



Analytics: Building Mobile Game-Users Insights using Parameters

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Abstract— *Business people, Marketers need to assess their product performance. For that, they need to set key performance indicators with the help of which their product can withstand with unique properties in market. Earlier websites was one of the important mode of doing e-business, but now web paradigm has been shifted to mobile applications. Most of the people use mobile app instead of normal website version. That's why the need comes out to look into analytics of mobile web or mobile apps. Mobile analytics is booming sector nowadays. To understand user engagement with application is one of the main purpose of Mobile Analytics.*

Thus, in this paper, we are going to develop mobile analytics dashboard or a Tool-Rolopanel which will easily help to track, analyse traffic of mobile app visitors through events tracking functionality. Events are nothing but actions that users takes while using any app. Particularly we are analysing here gaming apps data and the engagement of users with that mobile app. We have tried to build multifunctional dashboard which can display different tracked user data on single platform in a very simple manner as well it will help to understand its semantics easily. We have also developed Admin Game Configuration Panel in which we can change App parameters to regenerate new results.

Keywords— *mobile app analytics, app parameters, user engagement and adoption, evets tracking, dashboard*

I. INTRODUCTION

Before a decade, almost every marketing company and other business people were advertising their product with the help of websites. Data about the user or customer who are visiting the site was collected in the form of page views, visits, visitors, page hit count, and countries. But these parameters are not that sufficient to track the user behaviour because we are not able to find out engagement of user. As the web market is switching to mobile from web. Every transaction either it is of any bank, railways or any game can be completed using mobile application. For customers comfort and ease companies are launching Mobile Applications of website version. With this advancement and shifting to mobile paradigm, marketing people are taking interest in tracking their customer behaviour. Such detailed insight is very important to know users engagement. This process of knowing details about user's action is considered in Mobile Analytics. Earlier there was scarcity of web analytics and mobile analytics tools as a result of which it was difficult for companies to get connected with people and their different action tracking with particular application. But, now the scenario is totally changed, now with the advancement in technology and increase in number of smartphones applications, people, companies, marketers are connected with each other. Nowadays companies are finding new advance analytic tools to stay in touch with their customers [14]. With the added layer of mobile analytics now part of that mix, analytic as a service providing vendors have opened up a whole new world off understanding as how customers are using their website or mobile applications on their devices. They are getting much greater detail, and are able to segment visitors in to groups, draw up persons and drive better, more targeted campaigns. This is the

world of Mobile Analytics [15]

Mobile App analytics enables us to measure the impact our app has made. Analytics provide insights into user behaviour and engagement, and scenarios like why an app has low usage, why an app is getting poor adoption, etc. These insights can be used to improve user engagement, increase user retention, and enhance the user experience. Mobile app analytics provides insights like how many active users are there for the app, on what devices and platforms are these users active on, from which geography, and how did they reach the app. These insights enable the developer to discover new and relevant users, and help in allocating resources for his/her app promotion. [10]

Many users download apps, use it once or twice and then become inactive. App analytics gives insights on who is using your app in real time, so that you get to know the actual number of users using the app. Several app analytics tools show the user path and engagement inside the app, such as where the user has taken actions, how much time the user has spent on a particular screen, on what screen he quit the app, etc. App developers can leverage these insights to troubleshoot the app and also check loyalty and frequency of user visits. [10]

In this paper, we are going to build mobile analytic tool as “RoloPanel” based on certain parameters. We will demonstrate segmentation analysis, retention analysis for particular days as well geographically distributed users with the help of world map. All the output data collected will get displayed on dashboard. We will be considering daily active users, new users as well session started users for analysis. Then for retention analysis we will be calculating it for particular days as 1st day, 7th day, 30th day as well for various versions of app individually. To demonstrate all these features, we are considering Gaming Applications as one of the topmost game Dead Among Us released by Rolocule Games. To build tool we will take help of Mixpanel API's and other latest technologies. We have also built Admin Game Configuration Panel.

