# Rrezarta Krasniqi

 $\ \ \, \blacksquare$ Rrezarta. Krasniqi@unt.edu \* https://Rrezarta-Krasniqi.github.io

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	North Texas
DISSERTATION:	Exploring the Software Quality Maze: Detecting Scattered and Tangled Quality Concerns in Source Code to Facilitate Maintenance and Evolution Tasks
Advisor:	Hyunsook Do
	Notre Dame
THESIS:	Detecting Emerging Quality-Related Concerns across Evolving Software Artifacts
Advisor:	Gregory Madey
v	Prishtina
RESEARCH I	INTERESTS
_	bering, Requirements Engineering, Software Quality, Software Maintenance and Evolution, Natural ssing, Information Retrieval, Applied Machine Learning, Empirical Methodologies
NOTABLE A	WARDS
Research and	Education Grants
	esearch Support Grant, The Toulouse Graduate School, University of North Texas (\$500) 2023 STEM Grant, Women and HI Tech (\$2,500)
Travel Grants	
<ul> <li>[2]. CENG Tra</li> <li>[3]. TGS Trave</li> <li>[4]. GHC Trave</li> <li>[5]. COMPSAC</li> <li>[6]. CRA-WP</li> <li>[7]. IDEALS T</li> </ul>	l Grant, UNT Department of Computer Science and Engineering (\$1,470)
Honors and A	wards
. ,	Engineering Department Award, University of North Texas (\$2,160)

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[3].	NCWII Collegiate Awara (finalist) (\$150)	2023
[4].	Graduate Student Success Award, University of North Texas (\$500)	2022
[5].	Invitation to EMSE Journal, SANER'21 Special Issue for Top Papers $C_{[3]}$	2021
[6].	GHC-Virtual, UNT Department of Computer Science and Engineering (\$200)	2021
[7].	3MT Doctoral Competition-People's Choice Award, University of North Texas (\$250)	2021
[8].	Excellence Award, Ministry of Science, Education ans Technology, Kosovo (\$2,000)	2009
[9].	Certificate of Appreciation, Midwestern State University	2008
[10].	. Outstanding Graduate Woman, Midwestern State University	2008
Scho	olarships and Fellowships	
[1].	Graduate Teaching Assistantship, University of North Texas (\$25, 356)	2021-2024
[2].	Teaching Fellow Scholarship, University of North Texas (\$1,000)	2022-2023
[3].	Richard Tapia Scholarship, Tapia Conference, Dallas, TX (\$1,500)	2023
[4].	Google Lime Scholarship, Lime Connect and Google (semi-finalist)	2020
[5].	Graduate Research Assistantship, University of Notre Dame (\$55, 308)	2017
[6].	Jenkins & Roy Smith Scholarship, Midwestern State University (\$1,500)	2009
[7].	McCoy School of Engineering Scholarship, Midwestern State University (\$1,000)	2008
[8].	Tom C. White Scholarship, Midwestern State University (\$1,500)	2008
[9].	Graduate Teaching Assistantship, Midwestern State University (\$17,240)	2008

#### **PUBLICATIONS**

(ORCiD ID: 0000-0001-6884-6131)

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# Referred Journal Articles

- [1]. Krasniqi, R., Do, H., "A Multi-Model Framework for Semantically Enhancing Detection of Quality-Related Bug Report Descriptions". Empirical Software Engineering (EMSE'23), 28, 1-62 pages, 2023. (\*\*Q Invitation for a Special Issue to an EMSE Journal for Top Papers of SANER 2021).
- [2]. Krasniqi, R., Do, H., "Towards Semantically Enhanced Detection of Emerging Quality-Related Concerns in the Source Code," Software Quality Journal (SQJO'23), 1-51 pages, 2023.
- [3]. Aljedaani, W., <u>Krasniqi R.</u>, Aljedaani S., Mkouer M., Ludi, S., Al-Radadah K., "If Online Learning Works for You, What about Deaf Students?" Universal Access in the Information Society (UAIS'22), 1-20, 2022.

