	Unclear	AP MAP	LDA	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S28	Towards feature-aware retrieval of refinement traces	Unclear	Recall Precision AP	VSM LSI	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).



S29	Interactive recovery of requirements traceability links using user feedback and configuration management logs	Threshold	Recall Precision F-Measure	VSM	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S30	Supporting requirements to code traceability through refactoring	Threshold	Recall Precision MAP DiffAR	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S31	Recovering traceability links between requirements and source code using the configuration management log	Threshold	Recall Precision F-Measure	VSM	Level 4. Evidence obtained from industrial studies (e.g., causal case studies in an industrial setting).
S32	Exploiting Parts-of-Speech for Effective Automated Requirements Traceability	Unclear	Recall Precision MAP AP	VSM JS	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S33	Using Frugal User Feedback with Closeness Analysis on Code to Improve IR-Based Traceability Recovery	Threshold	Recall Precision F-Measure MAP AP	VSM LSI JS	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S34	Adaptive User Feedback for IR-Based Traceability Recovery	Threshold	Recall Precision	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S35	Evolving Software Trace Links between Requirements and Source Code	Unclear	Recall Precision F-Measure	VSM LSI	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S36	Supporting Requirements to Code Traceability Creation by Code Comments	Unclear	Recall Precision MAP AP	VSM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).
S37	Using code ownership to improve IR-based Traceability Link Recovery	Threshold	Recall Precision	VSM BM	Level 3. Evidence obtained from academic studies (e.g., controlled lab experiments).

**Table 7.** List of enhancement strategies for IR-based requirements trace recovery approaches

Strategy	IR model							Applying Phrase	Strategy Characteristics
	VSM	LSI	JS	LDA	BTM	RTM	BM		
Context- based [S2][S4]	•							P	Separating intent from context in requirements
Improved Term Weighting Scheme [S6][S10]		•		•				P	Proposing an improved term weighting scheme, namely, Developers Preferred Term Frequency/Inverse Document Frequency (DPTF/IDF)
Refactoring [S9][S26][S30]	•	•						P	Solving the problem of missing symbols, misplaced symbols and repeated symbols
Syntax Tree [S21]		•						P	Primary identifier keywords are converted to comment keywords by their similarity in appearance in the syntax tree location
Code Comments [S36]	•							P	Introducing different types of annotations to some extent compensate for vocabulary mismatches between requirements and source code to improve the accuracy of tracing links.
Commonality and Variability Analysis (CVA) [S31]	•							P	Analyzing to which products elements (e.g., requirements, code elements) belong.
Term Classification [S11]		•						P	Categorizing class names, comments, and all other terms in code
Analyzing Close Relations [S7]	•							G	Calculating the close relations (semantic similarity) between target artifacts
Verb-object Phrases [S1]	•							G	Extracting verb-object phrases as main information and essential meaning
Model-Driven Engineering (MDE) [S13]	•							G	Combining use of both MDE and IR, analyzing the textual information (organization and hierarchy) contained in the model to retrieve implicit links between documents
Hybrid Method [S15][S23]	•				•			G	Combing VSM and BTM which can help relieve data sparsity caused by short text
Genetic Algorithm [S23]					•			G	Configuring initial parameters of BTM by introducing Genetic Algorithm
Code Calling Relationships [S14]						•		G	Identifying errors between requirements and code traces by code-calling relationships
Historical Co-change Information [S17]	•	•						G	Taking the processed corpora and co-change information of classes as input to reorder and filter baseline links
Configuration Management Log [S29][S31]	•							G	Restoring links by finding revisions in the configuration management log that contain words related to requirements
Adaptive User Feedback [S34]	•							G	Determining whether and how to apply relevant feedback based on the verbosity of the software artifacts and the number of correct links and false positives that have been categorized. The accuracy is improved by combining the judgment provided by users on classified links.
Trace Link Evolver (TLE) [S35]	•	•						G	Proposing a TLE, which relies on a set of heuristics combined with refactoring detection tools and IR algorithms, to detect predefined change scenarios that occur between successive versions of a software system.
Code Ownership [S37]	•						•	G	Using source code ownership information to capture relationships between source code artifacts to improve recovery of trace links between documents and source code.
Mining software repositories [S16]	•		•					G	An expert is introduced to discard/reorder the baseline traceability links. The expert can submit messages and bugs reports by mining CVS/SVN in the software repository, and store all recovered requirements and links between the software repository in a dedicated set.
Dynamic Integration of Structural and Co-change Coupling [S22]	•							R	Retrieving indirect links based on weighted integration of structural coupling and class coupling based on change history
Cluster hypothesis [S24]	•							R	By discovering appropriate clustering mechanisms, distinguish between high quality and low-quality clusters, filter links in low quality clusters, catch all possible correct traceability links, and reduce false links.
Frugal User Feedback with Closeness Analysis on Code [S33]	•	•	•					R	Introducing only a small amount of user feedback into the closeness analysis on call and data dependencies in code
User Feedback [S29]	•							R	Introducing user validation for candidate links to improve accuracy
Analyzing Closeness of Code Dependencies [S5]	•	•	•					R	Quantifying the interaction degree of call dependency and data dependency between two code classes
Class Clustering [S11]		•						R	The products in the clustering have similar trace relationships
Correlation among Classes [S19]	•							R	Using structural or co-changing dependencies or both to find correlations between classes and use these dependencies to verify traceability links
Graph Clustering [S28]	•	•						R	Information about the cohesion of artifacts within a level of refinement helps improve the trace retrieval process between levels of refinement
ConPOS approach [S32]	•		•					R	Pruning trace links using the primary POS classification and apply constraints to recovery as a filtering process