II. LITERATURE SURVEY

Mobile analytics is a growing field. A significant amount of research is in progress to enhance performance of Mobile Analytics. We have surveyed different research papers and other whitepapers related to Mobile Analytics and Web Analytics. The paper titled “Web Analytics and Metrics: A Survey” [1] have contributed in process of Web Analytics. They also discussed different metrics and mechanism of evaluating websites and collecting information about behaviour of the user. Analysis of social media such as Twitter, Facebook with business activity with web-based API's provided by these services. [2] Different benefits of web analytics data suggests that this data sometimes used to perform technical troubleshooting and optimization. It also throws light to use of web analytics to understand their audiences, often for curiosity or entertainment, as well as for more site- design oriented tasks like increasing traffic and optimizing content. [3] The paper [4] aims to supports learning analytics through dashboard applications, ranging from small mobile applications to learnsapces on large public displays. Dashboards term refers to tools for the graphical visualization of key performance indicators (KPIs) complemented by reporting functions for data analysts. The author of the paper [5] investigate the risk of privacy leakage through mobile analytics services and demonstrate the ease with which an external adversary can extract individual's profile and mobile applications usage information, through two major mobile analytics services, i.e. Google Mobile App Analytics and Flurry. This whitepaper [6] exposes the lies being told about mobile analytics. They have discussed most common lies about mobile analytics which includes its accuracy, analytical solution correctness, hardware /software required as well measuring mobile visitors. A framework for Mobile Analytics to understand user engagement with mobile application is discussed in [7]. It also focuses on industry challenges to mobile analytics.

The report [8] examines the impact of mobile computing on the development, management, and implementation of applications and services for BI and analytics. The report will interpret the result of an extensive survey about organizations' current experiences and plans for future deployment of mobile BI and analytics for users ranging from executives to frontline sales, service, and support personnel. The report [9] on “Mobile Analytics from Netbiscuits-Using parameters to build web visitor insights” provides new insights to companies to get closer to their customers through new channels. It also introduces to Netbiscuits mobile analytic parameters, to demonstrate how they can be used to drive deeper understanding of customer preference and behavior.

III. PROPOSED SYSTEM

Analytics describes a measurement system that produces auditable records of events across a period of time that can be used to develop insights about a product. For freemium products, analytics is used to record the action of users, store the records, and communicate the information in them, mostly using visually graphical depictions.

For getting insights into user engagement analytics is the only means through which highly engaged users can be identified early and accommodated for and it is the only means of determining how a freemium product can best to be improved in order to enhance the experience for highly engaged users.

That's why, we have developed RoloPanel- a Mobile App Analytic Tool that will help in finding out user segmentation as well user retention also to locate geographically distributed users. Here mainly we have

developed Game Configuration Setting Panel which will help to reset or change gaming app properties and generate results accordingly.

The architecture of our proposed system is as follows:

Figure 1 explains how the data and control flows through different elements of system. As the control of our Mobile Analytic Tool is only with Administrator and Analysts. So number of analysts can send request at the same time to RoloPanel. Our tool is integrated with Mixpanel Analytic Tool. Mixpanel helps us to pull our data at any time and add key features to our own dashboard. Our own dashboard uses Mixpanel API and sends request to Mixpanel for fetching user data related to particular App. Here we will be considering Gaming Applications for analysis. Thus, RoloPanel finds out segmented users by using KPI as DAU (Daily Active Users), New Users and Session started users. It also tracks frequency of users visiting app and using it with the help of retention analysis. Frequency of users here tracked on 1st day, 7th day and 30th day. Also we are displaying total number of users corresponding to application on world map with respective countries for a period of one month. Our most important feature in RoloPanel is Admin Setting Panel where admin can change default events and properties set for fetching out data and results of segmentation and retention analysis.

Now, let us discuss about Segmentation Analysis and Retention Analysis as most versatile functionalities in mobile analytics.

