Xoanon Analytics

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I. Overview:

The main objective of anomaly detection is to identify unusual patterns among A-number that do not conform to expected behavior in order to mitigate and monitor unfair termination rates. To acquiesce A-number as anomalies, initial analysis was done on three use-cases which is explained in the next section. Xoanon algorithms will run on the datasets, collected on a daily basis and allocates risk zones for users, using which actions can be taken based on criticality. Only the high risk users for individual use-cases are exported to a SFTP folder as separate CSV files.

II. Use Case Description:

1. Based on distinct contacts: A single A-number calling in excess of twenty different B-numbers per calendar day
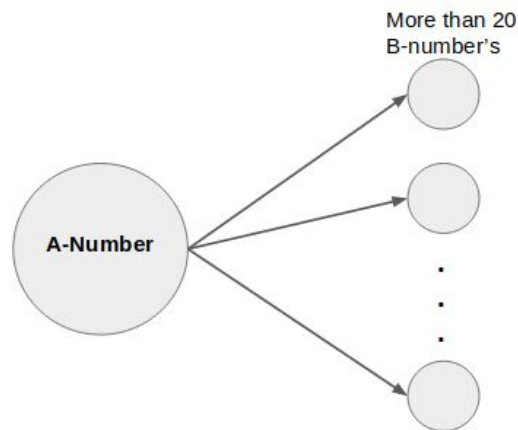

Fig. 1. Based on distinct contacts

- **High Risk** - more than 20 distinct B-Numbers
- **Medium Risk** - 0.03 percentile below high risk percentile (~11-20 contacts).
- **Low Risk** - 0.03 to 0.27 percentile below high risk percentile (~7-10 contacts).
- **No Risk** - less than 0.3 percentile below high risk percentile (~ <7 contacts).

2. Based on total duration: A single A-number generating more than 200 minutes per calendar day.
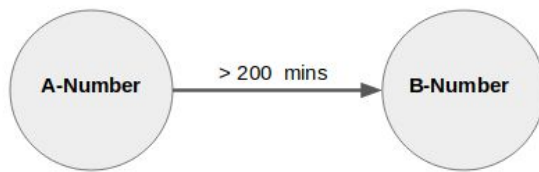

Fig. 2. Based on total duration

- **High Risk** - more than 200 minutes
- **Medium Risk** - 0.15 percentile below high risk percentile (~130-200 minutes)
- **Low Risk** - 0.15 to 0.35 percentile below high risk percentile (~100-129 minutes)
- **No Risk** - less than 0.5 percentile below high risk percentile (~ <100 minutes)

3. Based on return calls: A single A-number making more than 20 calls to a B-number in a single calendar day and had not received any return call(s) from that B-number in the past.
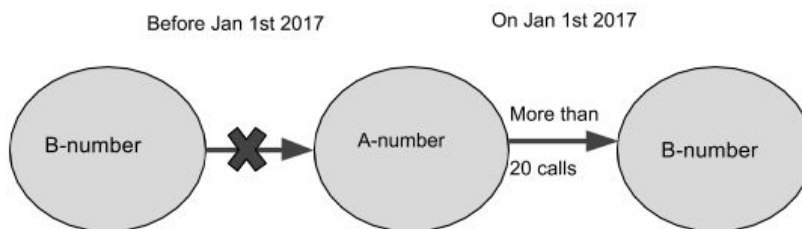

Fig. 3. Based on return calls

- **High Risk** - more than 20 calls with no return call
- **Medium Risk** - 0.125 percentile below high risk percentile (~14-20 calls without return call)
- **Low Risk** - 0.125 to 0.225 percentile below high risk percentile (~11-13 calls without return call)
- **No Risk** - less than 0.35 percentile below high risk percentile (~ <11 calls without return call)

An initial study was done with the distribution of total users along each attributes to fix the percentile condition values for each use cases. Xoanon algorithm dynamically sets the condition for risk zones on a daily basis based on the distribution. The percentile condition values for all three use cases changes from day to day.

Fig. 4. Distribution of users across risk zones

III. DashBoard/Report:

Xoanon provides Dashboards/Reports related to anomaly detection use cases for operationalization and insights. There are four sets of Dashboard provided:

- Anomaly Analysis -Daily Dashboard
- Anomaly Analysis -Monthly Dashboard
- Trend Analysis
- Exploratory Analysis

Telia has access to all four dashboards while NCell has access to only first three dashboards.

I.   **Anomaly Analysis - Daily Dashboard:**

This Dashboard provides at-a-glance visibility into the essential day-to-day information to track current performance of key metrics of normal users and anomalies. This report will be updated on a daily basis.

- **Filter**: Using the date filter available in the dashboard, the user can see the information for last 7 days. Also use case filter is provided to see the distribution of customers in different risk categories and their corresponding usages.

