Analyzing User Behaviour in Pgrkam Job Applications

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Abstract. The PGRKAM web and Android applications www.pgrkam.com offers valuable employment data that Punjab-based candidates can browse. Integrated tools to analyze user engagement do not exist in them, however. This project introduces Job Search India, an analytics platform using Python, Flask, MySQL, and Google Analytics. The application tracks the key user behaviors such as job searches, applications, and consumption of its content. Session length, engagement usage, and interaction trends are captured to derive actionable insights. These insights actually help with optimizing content delivery and improve the user experience. Ultimately, Job Search India is looking to help improve PGRKAM's platform by offering insight data that can help optimize content relevance and engagement among users.

Keywords. User Analytics, Job Search, Content Consumption, Google Analytics, Python, Flask, MySQL.

1 INTRODUCTION

PGRKAM website is a very important media through which employment data is passed on to the job seekers in Punjab. Despite having large user bases, the ability to track and analyze user engagement remains missing for these platforms. It suggests creating an all-inclusive user analytics system through the use of such technologies as Python, Flask, MySQL, along with the connectivity features with Google Analytics to track. It would capture user interactions at a level of fidelity that includes job searches and application behavior, generating actionable insights that help in the adjustment and optimization of content, therefore leading to a better engagement from users and general effectiveness in job seekers finding the opportunities they are looking for.

2 RESEARCH METHODOLOGY

The Job Search India user analytics platform follows a simple, efficient architecture:

1. Frontend: Developed using JavaScript, HTML, and CSS, the frontend integrates Google Analytics to track user events like job searches and applications.
2. Backend: Built with Python and Flask, the backend handles API requests, processes data, and integrates with Google Analytics to store user interactions.
3. Database: The MySQL database stores basic user credentials (username and password) for authentication.
4. Analytics Integration: Google Analytics tracks user interactions, sending data to the Flask backend, which processes and stores it in the database.
5. Data Processing: Insights on user behavior, such as job search trends and session duration, are displayed to administrators via a dashboard for optimization.

3 THEORY AND CALCULATION

The Job Search India app uses Google Analytics to measure site and mobile app data on user engagement. It tracks the events of page views, job searches, and job applications. With these events logged and tracked, the system gained knowledge about engagement patterns and user behaviour-a starting point for content optimization and improvement of user experience. Python and Flask were used for the development of the backend platform. Here, the processing of data captured from the Google Analytics takes place. However, the system holds very few data in it, such as usernames and passwords to users as it is in this case; tracking of action by users happens in real-time through Google Analytics. Some of the metrics calculated based on the retrieved data in Google Analyticsinclude session duration and event frequency through which functionality gets improved and the users' overall engagement in the

site is detected.

3.1 Mathematical Expressions and Symbols

1. **Average Session Duration**

Measures the average time a user spends per session.

Formula: Average Session Duration = $\frac{Total\ Time\ Spent\ by\ All\ Users}{Total\ Sessions}$

Total Time Spent by All Users: The combined time of all user sessions.

Total Sessions: The total count of user sessions recorded.

2. One-Page Session Rate

Measures the percentage of sessions where users visit only one page and leave without further interaction.

Formula: One-Page Session Rate = $\frac{Single\ Page\ Sessions}{Total\ Sessions} \times 100$

Completed Events: The number of times users successfully complete the targeted action (e.g., form submission, video completion).

Total Events: The total number of times users were presented with the event or action.

3. Engagement Rate

Measures user interaction with specific job categories (e.g., government vs. private).

Formula: Engagement Rate = $\frac{Interactions\ with\ Category\ (Government\ or\ Private)}{Total\ Interactions} \times 100$

Interactions with Category: Clicks, views, or time spent on a specific job type.

Total Interactions: All user interactions across the platform.

Metric	Government Jobs	Private Jobs	Overall Platform
Average Session Duration	5 minutes	3.5 minutes	4.2 minutes
One-Page Session Rate	12%	18%	15%
CTR (Click-Through Rate)	25%	20%	22.5%

3.2 Results and Discussion

Early testing of the Smart Analytics for User Engagement project has yielded encouraging results. This analytics system accurately captures essential user metrics, delivering insightful data on how visitors engage with the PGRKAM employment platform. Trends identified through Google Analytics indicate areas where content can be optimized, ultimately enhancing the overall user experience. The project's metrics highlight potential improvements that could help the platform better meet the needs and expectations of its users.

