Chandra Maddila

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ABOUT

I am a principal research engineer at Microsoft Research, USA. My work lies in the intersection of software engineering (SE), developer productivity, and machine learning (ML). My recent research has focused on large-scale software repository mining, building distributed data platforms and services that enable applications of ML and Information Retrieval (IR) for solving software engineering problems.

I also work on understanding developer productivity, empirical software engineering, and understanding the impact of smart recommenders on developer productivity and software development processes.
My work has resulted in tech transfers and generated measurable impact on engineering velocity and developer productivity across Microsoft. I also enjoy publishing my work in top-tier conferences and journals in SE, systems, and IR domains.

EXPERIENCE (~11.5 YEARS)

SEPTEMBER 2013 – PRESENT

PRINCIPAL RESEARCH ENGINEER, MICROSOFT RESEARCH, REDMOND, USA

I work for applied sciences group at Microsoft Research. I lead projects that aim at building large-scale, distributed data platforms and services for solving problems that occur at various phases of DevOps life cycle by leveraging machine learning and information retrieval methods.

I drive all the aspects of a project: research, setting up the vision, engineering, product management and strategy, deployment, and overseeing tech transfers. My job involves collaborating with people across these job disciplines and from different organizations inside Microsoft.

JULY 2012 – AUGUST 2013

SOFTWARE ENGINEER, CA TECHNOLOGIES, HYDERABAD, INDIA

Part of a research group that built various automation / orchestration products and services. These services are widely used by the customers to manage their IT infrastructure and DevOps efficiently.

MAY 2010 – JUNE 2012

RESEARCH ENGINEER, CONVERGYS, HYDERABAD, INDIA

Part of 'Forward R&D' team. Worked on next gen billing and rating products / services used by major telecom companies and ISPs across the world.

EDUCATION

2020 – 2022

DOCTOR OF PHILOSOPHY (PhD), TU - DELFT, THE NETHERLANDS

AI assisted DevOps. Empirical Software Engineering.

2015 – 2017

MASTER OF TECHNOLOGY (M. Tech), BITS-PILANI, INDIA

Software Systems, Data Analytics. CGPA: 8.35.

2006 – 2010

BACHELOR OF TECHNOLOGY (B. Tech), JNTU-KAKINADA, INDIA

Computer science and Engineering. Percentage: 74.8.

PROJECTS

Some of the research projects I led / worked on are listed below.

Software engineering, developer productivity

- Project Sankie (Podcast)
  Cofounded Project Sankie. Sankie is large-scale AIOps data platform. Sankie provides the necessary infrastructure to ingest data from software repositories and services, train machine learning models on the data, and eventually perform decorations or provide information to engineers to help increase the velocity and throughput of changes, bug fixes etc.

  Project Sankie is 'tech transferred' to a product organization. Sankie platform is deployed widely at Microsoft: Sankie is deployed on *20K repositories* and made recommendations on *a million pull requests* till now. Sankie helped *reducing the completion time of pull requests by ~ 40% (P 99), prevented ~3K bugs from slipping into the production systems*.

  Sankie platform enabled other developers in the company to develop *20+ ML-based recommenders*, which created more impact and delivered larger economic value to the business.
- Nudge (VentureBeat)
  Founder of Project Nudge, which is a large-scale, machine learning-based cloud service. Nudge helps in accelerating pull request completion time by reminding the author or the reviewer(s) to engage with their overdue pull requests by leveraging pull request level effort estimation models.