Note: “•” represents support; “P” represents Preprocessing Stage, “G” represents Links Generation Stage, “R” represents Links Refinement Stage.

**Table 8.** Datasets' information and the studied papers which used the datasets

Dataset Name	Source Artifacts (Number)	Target Artifacts (Number)	Space	True Links	Scale	Freq.	Resource links	Reference
iTrust	Use Cases (34)	Code (243)	8262	603	Large	18	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S2][S5][S6][S7][S8][S9][S10][S17][S19][S20][S22][S24][S26][S30][S33][S34][S35][S37]
	Requirements (50)	Code (299)	14950	314				
	Use Cases (33)	JSP (47)	1551	58	Small			
eTour	Use Cases (58)	Code (116)	6728	308	Large	13	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S1][S2][S8][S9][S12][S18][S23][S24][S25][S26][S30][S37][S38]
	Requirements (58)	Code (116)	6728	366				
EasyClinic	Requirements (30)	Code (47)	1410	83	Small	7	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S1][S3][S7][S15][S23][S28][S35]
	Use Cases (30)	Test Cases (63)	1890	63				
	UML Interaction Diagram (20)	Code Classes (47)	940	69				
CM-1	High-level Requirements (235)	Design (220)	51700	361	Large	5	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S3][S7][S8][S24][S28]
	Requirements (235)	Design (220)	51700	361				
	Requirements (235)	Use Case (Unclear)	Unclear	Unclear				
	Requirement (298)	Code (90)	26820	546	Unclear			
Pooka	Requirements (41)	Test Cases (25)	1025	51	Large	5	<a href="http://www.suberic.net/pooka/">http://www.suberic.net/pooka/</a>	[S6][S10][S16][S17][S33]
	Requirements (90)	Code (298)	26820	546				
EBT	requirements (40)	Code (50)	2000	98	Small	4	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S12][S15][S18][S23]
	Requirements (16)	Code (124)	1173	315				
GanttProject	Requirements (17)	Code (55)	935	54	Small	4	<a href="http://www.ganttproject.biz">http://www.ganttproject.biz</a>	[S5][S7][S14][S34]
Albergate	Requirements (82)	Code (1771)	145222	871	Small	3	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S12][S18][S25]
SIP Communicator	Non-functional Requirements (21)	Software Requirements Specification (89)	1869	58	Large	3	<a href="http://www.jitsi.org">http://www.jitsi.org</a>	[S16][S17][S33]
WARC	Functional Requirements (43)	Software Requirements Specification (89)	3827	78	Small	2	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S15][S23]
	High-level Requirements (17)	Low-level Requirements (69)	1173	68	Large			
GANNT	Use Cases (67)	Code (100)	6700	1044	Small	1	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S7]
SMOS	Requirements (34)	Code (483)	16422	Unclear	Large	1	<a href="http://www.coest.org/">http://www.coest.org/</a>	[S38]
jEdit v4.3	Requirements (237)	Code (388)	91956	1515	Large	1	<a href="http://www.jedit.org">http://www.jedit.org</a>	[S16]