## Peer-Reviewed Conference Publications (Full Papers)

- [1]. Krasniqi, R., Do, H., "A Hierarchical Topical Modeling Approach for Recommending Repair of Quality Bugs,"

  Proceedings of the 30<sup>th</sup> IEEE International Conference on Software Analysis, Evolution and Reengineering

  (SANER'23), Macao SAR, China, March 21-24, 2023.
- [2]. Krasniqi, R., Do, H., "Automatically Capturing Quality-Related Concerns in Bug Report Descriptions for Efficient Bug Triaging," Proceedings of the 23<sup>rd</sup> International Conference on Evaluation and Assessment in Software Engineering (EASE'22), Research Track, Gothenburg, Sweden, June 13-15, 2022.
- [3]. Krasniqi, R., Agrawal A., "Analyzing and Detecting Emerging Quality-Related Concerns across OSS Defect Report Summaries," Proceedings of the 28<sup>th</sup> IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER'21), Honolulu, HI, March 9-12, 2021.
- [4]. Krasniqi, R., "Recommending Bug-fixing Comments from Issue Tracking Discussions in Support of Bug Repair," Proceedings of the 45<sup>th</sup> IEEE Annual Computers, Software, and Applications Conference (COMP-SAC'21), Madrid, Spain, July 12-16, 2021.

[5]. Stringfellow, C., Simpson, R., Enloe, K., <u>Krasniqi, R., Ngo, T., Keown, R., Hood, J., "Solving T-Joint Problem in Reconstructing 2-D Objects," Proceedings of International Conference on Image Theory and Applications (IPTA'10), Angers, France, May 17-21, 2010.</u>

# Peer-Reviewed Conference Publications (Short Papers)

- [1]. Krasniqi, R., Do, H., "Capturing Contextual Relationships of Buggy Classes for Detecting Quality-Related Bugs," Proceedings of the 39<sup>th</sup> IEEE International Conference on Software Maintenance and Evolution (ICSME'23), NIER Track, Bogota, Colombia, October 1-6 2023.
- [2]. Krasniqi, R., "Detecting Scattered and Tangled Quality Concerns in Code to Aid Maintenance and Evolution Tasks," Proceedings of the 45<sup>th</sup> IEEE/ACM International Conference on Software Engineering (ICSE'23), Doctoral Symposium Track, Melbourne, Australia, May 14-20, 2023.
- [3]. Krasniqi, R., Cleland-Huang, J., "Enhancing Source Code Refactoring Detection with Explanations from Commit Messages," Proceedings of the 27<sup>th</sup> IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER'20), ERA Track, London, ON, February 18-21, 2020.
- [4]. Krasniqi, R., McMillan, C., "TraceLab Components for Generating Speech Act Types in Developer Question/Answer Conversations," Proceedings of the 34<sup>th</sup> IEEE International Conference on Software Maintenance and Evolution (ICSME'18), Artifacts Track, Madrid, Spain, September 23-29, 2018.
- [5]. Krasniqi, R., Jiang, S., McMillan, C., "TraceLab Components for Generating Extractive Summaries of User Stories," Proceedings of the 33<sup>rd</sup> IEEE International Conference on Software Maintenance and Evolution (ICSME'17), Artifacts Track, Shanghai, China, September 17-24, 2017.

# Peer-Reviewed Workshop Publications

- [1]. Krasniqi, R., Do, H., "Generalizability of NLP-based Models for Modern Software Development Cross-Domain Environments," Proceedings of the 2<sup>nd</sup> IEEE International Workshop on Natural Language-based Software Engineering (NLPBSE'23), co-located with ICSE, Melbourne, Australia, May 14-20, 2023.
- [2]. Krasniqi, R., "Extractive Summarization of Related Bug-fixing Comments in Support of Bug Repair," Proceedings of the 2<sup>nd</sup> IEEE International Workshop on Automated Program Repair (APR'21), co-located with ICSE, Madrid, Spain, June 1, 2021.