Key findings include:

User Engagement: High interaction rates across different job listings suggest strong user interest in both public and private sector opportunities.

Session Duration: Prolonged session times imply that users find the platform's content valuable and engaging.

Conversion Rate: The data shows a higher conversion rate, with more users actively applying for jobs, indicating effective content targeting and job relevance.

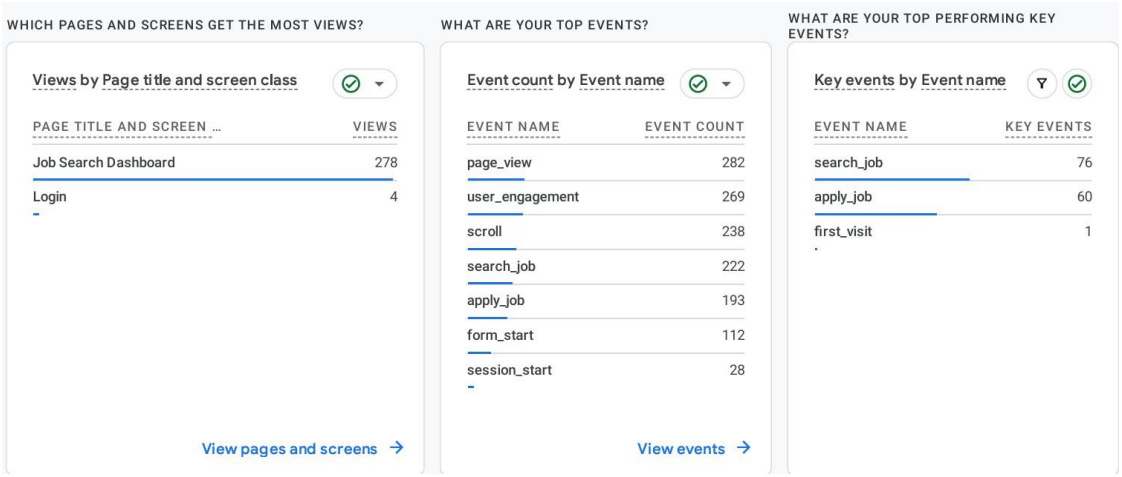

Figure 1 : Insights on User Actions and Page Views

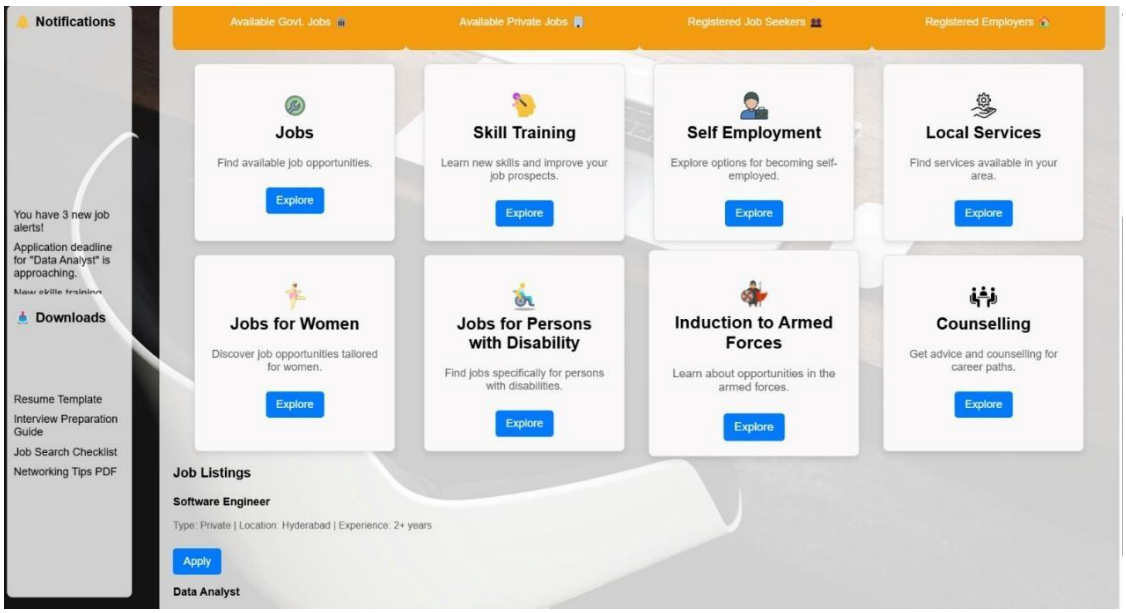

Figure 2 : Work Opportunities and Personal Development Programs

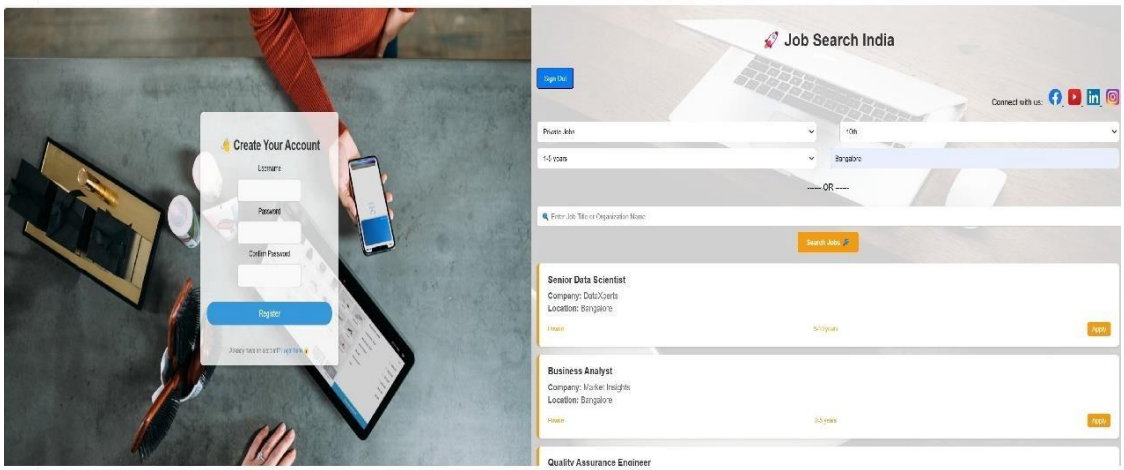

Figure 3 : Webpage to Register & filter the job types

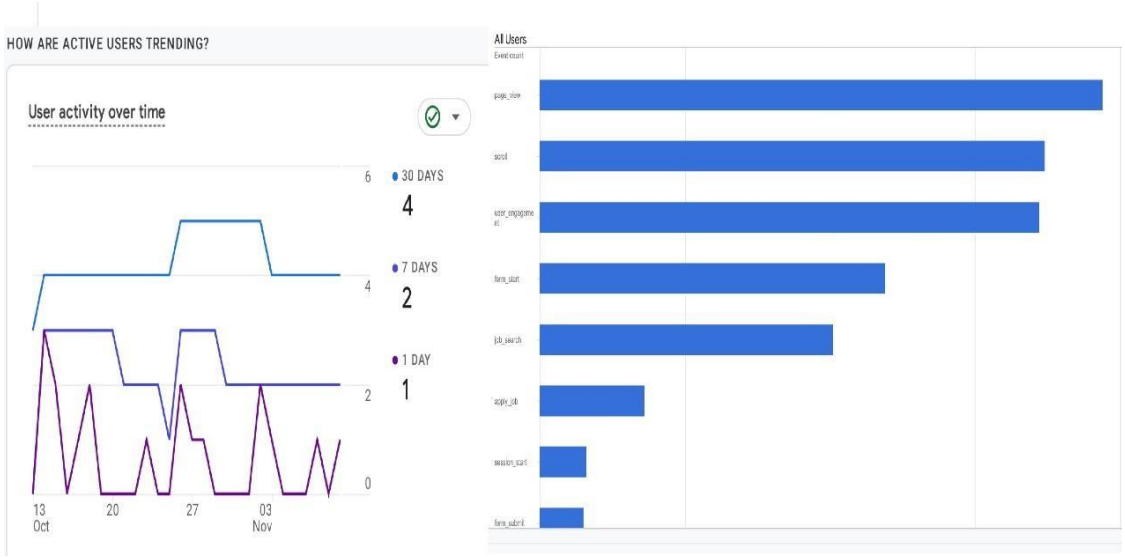

Figure 4 : User insights Based on activity and time

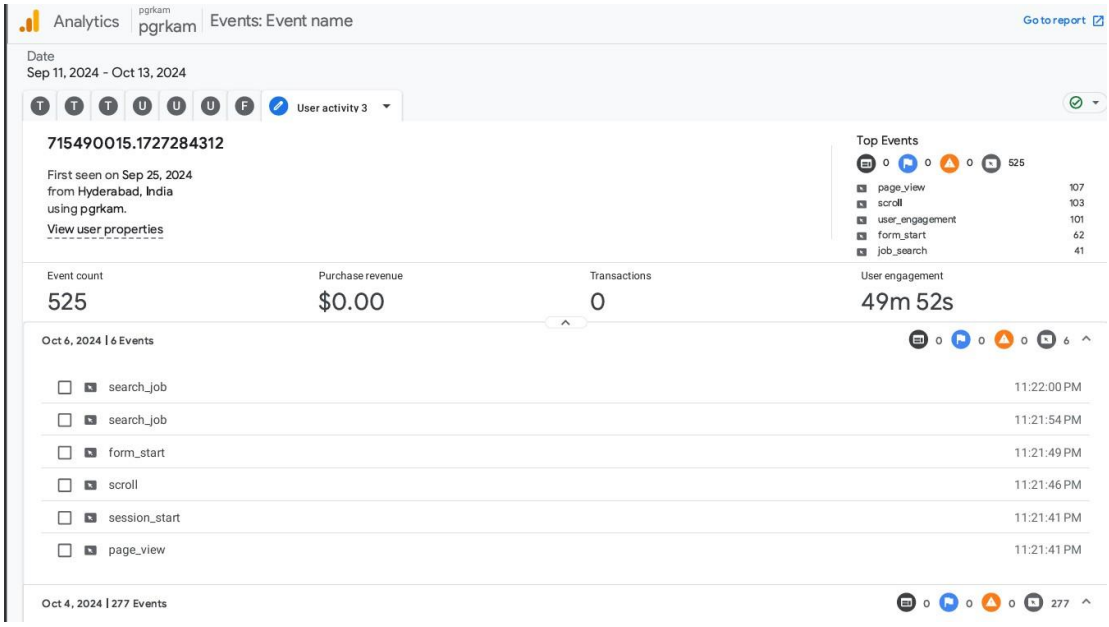

Figure 5: Events of an Particular user

4.1 Formatting Tables

Tables in the Smart Analytics for User Engagement project are designed to effectively present critical user interaction data, performance metrics, and trends. These tables serve to break down complex analytics into easily digestible information, enabling better insights into user behavior on the PGRKAM platform. Below is an example of how the data is structured

Session Duration	Average time users spend on the platform during each session.
Single-Page Session Rate	This metric represents the percentage of sessions where users visit only one page and do not interact further with the site.