  Nudge helped in increasing the velocity of change progression by ~60%. Nudge is deployed widely at Microsoft: it is deployed on *3K repositories and sent 200K reminders till now*. *Nudge is mandated to be enabled by default in every newly created source code repository in the company.*
- ORCA (online root cause analysis)
  ORCA is an IR-based differential bug localization tool, which helps in root causing service incidents faster. ORCA can map exceptions, stack traces, or error messages manifested in production to the code changes that introduced the bug. ORCA is deployed in various large-scale service DevOps environments in Microsoft such Office 365, Sharepoint online. Orca helped root causing *300+ service incidents till now and helped reducing the mean time to repair (MTTR) by 45%*.
- The new future of work
  As part of this project, I performed quantitative and qualitative studies, empirical analyses to understand the impact of COVID-19 and remote work on software development activity and productivity. A synthesis of this work can be found here. This work was presented to the Microsoft's leadership team (including *CEO Satya Nadella, Bill Gates*, and various other executives). The findings from my analysis helped the executive teams to take informed decisions and helped shaping up some of Microsoft's policies on remote work and engineering productivity improvements. This work is also featured in Satya Nadella's Build'2020 keynote.
- Project Nalanda
  Project Nalanda is aimed at building a large-scale socio-technical graph with every actor and entity involved in software development lifecycle represented as nodes and the relationships between them as edges. Nalanda is the largest socio-technical graph built on software development data till now: the graph contains *37 million nodes and 128 million edges.* We built various applications leveraging this graph and using graph neural networks.

Other projects

- MEC (Time magazine)
  Part of a team that developed a research project named massively empowered classrooms (MEC). MEC is an

experimental project designed to explore how online educational content and techniques in blended learning can be used to make online learning productive.
Sangam, which is an instance of MEC, has helped train *110,000+ municipal functionaries across 4,000+* cities in India on best sanitation practices. The Learning Passport, which is another incarnation of MEC, allows educators to upload local curricula. First deployed in Timor-Leste in 2020, the Learning Passport now has close to *1.6 million users in 13 countries.*

- Project Mélange
  The goal of Project Mélange is to understand the uses of and build tools around code-mixing. As part of project Mélange, I worked on building Hidden Markov Model (HMM) to detect language boundaries in code-mixed sentences. I also worked on deploying the models and create services / APIs to perform word level language detection. This work is *tech transferred into various Microsoft's services such as Microsoft translator*.
- Project Supernova
  The goal of Project Supernova is to build a C# toolkit with various statistical tests and machine learning algorithms. I shipped statistical tests such as KS test, Lilliefors test into the *Microsoft's ML.Net SDK*. These tests and the libraries are widely *used in Microsoft's Azure ML platform and services*.
- Convergys software appliance
  As part of the forward R&D team at Convergys, worked on automating the creation of Oracle database appliance and shipping it to the customers such as AT&T, T-Mobile, and Sprint. The purpose of this project is to automate the deployment of telecom billing and rating solutions on a distributed cluster (with both the application and database servers) and create a plug-and-play software cluster that can be shipped to the customers. This project resulted in *savings of ~5 million dollars per deployment* of Convergys's software stack.

AWARDS, INVITED TALKS, MEDIA

1. Winner of *Jay Lepreau best paper award* in *USENIX OSDI (2018)*.
2. Invited talk on differential bug localization (ORCA) at USENIX Annual technical Conference (ATC). USENIX ATC '19 - Orca: Differential Bug Localization in Large-Scale Services - YouTube
3. My work (Nudge) is featured in prestigious tech magazine VentureBeat. Microsoft's Nudge service leverages AI to speed up completion of pull requests | VentureBeat
4. My work (SPACE framework) is featured in Business Insider, InfoQ, and GitHub official blog.
5. My work (MEC) is featured in Time magazine – the best inventions of 2021.
6. My work (Sankie) is featured in prestigious Microsoft Research Podcast series. Podcast: Can we make better software by using ML and AI techniques? With Chandra Maddila and Chetan Bansal - Microsoft Research
7. Invited talk on AIOps in continuous software engineering. University of Victoria. AIOps in Continuous Software Engineering: A Q&A with Chandra Maddila - YouTube
8. Invited talk on Machine learning for software engineering (ML4SE). Delft university of Technology.