Infinispan	Requirements (116)	Code (413)	47908	744	Large	1	<a href="http://infinispan.org/">http://infinispan.org/</a>	[S34]
Lucene	Requirements (268)	Code (138)	36984	Unclear	Large	1	<a href="http://lucene.apache.org">http://lucene.apache.org</a>	[S6]
Rhino v1.6	Requirements (90)	Code (298)	26820	507	Large	1	<a href="http://www.mozilla.org/rhino/">http://www.mozilla.org/rhino/</a>	[S16]
Lynx	Requirements (128)	Code (unclear)	Unclear	376	Unclear	1	<a href="http://lynx.isc.org/">http://lynx.isc.org/</a>	[S33]
Maven	Requirements (68)	Code (236)	16048	356	Large	1	<a href="http://maven.apache.org/">http://maven.apache.org/</a>	[S34]
Pig	Requirements (Unclear)	Code (Unclear)	Unclear	Unclear	Large	1	<a href="https://pig.apache.org/">https://pig.apache.org/</a>	[S34]
Mylyn	Requirements (16)	Code (144)	2,304	221	Unclear	1	<a href="http://www.eclipse.org/mylyn/developers">http://www.eclipse.org/mylyn/developers</a>	[S20]
jHotDraw (JHD)	High-level Requirements (19)	Low-level Requirements (49)	931	567	Small	2		[S5][S14]
MODIS	Requirements (26)	Code (521)	13,546	229	Small	2		[S3][S35]
WDS	requirements (8)	Code (408)	3240	3240	Large	2		[S26][S30]
Chess	Requirements (15)	Code (unclear)	Unclear	Unclear	Large	1		[S14]
CUnit	Requirements (19)	Code (61)	1159	104				
iBooks	Use Cases (21)	Code (20)	420	45	Small	1		[S1]
iRobot	Use Cases (24)	Code (14)	336	37	Small	1		[S4]
iTruck	Use Cases (18)	Code (54)	872	51	Small	1		[S4]
iSudoku	Requirements (64)	Code (102)	6,528	1,071	Small	1		[S4]
SMS	Use Cases (24)	Test Cases (60)	1,440	711	Small	1		[S1]
MR0	Defect Reports (135)	Use Cases (28)	3,780	Unclear	Small	1		[S3]
MR1	Change Requests (28)	Use Cases (21)	588	Unclear	Small	1		[S3]
MR2	Requirements (49)	Use Cases (51)	2,499	Unclear	Small	1		[S3]
Pine	Requirements (13)	Code (169)	2,197	Unclear	Small	1		[S7]
VideoOnDemand (VoD)	Requirements (unclear)	Use Cases (unclear)	Unclear	Unclear	Small	1		[S14]
Waterloo	Requirements (88)	Code (208)	18,304	Unclear	Unclear	1		[S28]
LEDA	Requirements (49)	Code (unclear)	Unclear	Unclear	Large	1		[S25]
network control system	Requirements (9)	Code (4)	36	11	Unclear	1		[S32]
Domain Analysis App	Requirements (7)	Code (5)	35	7	Small	1		[S36]

## 2. Search process record

Database	Number of searches	Number of repetitions in each database	Number of each database (After deleting repetitions)	Number of repetitions in all 6 databases	Total number (After deleting repetitions)
IEEE	485	369	116	193	1618
EI	1156	639	517		
Science Direct	87	47	40		
Springer	266	0	266		
ACM	62	31	31		
Google scholar	1073	232	841		

### 2.1. Search records

Search terms:

P1	requirement traceability
P2	requirement trace
P3	requirement tracing
P4	requirement traceability recovery
I1	information retrieval
I2	IR
I3	semantic