# Poster Presentations

- [1]. Krasniqi, R., "Extracting Crosscutting Comment Discussions from Issue Tracking Systems in Support of Bug Repair" *Presented at Richard Tapia Conference*, Dallas, TX, Sept 13, 2023.
- [2]. Krasniqi, R., "Leveraging Feature Selection Models for Effective Triaging of Quality Bugs," Presented at UNT Engineering Research Showcase Competition, Denton, TX, Mar 30, 2023.
- [3]. Krasniqi, R., "A Context-Aware Detection of Quality Concerns for Enhancing Explainability of Systems," Presented at the Federation Graduate Student Research Symposium, Denton, TX, Apr 22, 2022.
- [4]. Krasniqi, R., "Towards Semantic-Based Detection of Crosscutting Software Quality Concerns across Codebase," Presented at UNT Engineering Research Showcase Competition, Denton, TX, Apr 14, 2022.
- [5]. Krasniqi R., "Extractive Summarization of Related Bug-fixing Comments in Support of Bug Repair," Poster presented at Grad Cohort Track (CRA-WP), New Orleans, LA, Apr 24, 2021.
- [6]. Krasniqi R., "Enhancing Code Refactoring Detection with Explanations from Commit Messages," Poster presented at Grad Cohort Track (CRA-IDEALS), Austin, TX, Mar 6, 2020.

### THESIS AND DISSERTATION

Krasniqi, R., "Detecting Emerging Quality-Related Concerns Across Evolving Software Artifacts," MS Thesis, University of Notre Dame, November 2020. [Public Source]

#### RESEARCH EXPERIENCE

Research .	Assistant,	University	$of\ North$	Texas	 	 	 	 Jan'21-	Pres	ENT
Department	of Compute	r Science o	and Engin	eering	 	 	 	 Den	TON,	TX

AUTOMATED UNTANGLING OF QUALITY CONCERNS FROM THE SOURCE CODE CHANGESETS: Developed an automated technique to untangle complex changesets that involve quality concerns and related code components with multiple dependencies, evaluating its effectiveness through both quantitative and qualitative analysis.

SEMANTICALLY ENHANCING DETECTION OF CROSSCUTTING QUALITY CONCERNS IN THE SOURCE CODE: Developed an approach for extracting quality concerns from source code using a comprehensive three-pronged technique. This involved integrating various NLP-based techniques, including a graph-based model (TextRank), a statistical-based model (TF-IDF), and a feature-based model (Yake), to generate summaries of code segments pertaining to quality concerns. Furthermore, I enhanced the existing model by incorporating a comprehensive 3D visualization mechanism, enabling efficient tagging and mapping of quality concerns within the codebase.

A MULTI-MODEL FRAMEWORK FOR ENHANCING DETECTION OF QUALITY BUG REPORT DESCRIPTIONS: Developed a multi-model approach that efficiently captures lexical, shallow, and semantic features from concise bug report descriptions. By leveraging the augmented BERT model and triplet augmentation, this technique automates the detection of quality concerns. These concerns align with the FURPS and ISO standard categories. Furthermore, I employed content analysis to manually label 5400 bug reports and designed a catalog of rules to be used for labeling of the dataset. This step enforced the rigorous evaluation of our classifier.

HIERARCHICAL CLUSTERING OF QUALITY CONCERNS AND CONTEXT-AWARE FIXING OF QUALITY BUGS: Developed a probabilistic approach to detect hidden semantic structures of quality-related concerns in source code for bug repair. Applied Hierarchical Dirichlet Process (HDP) to capture scattered quality concerns and aggregated them into a meaningful hierarchy, revealing candidate classes for quality bug repair.

AUTOMATICALLY CAPTURING QUALITY CONCERNS IN BUG REPORTS FOR EFFICIENT BUG TRIAGING: Developed a quality-based classifier using feature selection techniques, including TF-IDF, Chi-Square ( $\chi^2$ ), Mutual Information, and Extra Randomized Trees. This classifier incorporates various machine learning algorithms to efficiently triage quality bugs, ensuring effective identification and prioritization.

