Signals Matter: Understanding Popularity and Impact of Users on Stack Overflow

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Introduction
The paper explores the role of game elements such as reputation points and badges, earned by a user on StackOverflow.com, in predicting a user's popularity and impact. The findings are based on an initial survey followed by an analysis of the StackOverflow dataset of 3,831,147 users.

Approach
A user's **popularity score** has been defined as the number of distinct page views on a user's profile on the StackOverflow website and the **impact score** as the total number of views on quality questions and answers posted by the users on the forum, signifying their reach.
The paper investigates the effects of these game elements through three models: Control model (CM), Reputation model (RM) and Badges model (BM). CM comprises features - number of questions, answers, account age, etc. RM has all the features of CM in addition to reputation points. Similarly, BM has all the features of CM in addition to different badges. Gradient Tree Boosting Regression is used to fit popularity and impact score from these models.

Contributions
The study concludes that both badges and reputation points are **positively correlated** with impact and popularity. Badges even outperform the latter by rewarding distinct actions whereas reputation points represent the combined impact of positive actions as a single score which dilutes their reliability.

Age of the account is proven the best predictor in CM. Welch-t tests are used to differentiate between high impact low popularity and high popularity low impact users. It was found that large number of questions and answers drive popularity, whereas Necromancer, Populist and Great Answer Badges drive impact.

Suggestions
Popularity Score is solely dependent upon distinct profile views which are calculated using unique IP address visits in an hour. Hence their number can be erroneously inflated by an influx of page views from external sites like Hackernews, which don't reflect actual popularity on StackOverflow. A more robust system to calculate the popularity score can be designed which filters out incoming traffic from external sites.

As mentioned in the paper, old users have asked and answered relatively "easier" questions leading them to earn a disproportionately high impact score. A subset of data from the last 5 years can be taken to give better insights into recent trends.

Since users can climb to the ranks of moderators who play an important role in the website community, their activities can contribute to their impact score. Exploring any correlations between impact, popularity and moderation decisions might prove useful.

The use of these gamified elements for hiring purposes provides an incentive to manipulate the systems. Hence as competition in this field grows, the correlation between these metrics and impact might diverge.

Another differentiating point between badges and reputation is that badges can never be lost but reputation can be lost. During 2011 - 2019, StackOverflow rewarded those people more who gave answers than those who asked questions by devaluing upvote on reputation on questions.

Analysing these themes might help answer more questions surrounding the popularity and impact of users.