#### (1) IEEE

	Abstract	Title	Index term
P1+I1	38	2	49
P1+I2	21	0	12
P1+I3	38	3	20
P2+I1	34	0	23
P2+I2	17	0	4
P2+I3	27	1	11
P3+I1	34	0	23
P3+I2	17	0	4
P3+I3	27	1	11
P4+I1	13	1	20
P4+I2	9	0	9
P4+I3	9	1	6
Total	485		

An example screenshots of search process in IEEE

P1+I1: Abstract

Search within results Download PDFs ▾ | Per Page: 25 ▾ | Export ▾

Showing 1-25 of 38 for ("Abstract":requirement traceability) AND ("Abstract":information retrieval) ×

▼ Filters Applied: 2012 - 2021 ×

☐ Conferences (36) ☐ Journals (2)

**Show**

☒ All Results

☐ Subscribed Content ?

☐ Open Access Only

**Year** ▾

Single Year | Range

2012 | 2021

From 2012 To 2021

**Author** ▾

☐ Select All on Page

**Sort By: Relevance ▾**

☐ **Comparison of Information Retrieval Techniques for Traceability Link Recovery**

Danissa V. Rodriguez; Doris L. Carver

2019 IEEE 2nd International Conference on Information and Computer Technologies (ICICT)

Year: 2019 | Conference Paper | Publisher: IEEE

Cited by: Papers (4)

Abstract HTML PDF CC

☐ **An Extended Knowledge Representation Learning Approach for Context-Based Traceability Link Recovery: Extended Abstract**

Guoshuai Zhao; Tong Li; Zhen Yang

2020 IEEE Seventh International Workshop on Artificial Intelligence for Requirements Engineering (AIRE)

Year: 2020 | Conference Paper | Publisher: IEEE

Cited by: Papers (1)

Abstract LITAM PDF CC

(2) EI

	Abstract + Title + Keywords (Index term)
(p1 or p2 or p3 or p4) and (I1)	344
(p1 or p2 or p3 or p4) and (I2)	270
(p1 or p2 or p3 or p4) and (I3)	542
Total	1156

The screenshots of search process in EI

(p1 or p2 or p3 or p4) and (I1): Abstract + Title + Keywords

344 records found in Compendex for 2012-2021: ((requirement traceability OR requirement trace OR requirement tracing OR requirement traceability recovery) AND (information retrieval)) WN ALL AND (English) WN LA

Create alert Save search Share search RSS feed

Sort by: Relevance

Display: 25 results per page

**Refine**

By physical property

Filter results by physical properties such as size, temperature, pressure and many more ▾

By category

Limit to Exclude

Add a term

Open Access

☐ All Open Access (102)

☐ Gold (17)

☐ Hybrid Gold (11)

☐ Bronze (24)

☐ Green (79)

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Controlled vocabulary

☒ Information Retrieval (89)

☐ Semantics (51)

☐ Requirements Engineering (46)

☐ Search Engines (46)

☐ Recovery (33)

View more ▸

Document type

☐ Conference article (19)

☐ Journal article (11)

☐ Preprint (11)

☐ Conference proceeding (11)