- **KPIs**: An overview of day to day usage for all the key metrics is summarised to demonstrate how effectively the company is achieving key business objectives.
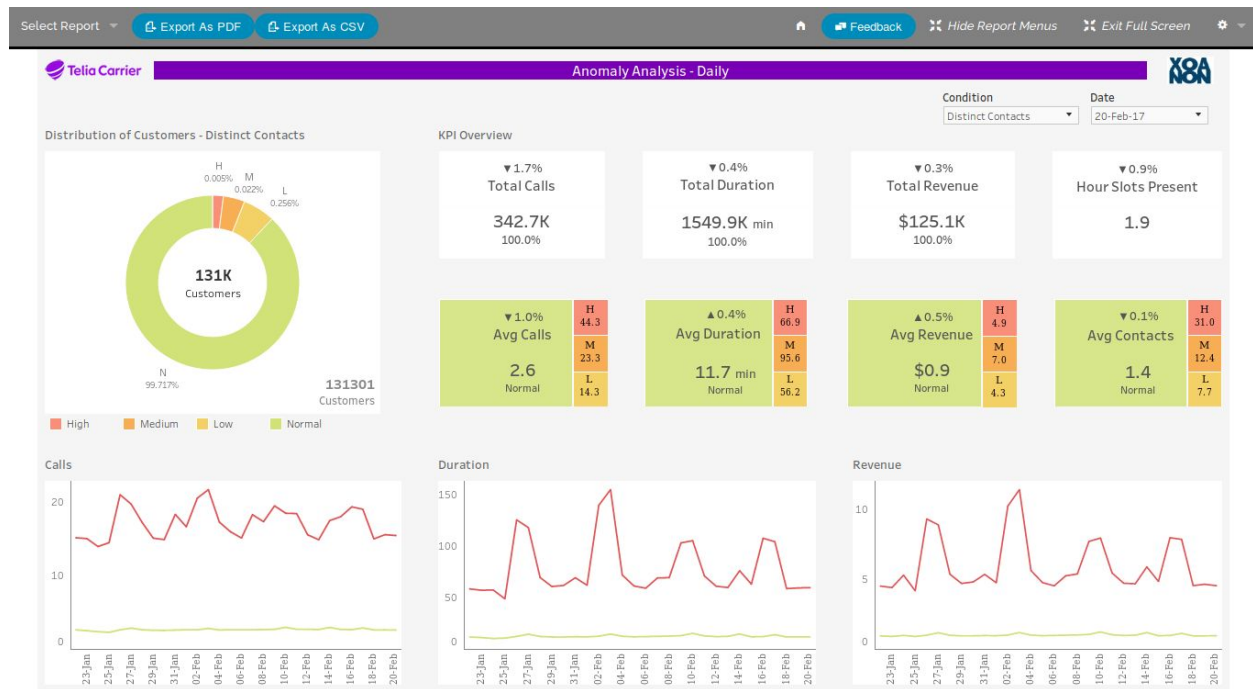
Fig. 5. Anomaly Dashboard - Daily

II.   Anomaly Analysis - Monthly Dashboard:

Monthly Dashboard is a platform that provides all KPIs and critical metrics across risk zones updated in a monthly basis. The month-on-month trend of metrics is shown. This dashboard will be made available in the near future.

III.   Trend Analysis Dashboard:

Trend analysis Dashboard captures the behavior of customers over time. It allows the user to see their customer's performance across daily, hourly, weekday/weekends among the three risk categories. In future, additional reports showing different patterns will be provided.
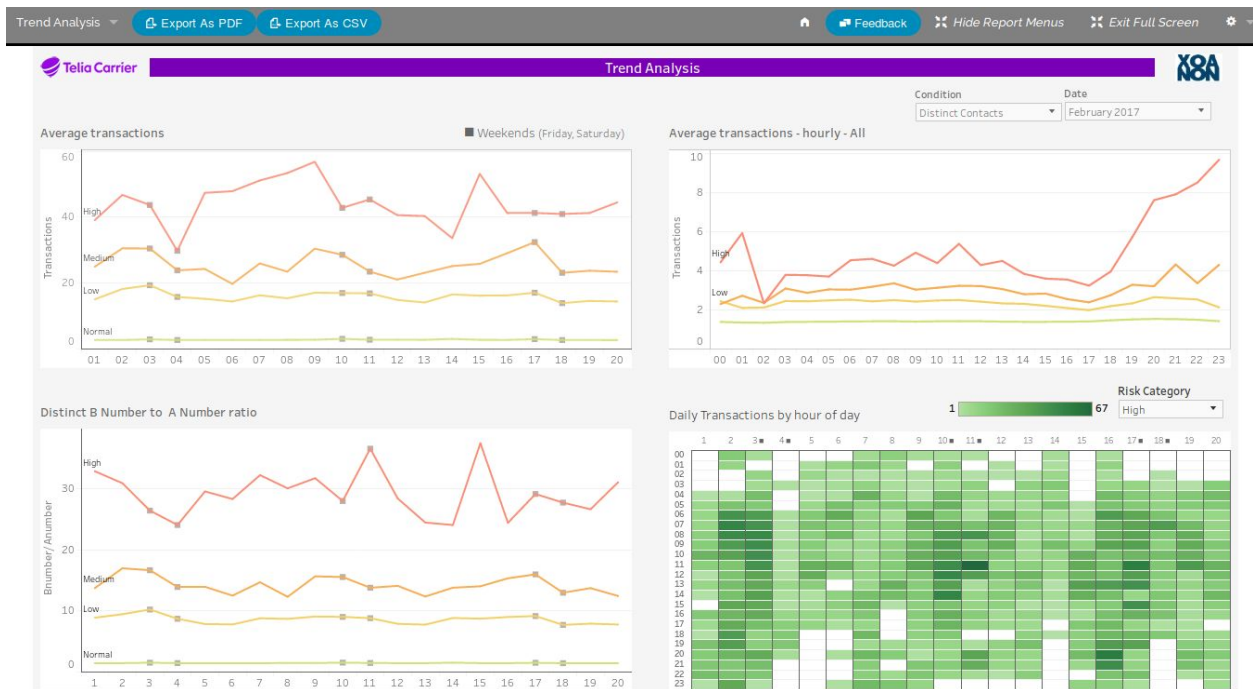
Fig. 6. Trend Analysis