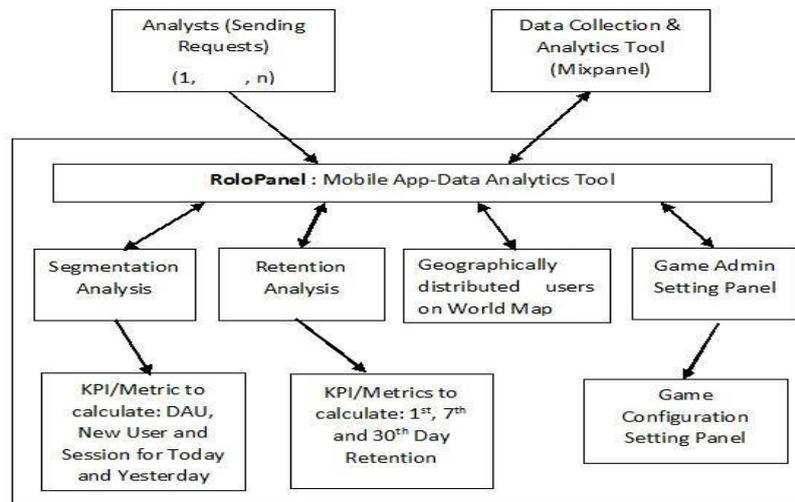


Figure 1. Proposed System Architecture for RoloPanel Mobile Analytic Tool

Segmentation Analysis: Segmentation is probably the most important tool that is booming in analysis toolbox. Segmentation helps to slice and dice data in some really creative ways. [16]

Retention Analysis: To find out an app is valuable to its customers or not, retention will help there. Retention reports customer's return and engagement with analyst's application. We can use that data to track and measure if any changes should company make to increase customer retention. Cohort analysis is next step forward. Cohorts are simply groups of customers that started with app within defined period of time. For example: all of the people who started using app in January form a new customer cohort for that month. By displaying how often these cohorts return to our app, we can measure if changes made by us make our app more or less valuable to customers. Cohorts are automatically grouped by data, week, or month, giving us the ability to see how our customer retention changes over time. [16]

By default, retention reports display a recurring behaviour (like logging in), but it can also show follow-up behaviour. If two reports are related then retention reports will show how often a person does one and then the other.

There can be 3 types of retention:

1. *Recurring Retention:* Recurring Retention will help us to understand how our most loyal users are using our apps. We will be able to see how our existing users come back and do something again.
2. *First Time Retention:* First time retention will help us to understand how new users are using our app. Just pick an event that happens once like someone signing up and it will show you how often people come back and do something else.
3. *Addiction:* Addiction will help us to understand how frequently people use our app in a day, week, or month.[16]

For Analysis we are considering following Gaming Application as

DEAD AMONG US– This is the latest Game announced and released by Rolocule Games Private Limited. This game can be downloaded from Apple App Store worldwide. Dead Among Us brings an incredible new way of playing shooters on mobile devices with its innovative single-hand controls. This addictive new first person shooter takes players on an exciting ride of killing zombies in a stunning post-apocalyptic setting across various breathtaking 3D locations. [11]

To build our RoloPanel we are taking help of Mixpanel analytic tool. Mixpanel is the one of the advanced

platform for mobile and web. Instead of traditional measuring pageviews, it helps us analyse the actions people take in our application. Here action can be anything – someone uploading a picture, playing a video, or sharing a post.

Before using Mixpanel API we need to first integrate it with our application. Mixpanel provides various Integration libraries for different languages and platforms as for JavaScript, Ios, Android, Python, Java, PHP, Ruby etc. We also need to send our events to track to Mixpanel using following reference code. We have used JavaScript API integration.

```
// Send a "Clicked Ad" event to Mixpanel
// with a property "Banner Color"
mixpanel.track(
    "Clicked Ad",
    {
        "Banner Color": "Blue"
    }
);
```

[12]

To track users’ engagement with the application, we are going to consider Application its Events to track and properties. Now, let us see what is event and property of particular application.

Event: - An event is an action someone takes in our application Exa: for Instagram this would be photo uploads **Property:** - A property is a little bit of extra information that describes an event. Exa: Instagram might send an event called “Uploaded Photo”. With that event, they could call ‘Photo File type’ so they could determine the kinds of photos uploaded. This information is needed to send with each event to track. [12]

Now, let us discuss the events of the Game Dead Among Us to track. There are number of events we can track but few are, Session Started, app-install, Bought Bow, Cash spent, Energy Exhausted, Gold Spent, Store Opened, Upgraded Now, User Registered, Watched Video and many more. We can flexibly add events at any time to track.

ROLOPANEL: - In our Analytic tool, we are going to get user insights using various parameters. For segmentation analysis we are using DAU, New User and session as parameters. We will be setting its related properties. Our latest Admin panel will let us change Games and its events properties. It will also let us add New Game with its API_KEY and API_SECRET as well delete game feature.

Now, let us discuss the way we followed to build RoloPanel Tool.

In order to ensure the security of our data, the Mixpanel API requires a basic system of authentication which will consider following parameters.