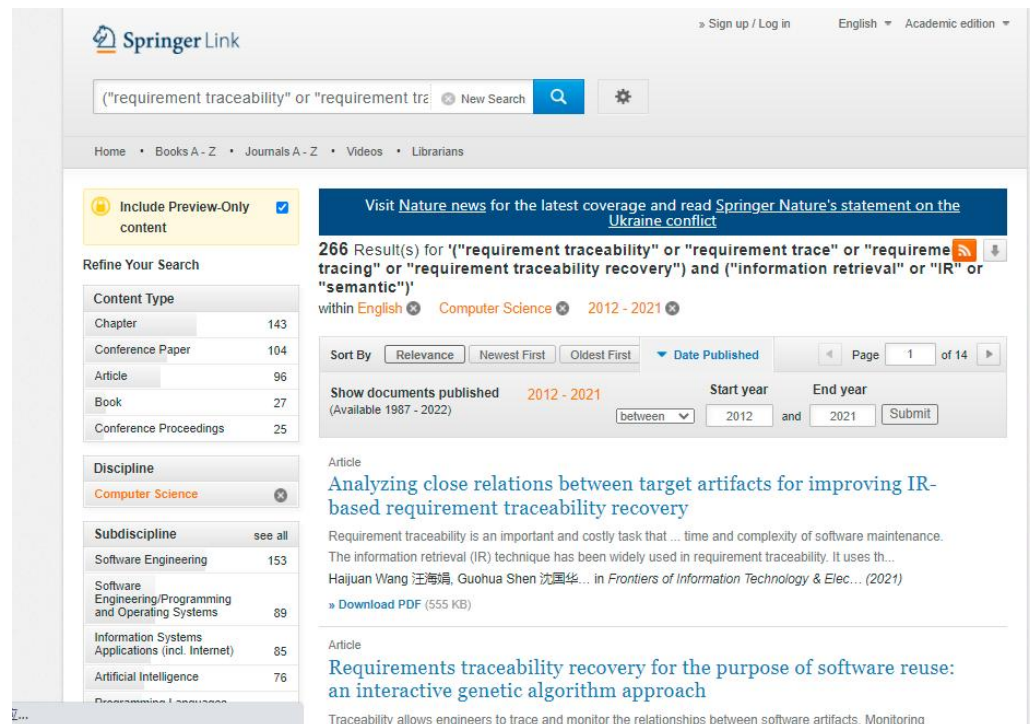
☐ Article in Press (5)

- ☐ **Analyzing close relations between target artifacts for improving IR-based requirement traceability recovery**  
Wang, Huijuan (College of Computer Science and Technology, Nanjing University of Aeronautics and Astronautics, Nanjing, 211106, China); Shen, Guohua; Huang, Zhiqiu; Yu, Yaoshen; Chen, Kai Source: Frontiers of Information Technology and Electronic Engineering, v 22, n 7, p 957-968, July 2021  
Database: Compendex  
Document type: Journal article (JA)  
Detailed Show preview ▾ Cited by in Scopus (1) Full text ▾
- ☐ **Comparison of Information Retrieval Techniques for Traceability Link Recovery**  
Rodriguez, Danissa V. (Division of Computer Science and Engineering, Louisiana State University, Baton Rouge, LA, 70803, United States); Carver, Doris L. Source: 2019 IEEE 2nd International Conference on Information and Computer Technologies, ICICT 2019, p 188-193, May 9, 2019, 2019 IEEE 2nd International Conference on Information and Computer Technologies, ICICT 2019  
Database: Compendex  
Document type: Conference article (CA)  
Detailed Show preview ▾ Cited by in Scopus (5) Full text ▾
- ☐ **Improving Traceability Link Recovery Using Fine-grained Requirements-to-Code Relations**  
Hey, Tobias (Karlsruhe Institute of Technology (KIT), Institute for Program Structures and Data Organization, Karlsruhe, Germany); Chen, Fei; Weigelt, Sebastian; Tichy, Walter F. Source: Proceedings - 2021 IEEE International Conference on Software Maintenance and Evolution, ICSME 2021, p 12-22, 2021, Proceedings - 2021 IEEE International Conference on Software Maintenance and Evolution, ICSME 2021  
Database: Compendex  
Document type: Conference article (CA)  
Detailed Show preview ▾ Full text ▾
- ☐ **Multi-Objective Information Retrieval-Based NSGA-II Optimization for Requirements Traceability Recovery**  
Rodriguez, Danissa V. (Louisiana State University, Division of Computer Science and Engineering, Baton Rouge, United States); Carver, Doris L. Source: IEEE International Conference on Electro Information Technology, EIT 2020, p 271-280, July 2020, 2020 IEEE International Conference on Electro Information Technology, EIT 2020  
Database: Compendex  
Document type: Conference article (CA)  
Detailed Show preview ▾ Cited by in Scopus (1) Full text ▾
- ☐ **ATLAS: A framework for traceability links recovery combining information retrieval and semi-supervised techniques** (Open Access)  
Balla, Emma Elita (RT Systems, Paris-Saclay, France); Croft, Stephen; Gerasim, Maria-Pierre; Bandreau, Rada Source: Proceedings - 2019 IEEE 23rd International Enterprise Distributed Object Computing Conference, EDOC 2019, p 161-170, October 2019, Proceedings - 2019 IEEE 23rd International Enterprise Distributed Object Computing Conference, EDOC 2019  
Database: Compendex  
Document type: Conference article (CA)  
Detailed Show preview ▾ Cited by in Scopus (1) Full text ▾