PUBLICATIONS AND PATENTS

1. *Chandra Maddila,* Nachiappan Nagappan, Christian Bird, Georgios Gousios, Arie van Deursen: ConE: A Concurrent Edit Detection Tool for Large Scale Software Development. TOSEM.
2. *Chandra Maddila*, Sai Surya Upadrasta, Chetan Bansal, Nachiappan Nagappan, Georgios Gousios, Arie van Deursen: *Nudge: Accelerating Overdue Pull Requests Towards Completion*. TOSEM.
3. Nicole Forsgren, Margaret Anne Storey, *Chandra Maddila*, Thomas Zimmermann, Brian Houck, Jenna Butler: *The SPACE of Developer Productivity: There's more to it than you think. Volume 19, January-February 2021, Association for Computing Machinery (ACM). ACM Queue.* *This is one of the top downloaded ACM papers with 161K downloads in ten months.*
4. Denae Ford Margaret-Anne Storey, Tom Zimmermann, Christian Bird, Sonia Jaffe, *Chandra Maddila*, Jenna Butler, Brian Houck, Nachi Nagappan: *A Tale of Two Cities: Software Developers Working from Home During the COVID-19 Pandemic*. TOSEM.
5. Nikitha Rao, Chetan Bansal, Subhabrata Mukherjee, *Chandra Maddila*: *Product Insights: Analyzing Product Intents in Web Search.* CIKM 2020

6. *Chandra Maddila,* Chetan Bansal, Nachiappan Nagappan: *Predicting pull request completion time: a case study on large scale cloud services. ESEC/SIGSOFT FSE 2019*
7. Adithya Abraham Philip, Ranjita Bhagwan, Rahul Kumar, *Chandra Maddila*, Nachiappan Nagappan*: FastLane: test minimization for rapidly deployed large-scale online services. ICSE 2019*
8. Sumit *Asthana,* Rahul Kumar, Ranjita Bhagwan, Christian Bird, Chetan Bansal, *Chandra Maddila*, Sonu Mehta, B. Ashok*: WhoDo: automating reviewer suggestions at scale. ESEC/SIGSOFT FSE 2019*
9. Ranjita Bhagwan, Rahul Kumar, *Chandra Shekhar Maddila*, Adithya Abraham Philip*: Orca: Differential Bug Localization in Large-Scale Services. OSDI 2018. **Jay Lepreau best paper award***
   **Author names are listed in the order of last names.*
10. Shruti Rijhwani, Royal Sequiera, Monojit Choudhury, Kalika Bali*, Chandra Sekhar Maddila: Estimating Code-Switching on Twitter with a Novel Generalized Word-Level Language Detection Technique. ACL 2017*
11. Detecting Misconfiguration and/or Bug (s) in Large Service (s) Using Correlated Change Analysis, USPTO App 16515135 (patent)
12. ConE: A Concurrent Edit Detection Tool for Large Scale Software Development (patent under filing with USPTO)

Workshops and short papers

13. Chetan Bansal, Pantazis Deligiannis, *Chandra Maddila*, Nikitha Rao: *Studying Ransomware Attacks Using Web Search Logs (short paper)*. SIGIR 2020
14. Rahul Kumar, Chetan Bansal, *Chandra Maddila*, Nitin Sharma, Shawn Martelock, Ravi Bhargava*: Building sankie: an AI platform for DevOps (workshop paper). BotSE@ICSE 2019*
15. Chandra Maddila, Apoorva Agrawal, Thomas Zimmermann, Nicole Forsgren, Kim Herzig, Arie van Deursen: *Nalanda: A Socio-Technical Graph for Building Software Analytics Tools at Enterprise Scale*. arxiv.

STUDENTS, INTERNS

1. Jiyang Zhang. Research intern (Summer, 2021). PhD student at the University of Texas at Austin.
2. Ujjwal Raizada. Research intern (Spring, 2021). Software engineer at Uber.
3. Sai Surya Upadrasta. Research intern (Spring, 2020). Software engineer at Google.
4. Apoorva Agrawal. Research Fellow (2020-). BITS-Pilani University, India.
5. Suhas Shanbhogue. Research intern (Summer, 2021). BITS-Pilani University, India.
6. Divyanshu Agrawal. Research intern (Fall, 2021). BITS-Pilani University, India.
7. Sumit Asthana. Research Fellow (2017-2019). PhD student at the University of Michigan Ann Arbor.
8. Adithya Philip. Research Fellow (2017-2019). PhD student at Carnegie Mellon University.