On the Mismatch Between Job Listings, the Tech Interview Process, and the Actual Job

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ABSTRACT

The hiring process in tech industry is challenging for both employees and employers, and it is characterized by difficulty, talent leakage, and enormous cost. A potential contributor to the hiring challenges is the mismatch between the skills demanded in the hiring process and those frequently needed in the real-life workplace. To study this potential mismatch, we obtain data from three major perspectives: job listings, interview process, and actual job. Our mixed-methods approach combines a survey of developers from top companies and a text analysis of 22,534 online job listings. The results showcase an overemphasis on skills like algorithmic problem solving in the hiring process over skills that are practiced daily like writing clean code and debugging. Consequently, to prevent talent leakage, tech companies could modify their hiring requirement and interview questions to be more aligned with skills needed in daily software development activities.

CCS CONCEPTS

• **Social and professional topics** → **Employment issues**.

KEYWORDS

hiring process, software engineering, mismatch, education

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1 PROBLEM AND MOTIVATION

Data from U.S. Bureau of Labor Statistics indicate a 22 percent growth in demand of computer and information scientists from 2020 to 2030 [12]. At the same time, Korn Ferry's research predicts a 4.3 million global workforce insufficiency in technology, media, and telecommunication in 2030 [11]. Realizing the consistent shortage of computer practitioners, along with the hidden high cost of recruiting a worker (22,750 dollar of enterprise value) [7], hiring the right worker becomes a critical task. To employ software developers, companies post job descriptions online, review resumes, conduct technical interviews, and admit qualified applicants, which process can cause severe talent leakage [4]. In this study, we attempt to understand a potential contributor to the challenges of the hiring process by focusing on the mismatch in technical skills between job listings, interview process, and actual job. More specifically, through mixed-methods approach combining a survey of developers from top companies and a text analysis of 22,534 online job listings, we address the following research questions:

RQ1: What are the most important skills demanded in job listings?
RQ2: What are the skills assessed in the tech interviews?
RQ3: What are the most important skills according to developers?

The results of these questions have implications to the industry and academia that we highlight in this paper.

2 BACKGROUND AND RELATED WORK

Study by Behroozi et al. suggests that talent leakages occur at all aspects of the hiring process, including contact, hiring criteria, and the friendliness of the interviewer [4]. The leakage is aggravated by the fact that 75% interviewees are inconsistent in their performances [9]. One study conducting trial interviews with 48 students evinces that the typical whiteboard-style interview adds unnecessary stress to the candidates [5]. Another study with eye tracking technique further claims that affordances, stress, and interruption are culprits for interviewees' poor performances [2].

Meanwhile, Behroozi et al. illustrate another critical problem by collecting developers' comments on Hacker News: the lack of real-world relevance of interview questions [3]. Therefore, what are the appropriate interview questions indicative of real challenges? Capretz and Ahmed [6] reveal the significance of communication and interpersonal skills while Scaffidi [13] pinpoints the importance of web development and relational database knowledge. Another study [8] comparing education and job needs concludes that educators should pay more attention on basic theoretical courses and object-oriented design. Furthermore, the use of web scraping technique is not a novelty. Aken et al. scrape a quarter million job advertisements and find 20 important tech skills [1] while a recent research scrape job listings for pedagogical purpose [10].

Different from all previous researches, here we specifically focus on recruiting challenges caused by mismatches between job listings, interview process, and actual job. Instead of collecting comments from online forum, we directly ask tech developers. Meanwhile, we scrape the most up-to-date job listings to reflect the status quo.

3 APPROACH AND UNIQUENESS

In this study, we set up a scheme of eight major skills: communication, clean code, code comprehension, debugging, algorithm, system design, version control, and testing.