(3) Springer

	Abstract + Title + Keywords (Index term)
(p1 or p2 or p3 or p4) and (I1 or I2 or I3)	266

The screenshots of search process in Springer:



#### (4) Science Direct

	Abstract + Title + Keywords (Index term)
P1+I1	10
P1+I2	16
P1+I3	12
P2+I1	10
P2+I2	16
P2+I3	12
P3+I1	3
P3+I2	4
P3+I3	3
P4+I1	1
P4+I2	0
P4+I3	0
Total	87

An example screenshots of search process in Elsevier

P1+ I1: Abstract + Title + Keywords:

Year: 2012-2021 X Title, abstract, keywords: requirement traceability and information retrieval X  
 Advanced search

10 results

Set search alert

Refine by:

☐ Subscribed journals

Years

☐ 2020 (3)  
☐ 2019 (2)  
☐ 2018 (4)  
 Show more

Article type

☐ Review articles (1)  
☐ Research articles (8)  
☐ Book chapters (1)

Publication title

☐ Journal of Systems and Software (2)  
☐ Neuropsychologia (1)  
☐ Computers in Industry (1)  
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1 Exploiting Parts-of-Speech for effective automated requirements traceability  
 Information and Software Technology, 27 September 2018, ...  
 Nasir Ali, Halpeng Cai, ... Jameleddine Hassine  
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Research article Full text access

2 Traceability Link Recovery between Requirements and Models using an Evolutionary Algorithm Guided by a Learning to Rank Algorithm: Train control and management case  
 Journal of Systems and Software, 15 January 2020, ...  
 Ana C. Marcén, Raúl Lapeña, ... Carlos Cetina  
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3 Requirements traceability technologies and technology transfer decision support: A systematic review  
 Journal of Systems and Software, 6 September 2018, ...  
 Bangchao Wang, Rong Peng, ... Zhuo Wang  
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Feedback

## (5) ACM

	Full text	Anywhere
P1+(I1, I2, I3)	24	24
P2+(I1, I2, I3)	4	4
P3+(I1, I2, I3)	3	3
P4+(I1, I2, I3)	0	0
Total	62	

An example screenshots of search process in ACM

Full text:

**Search**

Search anything within the ACM Digital Library or go to your [Saved Searches](#)

Search items from:

The ACM Full-Text collection

Search Within

Full text "requirement traceability "

Full text "information retrieval" OR "IR" OR "semantic"

Filters

Published in Match All Enter Search term

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**Applied Filters**

2012 - 2021 Clear All

**People**

Names ▼

Institutions ▼

Authors ▼

**Publications**

Journal/Magazine Names ▼

Proceedings/Book Names ▼

All Publications ▼

Content Type ▼

Media Formats ▼

Publisher ▼

**Conferences**

**24 Results for: [Full Text: "requirement traceability"] AND [(Full Text: "information retrieval") OR [Full Text: "ir"] OR [Full Text: "semantic"]] AND [Publication Date: (01/01/2012 TO 12/31/2021)]** Edit Search

Save Search

Searched The ACM Full-Text Collection (663,289 records) | Expand your search to The ACM Guide to Computing Literature (3,313,563 records) RSS

**RESULTS** **PEOPLE** Showing 1 - 20 of 24 Results

☐ Select All per page: 10 20 50 Relevance ▼

☐ **POSTER** May 2018

**Agile requirement traceability matrix**

Serin Jeong, Heetae Cho, Seonah Lee

ICSE '18: Proceedings of the 40th International Conference on Software Engineering: Companion Proceedings • May 2018, pp 187–188 • <https://doi.org/10.1145/3183440.3195089>

Over the past 20 years, agile development methodology has been commonly adopted by developers. One reason is that it flexibly responds to changes. In contrast, a typical requirement traceability matrix is inflexible in incorporating changes. In this ...