Required parameters:

1. api_key - This is an API key corresponding to the project we wish to consume from.
2. api_secret - This is a secret API key corresponding to the project. This should not be disclosed
3. sig - Signature for the method call, used in combination with your api_key, api_secret, and API endpoint parameters.
4. expire - UTC time in seconds; used to expire an API request. [13]

Segmentation Analysis helps to get data for an event, segmented and filtered by properties. Following table 1 shows standard parameters that needs to be set while using Mixpanel API whereas table 2 shows parameter list that we have set in our program for analysis .

| Required | Name | Description |
|----------|-----------|--|
| required | event | The event that you wish to segment on. |
| required | from_date | The date in yyyy-mm-dd format from which to begin querying for the event from. This date is inclusive. |
| required | to_date | The date in yyyy-mm-dd format from which to stop querying for the event from. This date is inclusive. |
| optional | on | The property expression to segment the event on. |
| optional | unit | This can be 'minute', 'hour', 'day', or 'month'. This determines the buckets into which the property values that you segment on are placed. |
| optional | where | An expression to filter events by. |
| optional | limit | Return the top limit property values. This parameter does nothing if 'on' is not specified. |
| optional | type | This can be 'general', 'unique', or 'average'. If this is set to 'unique', we return the unique count of events or property values. If set to 'general', we return the total, including repeats. If set to 'average', we return the average count. The default value is 'general'. |

Table 1: Standard Segmentation Analysis parameters from Mixpanel [13]

| Parameters | Values |
|--------------------------|---|
| api_key | 538a3541010a82e649f31ab0ec3c01e8 |
| sig | bde0cab26a675195c807e3b516b1024d |
| endpoint | Segmentation |
| Event for DAU | Session Started |
| Event for New User | User Registered |
| Event for Session | User Registered |
| From_date | (20 days earlier from today) 2015-05-19 |
| To_date | 2015-06-07 |
| Type for DAU | unique |
| Type for New User | unique |
| Type for Session | general |
| unit | day |
| limit | 10000 |
| Last Updations Game Date | 2015-01-01 |

Table 2: By Default set values of parameters for Segmentation Analysis of Dead Among Us App

Retention Analysis helps us to get cohort group of users. Following table 3 shows standard parameter list for retention and next table 4 will show the parameter list that we have set as default in our program.

| Required | Name | Description |
|----------|----------------|--|
| required | from_date | The date in yyyy-mm-dd format from which to begin generating cohorts from. This date is inclusive. |
| required | to_date | The date in yyyy-mm-dd format from which to stop generating cohorts from. This date is inclusive. |
| optional | retention_type | Must be either 'birth' or 'compounded'. Defaults to 'birth' |
| birth | born_event | The first event a user must do to be counted in a birth retention cohort. Required when retention type is 'birth'; ignored otherwise |
| optional | event | The event to generate returning counts for. Applies to birth and compounded retention. If not specified, we look across all events. |
| optional | born_where | An expression to filter born_events by. |
| optional | where | An expression to filter the returning events by |
| optional | interval | The number of days we want results bucketed into. |
| optional | interval_count | The number of intervals we want; defaults to 1. |
| optional | unit | This is an alternate way of specifying interval and can be 'day', 'week' or 'month' |
| optional | on | The property to segment the second event on |
| optional | limit | Return the top limit segmentation values. This parameter does nothing if 'on' is not specified |

Table 3: Standard Retention Analysis parameters [13]

| Parameters | Values |
|----------------------|---|
| api_key | 538a3541010a82e649f31ab0ec3c01e8 |
| sig | bde0cab26a675195c807e3b516b1024d |
| endpoint | retention |
| Retention born_event | Session Started |
| Retention from_date | 2015-01-01 |
| Retention to_date | 2015-06-07 |
| Type | birth |
| Interval Count | [1, 7, 30] 1 st day, 7 th day, 30 th day |
| Interval | 1 |
| on | app_version |
| Current_app_version | 0.73 |
| Older_App_Version | 0.72 |

Table 4: By Default set values of parameters for Retention Analysis

IV. IMPLEMENTATION DETAILS

We have successfully implemented our proposed system with following hardware and software details. The hardware requirement are as follows: Processor as Intel dual core and above with frequency as 1.73 and above, RAM as 1 GB & above, Hard Disk capacity as 7 GB and above. For Software Specifications, we have used Operating System as Mac OS X 10.7, XAMPP Server, Sublime Text Editor, Programming Languages used for exporting data as PHP, JavaScript.

