How does Machine Learning Change Software Development Practices?

Transactions on Software Engineering

Zhiyuan Wan

Xin Xia

David Lo

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Research Questions

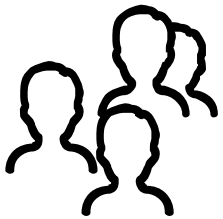
RQ1. How does the incorporation of ML into a system impact **software development practices**?

e.g., requirements, design, testing, process ***SWEBOK***

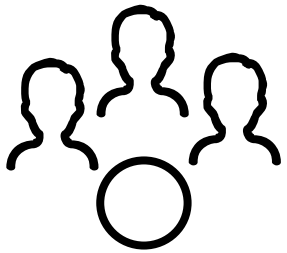
RQ2. How do the **work characteristics** change when incorporating ML into a system?

e.g., skill variety, job complexity and problem solving ***Applied Psychology***

Methodology

1 

Open-Ended Interviews
14 Participants

2 

Focus Groups
3 Sessions

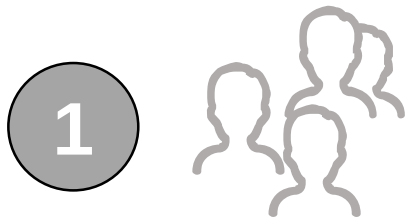
3 

Online Survey
342 Respondents

80 Candidate Statements

31 Final Statements

Survey



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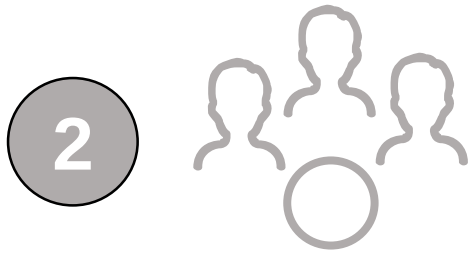

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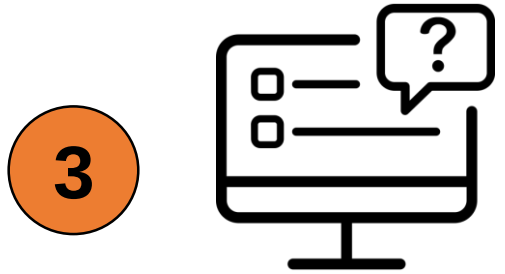