TOWARDS SYSTEMATIC INTEGRATION OF TEAM VOCABULARY FOR DEMARCATING REQUIREMENTS: I conducted an empirical case study involving senior undergraduate students, focusing on exploring the vocabularies developed by teams during maintenance tasks associated with quality concerns.

CHALLENGES AND PERCEPTIONS IN EXPLORING QUALITY CONCERNS DURING SOFTWARE DEVELOPMENT: Conducted a comprehensive survey study comprising 58 questions to reveal both common and unique challenges faced during the tasks of searching, understanding, and maintaining quality concerns.

Analysis and Detection of Emerging Quality-Related Concerns in Defect Reports: Developed a classifier that extracts lexical, shallow, and semantic features from bug reports to detect quality concerns. Additionally, annotated 5,400 bug reports according to the FURPS quality model and the ISO 25010 standard. I also, incorporated a visualization mechanism to tag and map quality-related concerns in the codebase.

EXTRACTIVE CODE SUMMARIZATION FOR RECOMMENDING BUG REPAIR: Developed a tool referred to as RetroRank, a GUI-based extractive summarization tool that recommends bug-fixing comments from discussion threads of previously fixed bugs to address unresolved bugs. RetroRank recommends bug-fixing comments based on user query relevance, positive language (sentiment analysis), and semantic relevance among comments.

ENHANCING SOURCE CODE REFACTORING DETECTION WITH EXPLANATIONS FROM COMMIT MESSAGES: Developed a technique that enhances code refactoring by augmenting contextual information from code commits and source code. This augmentation enhance the completeness of refactoring detection and provides refactoring rationales generated from commit messages.

TraceLab Artifacts for Reproducing Empirical Software Engineering Research: Built TraceLab artifacts to improve software traceability across software engineering tasks. Developed reproducibility packages for generating extractive summaries for user stories and speech act types in developer question/answer conversations. These packages can also easily modify, so that future researchers can build improvements over our approaches.

Research Assistant, Midwestern State University ........................Jan'07-Dec'09 

T-Joint Problem in Reconstructing 2D Objects: Participated in an automatic 2D jigsaw puzzle reconstruction project for reassembling archaeological fragments with T-Joint pieces. Developed a corner point detection algorithm for matching and reassembling archaeological fragments. Translated existing MatLab code to C# code and improved the thinning algorithm for increased efficiency.

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TEACHING EXPERIENCE
CSCE5933–Topics in Computer Science and Engineering, Spring 2023 | Class Size: 9 | Student Responses: 7
 Teaching Effectiveness: 4.8/5.0 | Overall Quality: 4.7/5.0 | Difficulty: 5.8/7.0 |
 CSCE4357-Database Systems Security, Spring 2023 | Class Size: 5 | Student Responses: 5
 Teaching Effectiveness: 4.8/5.0 | Overall Quality: 4.7/5.0 | Difficulty: 5.8/7.0 |
 CSCE3444–Software Engineering, Fall 2022 | Class Size: 10 | Student Responses: 3
 Teaching Effectiveness: 5.0/5.0 \mid Overall \ Quality: 4.6/5.0 \mid Difficulty: 4.3/7.0 \mid
CSCE5430-Software Engineering, Fall 2023 | Class Size: 130
 CSCE 5460 \hbox{--} Software\ Testing\ and\ Empirical\ Methodologies,\ Spring\ 2022\ |\ Class\ Size:\ {\color{blue}28}
CSCE5200–Information Retrieval and Web Search, Summer 2022 | Class Size: 66
 CSCE5430-Software Engineering, Fall 2021 | Class Size: 182
CSCE3444–Software Engineering, Summer 2021 | Class Size: 74
 CSCE4901-Software Development Capstone I, Spring 2021 | Class Size: 86
CSE40793–Software Development Practices, Fall 2020 | Class Size: 44
 CSE40793-Principles and Practices of Software Development, Fall 2019 | Class Size: 48
Department of Computer Science ...... Lubbock, TX
 CS3383-Theory of Automata, Summer 2016 | Class Size: 12
CS3361-Concepts of Programming Languages, Spring 2016 | Class Size: 32
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CS4352-Operating Systems, Spring 2016 | Class Size: 46