The screenshots of results is as shown below. We have developed a mobile analytic tool which will help to track game-user behavior with the help of segmentation and retention analysis as described above. Here we are giving output screenshots for Dead Among Us along with geographically distributed users for particular game over a period of 1 month. For this we have used GeoMap API of google developers. We are also discussing Admin Configuration Panel and its result before and after properties changed.

Figure 2 shows Segmentation Analysis for Dead Among Us game. With the help of Next, Previous and Refresh stop buttons we can increment game or decrement game or stop refreshing of webpage to analyze game data for particular. Admin Setting button will redirect to admin setting configuration page. We can see on Rolopanel, it shows total number of users for today and yesterday. And similarly the up arrow and down arrow shows the difference between users for yesterday and today and corresponding decrease or increase in percentage of users. The graph corresponding to particular yesterday DAU, New User and Session shows number of users from last 20 days. The graphical curve clearly displays up's and down's in number of users using application. This is all real-time data and is varying daily. We have measured this on daily basis and produced data. But here, we are displaying it for particular day.

Now let us discuss about Retention Analysis for Dead among Us. Consider figure 3. Here, we have found out retention of users on particular days as on 1st day, 7th day and 30th day. I.e. retention analysis gives us recurring users. If a user coming on first day to play certain game and doesn't come for 5-6 next days and comes on 7th day, then our analytic tool helps to find out how many users are playing app on first day and then coming on 7th day and then on 30th day. We have taken out percentage of such users. Here we are giving percentage of such users for both current version and older version of particular app along with overall retention.

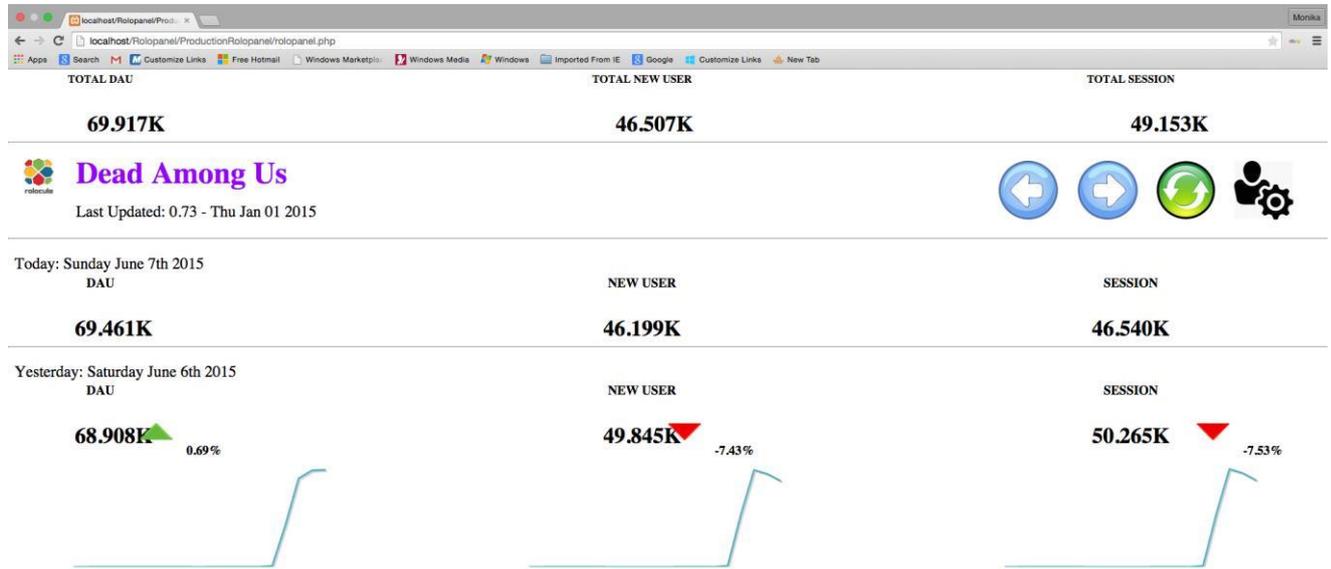


Figure 2: Rolopanel segmentation analysis for Dead among us with Session Started Event.