Online Survey
342 Respondents

Survey Respondents: 3 Groups

39 Respondents

ML Frameworks and Libraries

59 Respondents

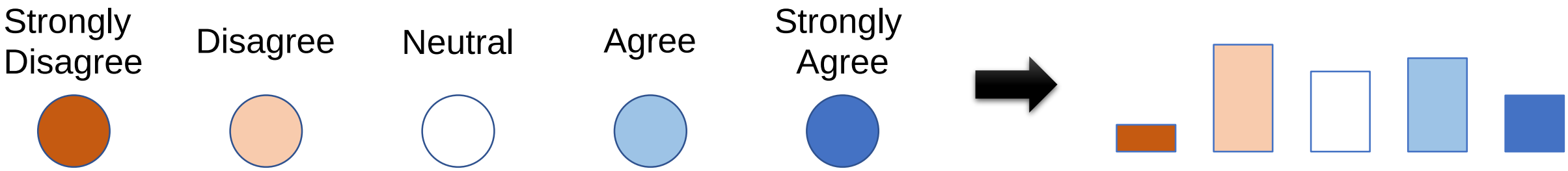
ML Frameworks and Libraries

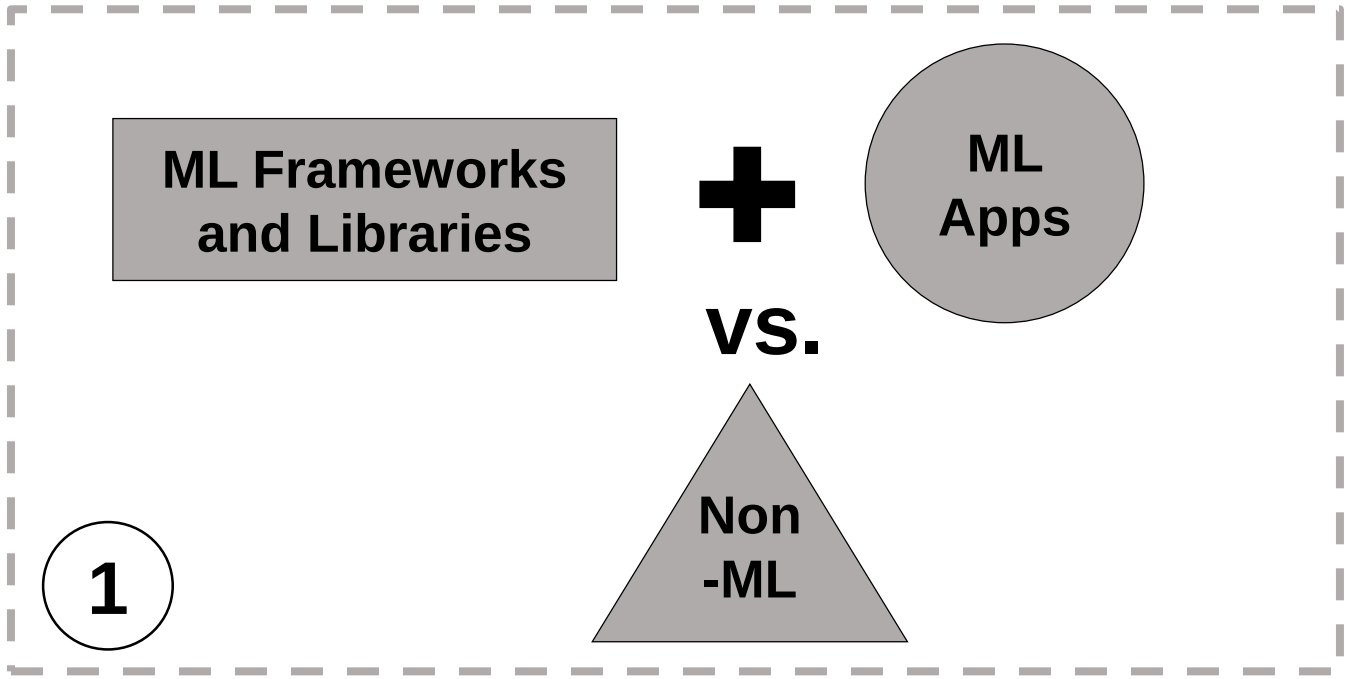
ML Apps

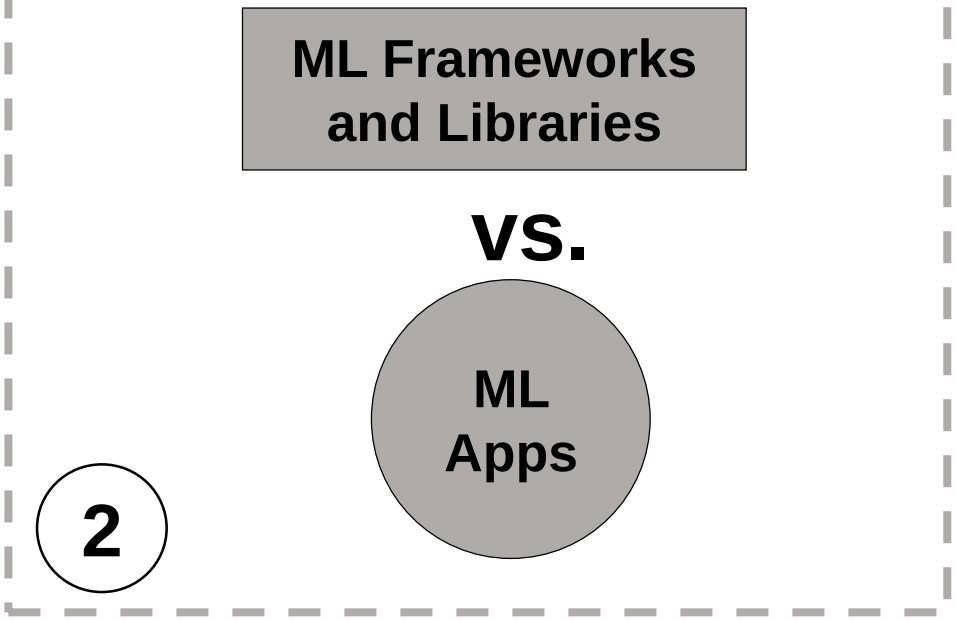
244 Respondents

Non-ML

Survey: Data Analysis







Survey: Results

11 Significant Differences

RQ1. Differences in Software Development Practices

Requirements, Design, Testing and Quality, Process and Management.

RQ2. Differences in Work Characteristics

Skill Variety, Job Complexity and Problem Solving, Task Identity, and Interaction.

Survey: Results

11 Significant Differences: Top 3 Effect Size

Skill Variety: “Developing my software requires knowledge in math, information theory, and statistics”

ML Practitioners	Non-ML Practitioners	Cliff’s Delta
		0.45

Survey: Results

11 Significant Differences: Top 3 Effect Size

Design: “Detailed design is time-consuming and conducted in an iterative way.”

ML Practitioners	Non-ML Practitioners	Cliff’s Delta
		0.32

Survey: Results

11 Significant Differences: Top 3 Effect Size

Task Identity: “It is easy to make an accurate plan for the development tasks of my software.”

ML Practitioners	Non-ML Practitioners	Cliff’s Delta
		0.32

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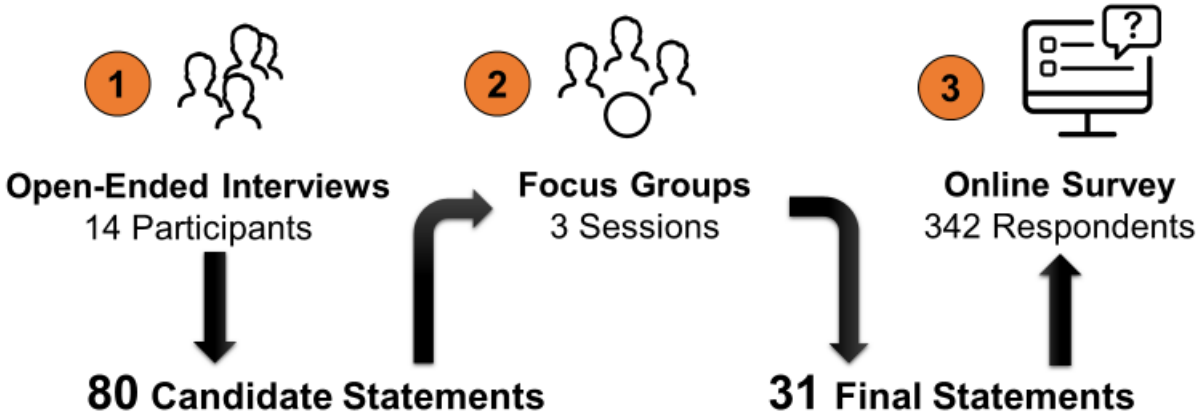

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Thank you!

For implications and other findings, please refer to our preprint at: https://zhiyuan-wan.github.io

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