3 295 Highlights ▼ Get Access

☐ **SHORT-PAPER** September 2015

**Cost-Effective Traceability Links for Architecture-Level Software Understanding: A Controlled Experiment**

Muhammad Atif Iaved, Srdjan Stevanetic, Uwe Zdun

ASWEC '15 Vol. II: Proceedings of the ASWEC 2015 24th Australasian Software Engineering Conference • September 2015, pp 69–73 • <https://doi.org/10.1145/2811681.2811695>

An important architectural challenge is to recover traceability links between the software architecture and artifacts produced in the other activities of the development process, such as requirements, detailed design,

## (6) Google Scholar

	Title	Abstract	Index term
(p1 or p2 or p3 or p4) and (I1 or I2 or I3)	216	7	850
Total	1073		

An example screenshots of search process in Google Scholar

intext:

intext: requirement traceability

scholar.google.com/scholar?q=intext%3A%5B%5B%5C%22requirement+traceability%22+OR+%22requirement+trace%22+OR+%22requirement+tracing%22+OR+%22requirement+traceability+recovery%22%5D+AND+%5B%5B%5C%22information+retrieval%22+OR+ir+O...

**Google Scholar** intext: requirement traceability OR requirement trace OR requirement tra

**Articles** About 850 results (0.02 sec)

Any time  
Since 2022  
Since 2021  
Since 2018  
Custom range: 2012 - 2021

Sort by relevance  
Sort by date

Any language  
Search English pages

Any type  
Review articles

☐ Include patents  
☒ Include citations

Create alert

**Trustrace: Mining software repositories to improve the accuracy of requirement traceability links**  
N Ali, YG Guathineus, G Antoniol - IEEE Transactions on ..., 2012 - IEEE Xplore

Abstract: Requirement traceability is an important and costly task that creates trace links with those of state-of-the-art IR techniques. As state-of-the-art IR techniques, we choose the Vector Space ...  
★ Save 90 Cite Cited by 124 Related articles All 6 versions Import into EndNote

**Analyzing close relations between target artifacts for improving IR-based requirement traceability recovery**  
H Wang, G Shen, Z Huang, Y Yu, K Chen - Frontiers of Information ..., 2021 - Springer

Abstract: Requirement traceability is an important and costly task that creates trace links ...  
The information retrieval (IR) technique has been widely used in requirement traceability. It uses ...  
★ Save 90 Cite Cited by 1 Related articles All 2 versions Import into EndNote

**Information retrieval based requirement traceability recovery approaches-a systematic literature review** [PDF] academia.edu  
M Saleem, NM Minhas - University of Sindh Journal of Information ..., 2018 - academia.edu

This study summarizes the IR based requirement traceability recovery approaches to ...  
Missing relevant studies: Our search focused on requirement traceability solutions based on IR ...  
★ Save 90 Cite Cited by 7 Related articles All 3 versions Import into EndNote 90

**An effective approach for accuracy of requirement traceability in DevOps**  
VM Sale, S Thigale, BC Melimath, S Shaikh - Techno-social 2020, 2021 - Springer

The analysis of different IR methods can be in three steps [13]. First, after preprocessing ...  
the similarity varies depends on the IR method. We use the VSM IR method in this paper and ...  
★ Save 90 Cite Cited by 1 Related articles Import into EndNote

**OntoReq: an ontology focused collective knowledge approach for requirement traceability modelling**  
V Adithya, G Deepak - European, Asian, Middle Eastern, North African ..., 2021 - Springer

the node of the entity and UML diagrams is done and semantic similarity is computed and optimized using Sunflower optimization and Requirement traceability matrix is created ...  
★ Save 90 Cite Cited by 4 Related articles Import into EndNote

**The Research of Domain Ontology Recommendation Method with Its Applications in Requirement Traceability**  
D Huaqiang, L Hongting, X Songyu - ..., 2017 - IEEE Xplore

requirement traceability in the semantic level. A domain ontology recommendation method has been proposed. Using this method, the lexical semantic ... the requirement traceability can ...  
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