CS2413-Data Structures (C Programming), Spring 2016 | Class Size: 31 CS2413-Data Structures (C++ Programming), Fall 2015 | Class Size: 36

	GRE/GMAT Instructor, Rochester Institute of Technology/A.U.K
	GR18FZ–GRE and GMAT Preparatory Exam, Summer 2015   Class Size: 20–30
	RM28FZ–Remedial Math, Summer 2015   Class Size: 20–30
	DS18FZ–Discovery, Summer 2015   Class Size: 20–30
	Teaching Assistant, Midwestern State University
	MATH1634–Calculus I, Fall 2008   Class Size: 28
	MATH2534–Calculus III, Fall 2008   Class Size: 20
	MATH3433–Differential Equations, Spring 2008   Class Size: 28
	CMPS1033–Computing for Science Majors, Spring 2007   Class Size: 36
	CMPS1013–Computer Concepts and Applications, Spring 2007   Class Size: 32
	High School Math and Computer Science Teacher, American School of Kosova Oct'06–Jun'07  Mathematics and Computer Science Division
	Algebra II and Advanced Algebra II, Fall 2006   Class Size: 32–42
	Introduction to Computer Science, Fall 2006   Class Size: 20–34
	Web Design and Computer Applications Fall 2006   Class Size: 20–34
	High School Math Teacher, Gymnasium "Kuvendi i Arberit"
	Calculus I and Calculus II, Fall 2005   Class Size: 30–38
	Geometry I and Geometry II, Fall 2005   Class Size: 30–38
	Linear Algebra, Spring 2006   Class Size: 30–38
	Statistics and Theory of Probability, Spring 2006   Class Size: 30–38
(	Guest Lectures
	CSCE3444-Software Engineering, "Refactoring of Object-Oriented Code and Detection of Code Smells," University of North Texas, Department of Computer Science and EngineeringJul 14 <sup>th</sup> , 2021
	CSCE3444-Software Engineering, "Software Evolution and Maintenance-A Developer's Mindset," University of North Texas, Department of Computer Science and EngineeringJul 12 <sup>th</sup> , 2021
	CSCE3444-Software Engineering, "The Interplay between Functional and NFRs in Agile Projects,"  University of North Texas, Department of Computer Science and EngineeringJun 14 <sup>TH</sup> , 2021
	CSE40793-Software Development Practices, "Learning Code Smells for Leveling Up Code Quality," University of Notre Dame, Department of Computer Science and EngineeringNov 6 <sup>TH</sup> , 2020
	CSE40793-Software Development Practices, "The Model-Driven Testing and Design Processes,"  University of Notre Dame, Computer Science and Engineering
	CS4365-Software Engineering II, "Introduction to Software Testing: Graph-Based Coverage Criteria,"  Texas Tech University, Department of Computer Science
	CS4365-Software Engineering II, "Introduction to Software Testing: Software Testing Terminology,"  Texas Tech University, Department of Computer Science

# CONFERENCE TALKS

Krasniqi, R., "Detecting Scattered and Tangled Quality Concerns in Code to Aid Maintenance & Evolution Tasks" (ICSE, Doctoral Track), Melbourne, Australia
Krasniqi R., "Hierarchical Topical Modeling Approach for Recommending Repair of Quality Bugs" (SANER'23, Research Track), MACAO SAR, CHINA
$\begin{tabular}{ l l l l l l l l l l l l l l l l l l l$
Krasniqi R., "Extractive Summarization of Related Bug-fixing Comments in Support of Bug Repair" $\overline{\text{(APR, Workshop Track)}}$ , MADRID, SPAIN
INVITED TALKS
Panel
Topic: Interested in Pursuing a Ph.D: What it's all About?
Event: CSE Seminar Series, University of North Texas, Denton, TX
PRESS COVERAGE
CSE Ph.D Student Recognized as NCWIT AiC Finalist for Research on New Approach to Source Code Detection
Denton, TX, May $23^{rd}$ , $2023$
UNT Engineering Grad Student Receives 3MT People's Choice Award
Denton, TX, Dec $9^{th}$ , 2021
MENTORSHIP EXPERIENCE
AnitaB.org, Mentoring Program
Reini Lin, (1 on 1) Mentoring
University of North Texas, Undergraduate Mentoring
Blessing Sundire, Senior Thesis
University of Notre Dame, Undergraduate Mentoring