Engagement Rate	Total number of interactions including clicks, views, and time spent on the platform.

This table format ensures clarity, presenting each metric alongside a concise explanation, making it easier to interpret and analyze the platform's performance.

4.2 Formatting Figures

Figures in the Smart Analytics for User Engagement project are carefully formatted with high resolution to clearly illustrate key user behavior metrics and trends. These visuals, including graphs and charts, effectively convey insights into user interactions, session durations, and click-through patterns. Each figure is designed to support the analysis by presenting data such as engagement rates and conversion metrics in an easily understandable way, allowing stakeholders to quickly grasp the platform’s performance.

5 CONCLUSIONS

The introduction of an advanced analytics system into the PGRKAM platform greatly improved its ability to monitor, interpret, and optimize how users interact with the site. By leveraging Google Analytics, we gained real-time insights into user behavior, including application patterns, demographic preferences, and engagement with different job categories. These findings drove meaningful changes to content delivery and user experience, which in turn led to higher success rates in job applications and more tailored recommendations for users. This project lays the foundation for future updates, such as offering personalized job suggestions based on emerging user trends and demographic data.

6 DECLARATIONS

6.1 Study Limitations

A key limitation of this project is the lack of real-time user data, as the PGRKAM platform is government-operated and does not permit live access to user information for testing purposes. This constraint hindered the ability to fully assess the system's performance in a real-world setting, requiring reliance on simulated data during both the development and testing phases. While the system is designed to work with live data, the absence of real-time information poses challenges in evaluating its immediate impact on user engagement and overall behavior.

6.2 Acknowledgements

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6.3 Funding source

This project did not receive any external funding.

6.4 Competing Interests

Given that this project is focused on enhancing a government-operated platform, there are no conflicts of interest or commercial gains associated with its development. The sole aim of this initiative is to improve the functionality and user experience of the PGRKAM system for the benefit of the public. The development team holds no financial, personal, or proprietary stakes in the project outcomes. Any advancements or insights gained from this work will be openly shared with government authorities, ensuring full transparency and a commitment to the public good, free from any external influences or competitive interests.

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