IV. Exploratory Analysis Dashboard:

The Exploratory Dashboard gives an in-depth A-number level analysis and allows the user to observe the daily performance of the risk users. The above mentioned dashboards shows only the univariate analysis of the use cases whereas this report gives a **multivariate analysis.** Use Case 1(distinct contacts) and Use Case 2(total duration) are correlated to begin with. For example in the image shown below, the A-number present in extreme right or at the top end of the graph exhibits abnormal behavior in only one Use Case, whereas the A-number present in the middle of the graph exhibits abnormal behavior in both the Use Cases. This report also allows the user to select single A-Number (or) set of A-numbers to see their performance of key metrics and trend. An option to export the list of A-number selected in the graph is available, this can be done by clicking the 'Selected List' button at the top of the portal.
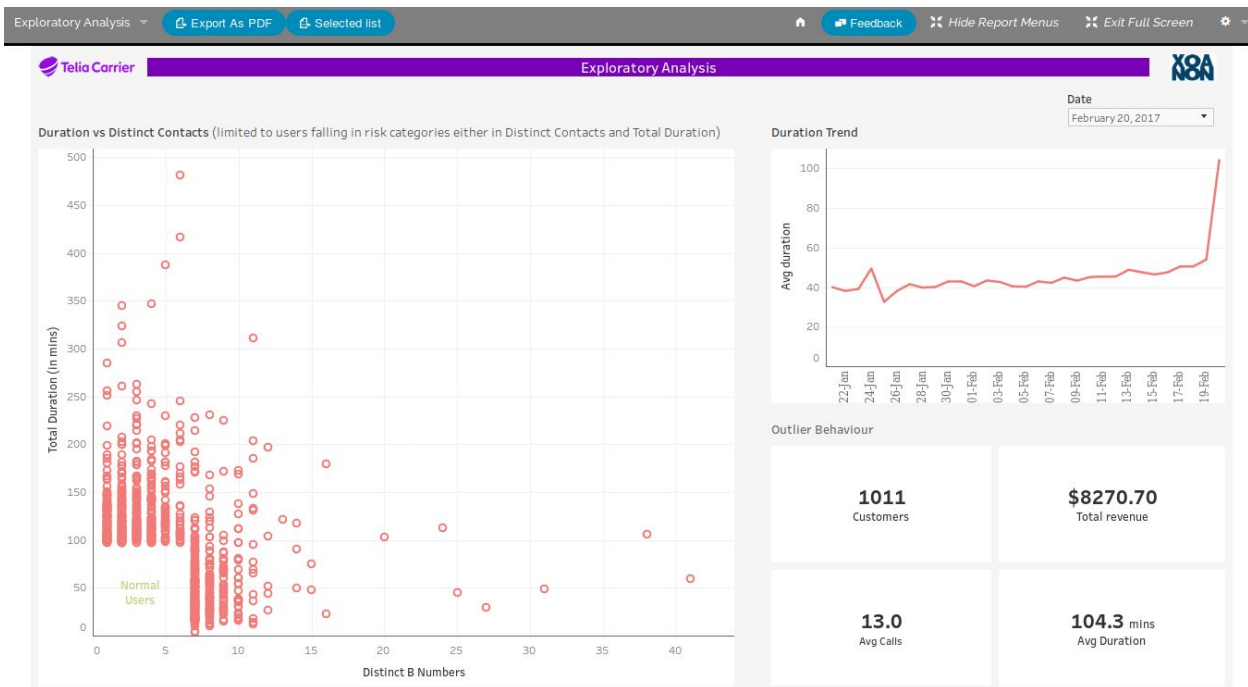
Fig. 7. Exploratory Analysis

IV. Export Feature:

The dashboard/reports can be exported as a PDF, by clicking on the 'Export as PDF' button present at the top of the dashboard. Clicking on the 'Export as CSV' button will display the location to find the CSV file containing the high risk users.