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on first day and then coming on 7th day and then on 30th day. We have taken out percentage of such users. Here we are giving percentage of such users for both current version and older version of particular app along with overall retention. Adjacent figure 4 shows geographically distributed users for Dead Among Us all over the world for particular time period as of one month. Here the scale shown at leftmost bottom clearly indicates total highest number of users which is shown on map with dark blue color. As the density or number of users getting less are displayed with some more fade/light shades of blue. When we take mouse pointer on particular region it will display total number of user for that country/region. We can do this for different cities in countries i.e. city wise users' distribution on map. This is also dynamic and changes on monthly basis.

Figure 5 shows Admin Setting Panel, where we have provided three functionalities as Game Configuration Changing, Add Game, Delete Game details. Here by default properties set can be changed, which includes

1. Features: DAU, New User, Session and Retention on 1st, 7th or 30th day and its corresponding events can be changed.
2. Default Event: - Figure 6 shows drop-down list of number of events. One of them can be choose to generate results. As many number of events to be tracked, that much number of different results for both segmentation and retention analysis will get produced.
3. Default Game Change Time for All Games (in sec):- This property represents refresh time for number of games when some new games will get added. i.e. if we add two more games with Dead Among Us and game change time is set as 20 sec then these three games will display their result on screen after every 20 sec.
4. Retention Date: - This parameter signifies that from which date we want retention analysis to be set. Here by default set is 01/01/2015, which can be changed to any date as before one month to today.
5. Last Updated On: - This parameter will change last updated game date and will display same on screen. As we know that, updations for one gaming apps gets released after every 1-2 months so depending upon that this date can be changed.
6. Graph Analytics Since (in days): - This parameter will display the graphical curve in yesterday analytics from set date. Here as 20 days set so, the graphical curve is displayed from 20 days back to today.
7. Current Version and Older Version: - We can generate retention analysis for current version and older version just by specifying version number in admin panel.

| RETENTION ANALYSIS | | | |
|---------------------|---------------|--------------|--------------|
| Overall | DAY 1 | DAY 7 | DAY 30 |
| | 22.35% | 9.29% | 3.24% |
| <hr/> | | | |
| 0.73 Latest version | DAY 1 | DAY 7 | DAY 30 |
| | 12.87% | 8.85% | 2.72% |
| <hr/> | | | |
| 0.72 Older version | DAY 1 | DAY 7 | DAY 30 |
| | 17.15% | 5.6% | 3.07% |

Figure 3. Retention Analysis for Dead Amon Us with Session Started Event



Figure 4. Geographically Distributed Users for Dead Among Us Gaming Application over date range as one month before from today (7th June 2015)



