AMEYA KETKAR

Ph.D. candidate at Oregon State University, specializing in Software Engineering and Programming Languages

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EXPERIENCE

Visiting Researcher- Concordia University, Canada Sep 2019 – Dec 2019

- Developing a technique to mine refactorings that developers performed in millions of commits, and learn to correctly perform type related changes such as *Change Attribute Type* or *Change Method Signature*.
- This technique can be used to perform changes to improve performance, security and maintain ability of a program along with software maintenance tasks such as library migration or bug fixing.

Graduate Research Assistant- Oregon State University, U.S.A. Dec 2016 – Ongoing

- Developed novel static source code analysis tools and surveyed hundreds of developers to understand how and why they use particular program constructs and transform them (e.g., changing variable type or introducing lambda expressions).
- Developed techniques to perform multi-step refactorings like type migrations, in ultra-large code bases (300 million LOC).
- Surveyed on how clients use and retrofit machine learning libraries and evolve their usage over the lifetime.

Software Analyst- Barclays Investment Bank, India Jul 2014 – Aug 2016

- Designed unified Java API for generating Intraday and EOD trade reports, as required by monetary authorities.
- Contributed to the development and release of application reporting to Hong Kong Monetary Authority.
- Enhanced C#-WPF based desktop applications used by front office traders to buy-sell loans in U.S. Market. Analysed additional information about the loans such as party information or risk metrics.

EDUCATION

Ph.D, Oregon State University, U.S.A. Sep 2016 – Ongoing

Major: Computer Science (Specialization in SE and PL) GPA: 3.7/4 Advisor: Dr. Danny Dig

Bachelor of Engineering, Mumbai University, India Jul 2010 – Jun 2014

Major: Computer Engineering GPA: 3.6/4

SELECTED PROJECTS

T2R: Scalable type migration tool [Tool & Results]

- In collaboration with Google, developed the first MapReduce amiable, multi-step refactoring tool for type migration.
- T2R was evaluated over Google's 300M LOC Java code base and 7 large open source projects, to improve performance of programs by specializing usage of Java's functional interface API.
- T2R produced type migration patches with *98%* accuracy.
- *97%* of patches produced by T2R were accepted by developers at Google and best-in-class open source Java projects like *Cassandra*, *Neo4J*, *CoreNLP*, *Sonarqube* and *Speedment*, highlighting usefulness of T2R.

Understanding type changes in Java [Tool & Results]

- Conducted the first large-scale and the most fine-grained empirical study on type changes performed in Java.
- Extended state-of-the-art RefactoringMiner to efficiently mine 300,714 type changes from 552,841 commits.
- Validated the tools to show high precision (99.6%) and recall (93.1%).
- Leveraged the extensive and reliable dataset to 1) answer six research questions, 2) present empirically-justified implications for researchers, language designers and developers and 3) identify most popular type changes in practice.

Understanding use of lambda expressions in Java [Tool & Results]

- Extended state-of-the-art refactoring mining tool to provide deeper insight into introduction lambda expressions in a commit, to study 100K lambda expressions introduced by developers of 240 Java projects.

- Conducted firehouse interviews with 100 developers to understand motivation behind use of lambda expressions.
- Triangulated the results, providing empirically justified implications for researchers, language designers and developers.

JTML: A DSL to express type safe program transformations [Tool & Report]

- Developed syntax for a domain specific language (DSL) to express type-related transformations for Java programs.
- Implemented type checker for this DSL in Haskell, to prevent user from expressing transformations which introduces type inconsistencies in Java program.

SKILLS

Fundamentals

Software Engineering | Programming Languages | Object Oriented Programming | Functional Programming | DSLs | Type Systems | Algorithms | Data Structures | Refactoring | Code Clones | Empirical Studies | Mining Software Repository | Dependent Types | Relational Databases | Graph Databases | Static Code Analysis | Program synthesis | Proof Assistants | Type Checking | Parsers | Modularity | Parallel programming | Developer survey | Agile | API Design | Machine learning | AI

Programming Languages & Tools

Java & Java 8+ *(proficient)* | Python *(proficient)* | Haskell *(proficient)* | SQL *(proficient)* | TeX *(proficient)* | Protocol Buffers *(proficient)* | C++ *(familiar)* | Javascript *(familiar)* | HTML *(proficient)* | Gremlin *(familiar)* | C# *(familiar)* | Scala *(familiar)* | Idris *(familiar)* | Emacs Lisp *(familiar)* | Bash *(proficient)* | R *(familiar)* | Coq *(familiar)* | Standard ML *(familiar)* | Continious Integration *(Familiar)* | Refactoring tools *(Proficient)* | Linter tools*(Proficient)*

Frameworks

JUnit *(proficient)* | Speedment *(proficient)* | Euterpea *(familiar)* | JAXB *(proficient)* | Spring Framework *(proficient)* | Apache TinkerGraphs *(proficient)* | Eclipse JDT *(proficient)* | Java Compiler tools *(Proficient)* | Apache Camel*(familiar)* | JBehave *(familiar)* | Cucumber *(familiar)*

PUBLICATIONS

- **Ketkar, A.***, Tsantalis, N. and Dig, D. "Understanding Type Changes In Java". Under-Review at ICSE'20.
- **Ketkar, A.***, Mesbah, A., Mazinaian, D., Dig, D. and Aftandilian, E. "Type Migration in Ultra-large CodeBases". ICSE'19.
- **Ketkar, A.**"Type Migration in Large-Scale CodeBases". FSE'18 (Student Research Competition).
- Mazinanian, D.*, **Ketkar, A.***, Tsantalis, N. and Dig, D. "Understanding the Use of Lambda Expressions in Java". OOPSLA'17.

ACHIEVEMENTS

- Received **"Outstanding Contribution Award"** at Barclays Investment Bank, 2016
- Received **"Distinguished Artifact Award"** at OOPSLA, 2017
- Stood **Second Place** at **"Microsoft Student Research Competition"** at FSE, 2018

SERVICE

- Sub-reviewer for ASE 2017, ICSE 2019 and ICSE 2020.
- Volunteer English Teacher at Teach India, Mumbai.