

Productivity Tools and Software Engineering IBM Research – India

<http://www.research.ibm.com/labs/india/>



The research agenda of the Productivity Tools and Software Engineering group at IBM Research - India focuses on improving software product and service quality throughout the life-cycle and developing new techniques for mobile and cloud enablement of software and services. Our agenda is driven specifically by the needs of the software services industry. Our research uses many core techniques, such as program analysis, text analysis, and data mining. In addition to developing new technologies that have a significant business impact, we strive for creating intellectual property and make broader scientific impact by publishing our research in top conferences. Below we describe our current research themes.

Software Testing

Our research agenda in software testing focuses on developing techniques and tools that bring automation and rigor to the tasks that are performed manually in testing services, often in an ad-hoc manner, and are prone to human lapses. Our research covers a broad spectrum of topics, including test automation, test data generation, test suite reduction, test repair, and regression testing.

Robust Test Automation Using Contextual Clues, ISSTA 2014.

Efficient and Flexible GUI Test Execution via Test Merging, ISSTA 2013.

Guided Test Generation for Web Applications, ICSE 2013.

Automating Test Automation, ICSE 2012.

Understanding Myths and Realities of Test-Suite Evolution, FSE 2012.

Software Development and Maintenance

Our group is developing scalable automated techniques for API extraction from legacy code, fault detection, localization, explanation and repair. We develop new techniques for migration to mobile and cloud platforms and create productivity tools to improve design of cognitive, database-driven, cloud-based applications. Our methods employ sophisticated constraint-solving and theorem-proving techniques coupled with efficient program-analysis techniques, such slicing and differencing, along with effective information visualization and summarization for reducing cognitive overload.

Data-Guided Repair of Selection Statements, ICSE 2014.

Distributed Program Tracing, FSE 2013.

Compiling Mockups to Flexible UIs, FSE 2013.

SemFix: Program Repair via Semantic Analysis, ICSE 2013.

Alternate and Learn: Finding Witnesses without looking all over, CAV 2012.

Mining Software Repositories

Repositories, such as version management systems and bug management systems, contain a wealth of information on how an application evolves over time. This information, if mined appropriately, can help project teams gain insights for supporting maintenance of the software, improving design/reuse, and enabling effective transitioning of new people into a project. Our research agenda in this area focuses on using analytics on code and other artifacts generated during SDLC, and visualization to enable decision making, based on knowledge derived from software repositories.

Panning Requirement Nuggets in Stream of Software Maintenance Tickets, FSE 2014.

API as a Social Glue, ICSE NIER 2014.

A Study of External Community Contribution to Open-Source Projects on GitHub, MSR Challenge 2014.

AUSUM: Approach for Unsupervised bug report SUMmarization, FSE 2012.

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Service Delivery Optimization

The goal is to improve the efficiency of service delivery processes through intelligent assignment, scheduling and routing of work for management of practitioner utilization, and application of simulation and optimization techniques to determine optimal staffing in the delivery organization. A specific context that motivates this research is the factory model of shared delivery, where instead of having customer-specific teams, a common pool of practitioners in a given specialization area is responsible for meeting the service requests of multiple customers in that area. Building automation tooling capabilities that assist practitioners in their day-to-day work is also an area of interest. Ticket lifecycle management, application configuration discovery, patch management and server health-check monitoring are all human-intensive processes which are made easier and more efficient by tools and technologies that allow auto-discovery, auto-configuration and auto-remediation. We are also exploring the social network of practitioners and evolution of skills in large-scale global delivery centers following such a model. Information visualization is also another area of work for aiding decision making by service delivery managers.

Optimal Strategy for Proactive Service Delivery Management Using Inter-KPI Influence Relationships, ICSOC 2013.

Does One-Size-Fit-All Suffice for Service Delivery Clients?, ICSOC 2013.

Interleaving Execution into Model Driven Service Design, ICWS 2013.

Accelerating Collaboration in Task Assignment Using a Socially Enhanced Resource Model, BPM 2013.

SmartDispatch: enabling efficient ticket dispatch in an IT service environment, KDD 2012.

Career Opportunities

The Productivity Tools and Software Engineering group at IBM Research India is seeking applications from both fresh and experienced researchers. Applications should have a PhD in Computer Science and related areas, and an excellent track record demonstrated by publications, patents, and technical impact. Candidates with an MS degree and an aptitude for working in a research environment are also encouraged to apply. A strong interest in industrial research and building complex software systems, and flexibility for multi-disciplinary work in a team-oriented environment is a must. As a member of the research team, you will have the opportunity to collaborate with some of the best minds at IBM, work with premier academic research institutions, and deploy your methods and tools for use by a vast network of IBM practitioners.

Applications and queries can be sent to careeir1@in.ibm.com

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