To answer ***RQ1: What are the most important skills demanded in job listings?*** we use Selenium[1] to scrape job listings on Google, extracting hiring information, such as job title, posting time, job location, and job requirement. We classify listings based on job types, count keywords, and normalize the counts into

[1]https://selenium-python.readthedocs.io/

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Job Listings		Interview Process		Daily Job	
Skill	Frequency	Skill	Count	Skill	Ranking
Communication	962.55	Communication	14	Communication	3.05
Testing	835.86	Code Comprehension	12	Clean Code	3.79
Debugging	117.63	Algorithm	10	Code Comprehension	3.95
Algorithm	83.83	System Design	9	Debugging	4.05
Version Control	60.82	Clean Code	8	Algorithm	4.84
System Design	34.98	Testing	8	System Design	5.16
Clean Code	2.52	Debugging	7	Version Control	5.42
Code Comprehension	0.00	Version Control	2	Testing	5.74

Table 1: Skill ranking in job posts, interview process, and daily job (most important on top).

number of keywords per million words. Up to this moment, we get a general picture of the importance of skills in tech industry. In the future, however, we will delve into specific job types, like data analyst and web developer, and see if the level of requirement for the same skills changes among different fields.

We obtain subjective insights from software developers from top companies via an online questionnaire. We ask questions about interview preparation process, interview experience, skills being tested in the interview, and technical skills frequently utilized in the workplace. To answer ***RQ2: What are the skills assessed in the tech interviews?*** we display eight aforementioned skills as choices. Participants select the ones that are assessed during the interview. To answer ***RQ3: What are the most important skills according to developers?*** we ask participants to rank the importance of eight skills based on daily working experience and calculate the mean ranking for each skill.

Moreover, we ask some demographic questions regarding the gender identity, job position, the scale of the corporation they currently work in, and their self-evaluation of expertise. In the next stage of our study, we will categorize participants into groups based on gender, size of corporation, or job position and see how the opinions of different groups of developers can vary. Furthermore, We will also dig into skills academia mostly focus on. Ideally, we will scrape syllabi of computer-science courses to examine the potential mismatch between academia and the industry.

4 PRELIMINARY RESULTS

4.1 RQ1: What are the most important skills demanded in job listings?

We scraped in total 22,534 job listings up to this moment, with job types such as web development, artificial intelligence, robotics, computer theory, and data analysis. We analyzed the job requirements and counted the frequencies of keywords that reflect the eight major skills that we focus on. According to our initial results in Table 1, communication skills and testing are mentioned most frequently in job listings while clean code and code comprehension are almost never referred.

4.2 RQ2: What are the skills assessed in the tech interviews?

We have received 23 valid responses to our questionnaire. Our participants have on average 6.4 years of programming experience and 6.0 years of professional programming experience in general, and 78% currently work in top tech corporations such as Google, Microsoft, and Amazon. Participants have received 14.5 interviews since they entered the workforce and spend on average 2.4 months to prepare for a technical interview (as interviewers). We ask participants to select skills being assessed during the interview process and count the number of times each skill has been chosen. We see that written and verbal communication and code comprehension are most frequently assessed while version control and debugging skills are comparatively less emphasized.

4.3 RQ3: What are the most important skills according to developers?

In the survey, we also asked participants to rank the importance of aforementioned eight skills based on their daily working experience. The smaller the mean ranking, the higher the priority. In the Table 1, we see written and verbal communication is considered the most crucial skills in real job, followed by clean code and documentation. On the other side of the spectrum, version control and testing are relatively less significant.

The initial results highlight misalignment between interview process and the actual job. Interviewers focus on skills like algorithmic problem solving while they put less emphasis on skills that are viewed as important by highly-skilled developers. This mismatch is further corroborated by the fact that only 47.8% of the participants agree that questions at their last technical interview match the activities and expectations that they encounter in the daily work.

Our initial results have implications to industry and academia. For industry, companies and technical managers should focus more on skills that are needed on daily bases such as clean code, code comprehension, and debugging. For academia, more emphasis should be given to communication skills, writing clean code, code comprehension, and debugging.

5 CONTRIBUTIONS

I am the principal contributor to this research paper with guiding help from my advisor. My contribution to this project consist of participating in the design of the study and questionnaire along with my advisor. In addition, I worked independently on developing the job listing scraping tool, collecting data, and analyzing the questionnaire and job listing results.

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