Figure 5. Admin Game Configuration Setting Panel for Dead Among Us

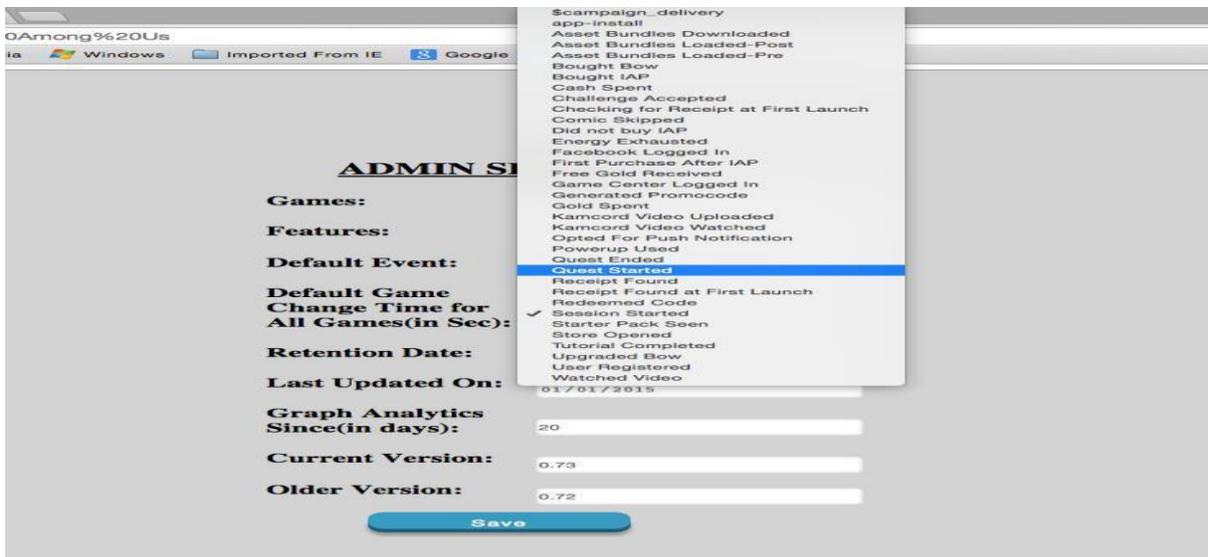


Figure 6. Changing Game Event to User registered in Admin Setting Panel for Dead Among Us

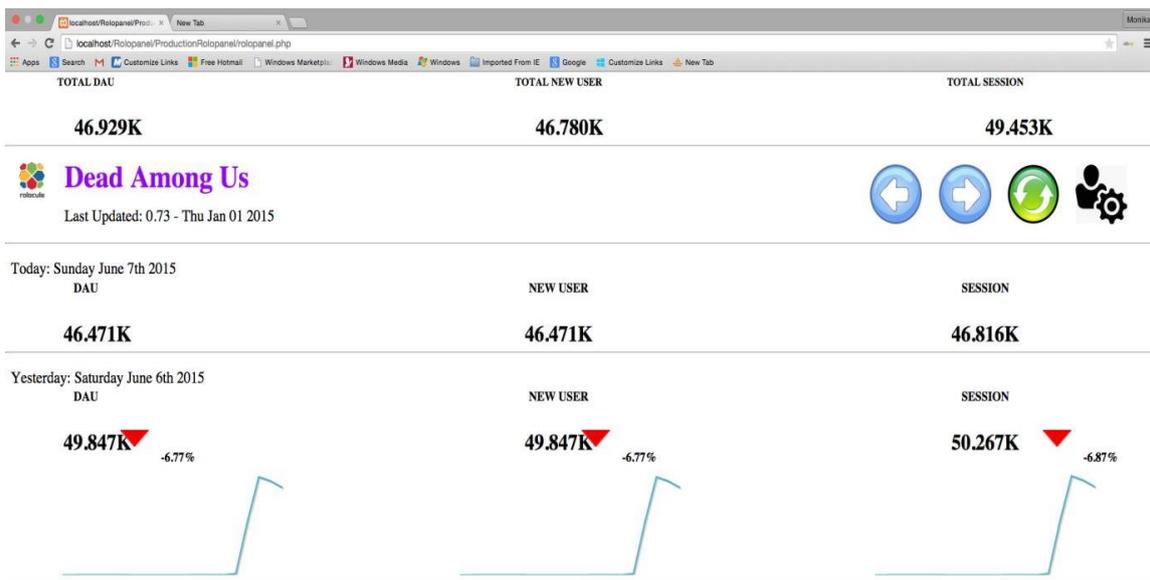


Figure 7: Rolopanel segmentation analysis for Dead among us with User Registered Event.

Above figure 7 displays Segmentation analysis for User Registered Event. We can clearly see difference between the data fetched for session started in figure 2 and user registered in figure 7. In this way, we can change number of different parameters on Admin setting panel and find out desired results.

V. CONCLUSION

Mobile App Analytics is establishing its existence nowadays in business by providing different analytic services to marketers, analysts and surely it will take a significant position in coming future. Thus, through this paper we have overviewed the Mobile analytics need, its advantages as well different measurement parameters with KPI's. We have also discussed system architecture for proposed Mobile App Analytics. To find out semantics out of mobile analytics we have built strong mobile analytic tool as Rolopanel with the help of Mixpanel API's. We have considered segmentation analysis, retention analysis and geographically distributed users to show on world map along with their some predefined parameters. We have discussed standard parameters needs to set while using Mixpanel API and the list of parameter we have used to find out the results for Gaming Application. We have built Rolopanel dashboard as well game configuration setting admin control panel with the help of which analysis of particular app can be changed by passing different parameters to it. Our current work is going on beautifying dashboard so that we can use it in better way for business intelligence as well increasing performance of dashboard/tool.

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