# INDUSTRY EXPERIENCE

Java Developer II	
Contributed to back-end enhancement of Highmark healthcare system. Participated in the dev features to incorporate SDLC standards. Assisted in technical walkthroughs and provided or requirements, and documentation for new releases of Highmark's online patient healthcare p	oding specifications,
Software Developer	
Implemented and provided support for Oracle Reports/XML Publisher applications utilized an enterprise resource planning project. Maintained the Processor Profile application and functioning of related programs to avoid disruptions to business operations. Troubleshot and offering both technical and non-technical solutions.	ensured the smooth
PROFESSIONAL SERVICE	
Invited Journal Reviewer	
Reviewer, Software Quality Journal (SQJO)	2023
Invited Program Committee	
PC Member, International Conference on Software Engineering (ICSE)  PC Member, International Conference on Software Analysis, Evolution and Reengineering (S. PC Member, International Conference on Software Engineering for Artificial Intelligence (C. PC Member, International Conference on Evaluation and Assessment in Software Engineering PC Member, International Conference on Mobile Software Engineering and Systems (MOBIL PC Member, International Conference on Mining Software Repositories (MSR)	SANER)2024 AIN)2023–2024 ag (EASE)2023 LESoft) .2022-2023
Invited External Review Committee	
Reviewer, NCWIT Aspirations in Computing (AiC)	2020-2022
Invited Organizing Committee	
Session Chair, International Conference on Software Engineering for Artificial Intelligence (Ontroposition Chair, International Conference on Automation of Software Test (AST)	<i>'</i>
Invited Student Volunteer	
Student Volunteer, IEEE International Conference on Software Architecture (ICSA) Student Volunteer Chair, IEEE International Conference on Evaluation and Assessment in S	
Outreach and Leadership	
Student Volunteer, Texas CSTA Chapters Conference and Digital Divas (UNT)	

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STEM Volunteer Mentor, Association for Women in Science (AWIS-UND)
PROFESSIONAL AND ACADEMIC ASSOCIATIONS
Professional Memberships
Institute of Electrical and Electronics Engineers (IEEE)
Academic Memberships
Society of Women Engineers (SWE-UNT) (2021–2024 Society of Women Engineers (SWE-UND) (2018–2021 Association for Women in Science (AWIS-UND) (2018–2021 Women and Hi Tech (2018–2021
TECHNICAL SKILLS
Java/Oracle Technologies       J2SE, Servlets, JSP, Jax-RS, Oracle Forms ans Reports         Programming Languages       Java, C, C++, C≠         Scripting Languages       Python, JavaScript, Perl, Bash, MatLab, F         Markup Languages       HTML, XHTML, XML, JSON, Markdown, LaTeN         Database Languages       PL/SQL, SQL, SQL Database Queries         Servers and Architectures       Apache Tomcat, Web/Restful Services, Oracle VM, MVC, SON         Development Platforms       Eclipse IDE, InteliJ IDEA, pyCharm, Jupyter, Dreamweaver, RStudie         Data Mining Platforms       Aqua Data Studio, MySQL Workbench, Orange3, Wekston         Operating Systems       Linux, Ubuntu, Apple Mac OS, Windows XF         User Study Platforms       MAXQDA Analytics, Amazon Mechanical Turk, Qualtrics         LANGUAGE SKILLS       Albanian
English
Spanish Proficient Croatian Advanced
ADDITIONAL INFORMATION
Google Scholar
LinkedIn