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Using a Predictive Rating System for Computer Programmers to Optimise Recruitment:

Using Ratings to Optimise Programmer Recruitment

Paul J. Bracewell, DOT loves data, Wellington, New Zealand
Ankit K. Patel, DOT loves data, Wellington, New Zealand
Evan J. Blackie, DOT loves data, Wellington, New Zealand
Chris Boys, Umano, Sydney, Australia

ABSTRACT

Using a quantitative assessment system, the number of resumes reviewed to identify a suitable developer was reduced to 3.5% with a successful recruitment decision made in 10 working days of posting the job advertisement. This paper summarises the methodology for developing that rating system. The depth and quality of an available talent pool is a function of demand, which is demonstrated by comparing globally-scaled individual performance metrics. Public code repositories are accessed and the code quality assessed algorithmically. The performance score combines accuracy, timeliness and difficulty from a series of challenges. These three attributes form a meaningful predictive measure of performance by using a non-linear optimisation routine. Bootstrapping is used to validate the approach. This process randomly omitted a scored performance observation per coder in order to calculate the performance score from the retained scores. There was a strong relationship ($r = 0.70$) between the predicted 1-omitted-performance score with the actual omitted score highlighting the predictive power.

KEYWORDS

Bootstrapping, Gamma Distribution, Log Concave, Performance Monitoring, Talent Identification

1. INTRODUCTION

The technology industry has experienced rapid growth in the demand for developers. According to the U.S. Bureau of Labour, software developer jobs are expected to grow 17% from 2014 till 2024. This rate of growth is much faster than the average rate among other professions. Overall by 2020, employment in all computer occupations is expected to increase by 22%. (Thibodeau, 2012). Among these occupations, software developers are expected to see the highest growth (32%), followed by database administration (21%), network and systems administration (28%), computer systems analysts (22%) and computer and information systems managers (18%). This increasing demand has resulted

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in a shortage in supply, creating an environment where organizations are constantly competing to identify the ideal candidate.

According to Soper (2014), virtually every recent scientific study identified a high demand for developers. The number of computer science graduates coming out of universities each year is not high enough to accommodate industry demand and this shortage of quality web developers in tech hubs like San Francisco translates into higher salary packages (Developers are in high demand, 2016). Given this large increase in IT demand, recruitment companies are increasingly finding it difficult to identify the best talent and are continually competing against other agencies to identify this talent. However, hiring a recruitment agency to identify the necessary talent is expensive, time consuming and may not provide the ideal match. Further, the recruitment process can be lengthy and this can be an influential factor in failing to secure the appropriate coder for the job.

Unlike accounting, finance and law which have professional standards, there is no global method of evaluating a coder/ developer's ability. Recruiters and HR teams are continually trying to identify the ideal way to identify quality coders in a timely manner and address high incoming demands.

An organization's inability to effectively and efficiently hire personnel leads to large exhaustion of resources such as time and money. This has given rise to E-recruiting, whereby the use of electronic resources, typically the internet and HR software, can guide and assist the hiring process to reduce the administrative and financial burden of recruitment and gain access to a wider talent pool (Dhamija, 2012). "The purpose of E-recruitment is to make the process involved more efficient and effective, as well as less expensive" (E-Recruiting, 2012).

A challenge for anyone attempting to recruit technical talent is objectively assessing the quality of a potential resource. Herein, we outline a quantitative rating system (Umano) for streamlining the technology recruitment process to identify appropriate talent in the field of computer programming. Essentially, the goal of the methodology is to streamline the hiring process by reducing the length in hiring time by identifying the most suitable candidate from a pool of talent. We apply this approach ourselves to a recruitment setting, where we could quickly focus our efforts on the most relevant 3.5% of applications and could offer the preferred candidate a role within ten working days of posting our job advertisement. This work describes the first commercial deployment of the Umano framework.

The Umano score is a data-driven framework designed to predict a coder's likely on-the-job success. The score is calibrated against coders from all over the world to provide a metric which indicates the relative ranking of an individual on a scale of 1-100. A score of 83 indicates that the individual is in the top 17% of coders worldwide. Using performance on simpler tasks to predict a coder's performance on more difficult tasks provides both an internal validation of Umano's testing regime and a fit-for-purpose source of data for optimising the development of a robust and relevant score. This is then further validated using a bootstrapping process.

The depth and quality of individuals within an available talent pool is found to be a function of demand of the coding language. This is demonstrated by comparing globally scaled performance metrics with measures of demand. The emphasis in this research is to understand how demand shapes the depth and quality of a talent pool and extends the work of Bracewell et al. (2016). This parameterisation of group behaviour is important for developing a cross programming language to enable appropriate and comparable rankings. We briefly describe our use of this approach for recruitment purposes.

The following section reviews literature on: firstly, how demand shapes the depth and quality of a talent pool and secondly, the factors that affect human performance and the distribution that best describes the demand of talented individuals.

2. LITERATURE REVIEW

There is no shortage of academic research that examines the performance of individuals, groups and teams within a wide variety of contexts. For example, cricket with its inherently data rich scoring

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