Revenue optimization

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Problem statement

To maximize revenue with minimum traffic allocation

Given a dataset with the following variables

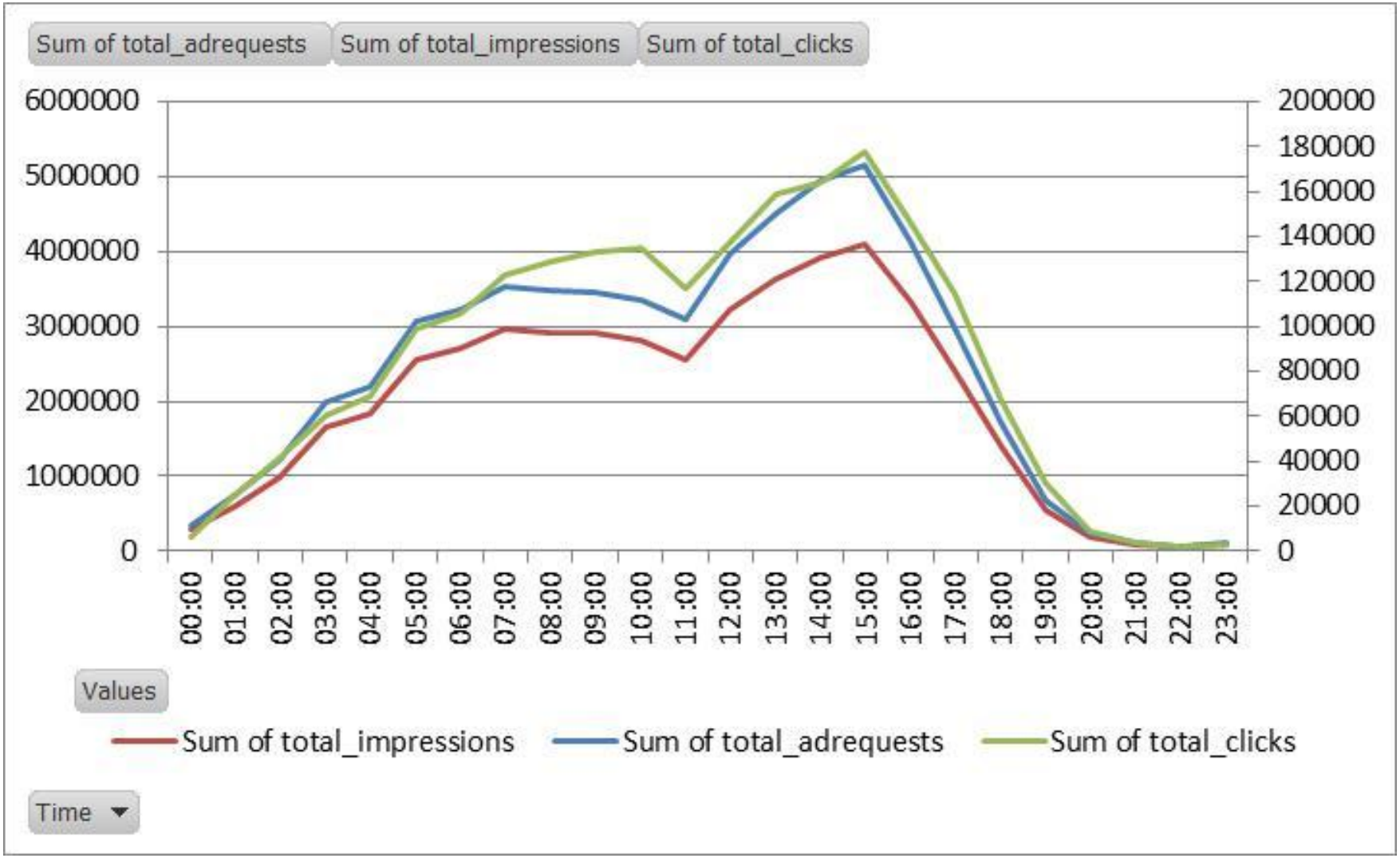
- created_at
- game_id
- campaign_id
- adgroup_id
- country_id
- category
- revenue
- total_adrequests
- total_impressions
- total_clicks

Analysis

- Clickthrough Rate Vs industry standard(FB ads): **4.30%** Vs **0.9%***
- Impressions/Ad requests ratio: **81.9%**
- Revenue/Click: **0.002**
- eCPM: **0.128**
- The revenue from game ID 32359233 is **5 times more** than revenue from game ID 43346372, even though the CTR of game ID 32359233 is **4% less than** CTR of game ID 43346372
- **82% of the total revenue** and **~90% of ad requests** come from game ID 55107008 and 32359233
- Revenue generated by adgroup ID 4 is the maximum and the top 3 groups(4,13,1) generate 61% of the total revenue. However, the top 3 total number of clicks generated by groups (4,1,10) is maximum implying that group 13 has relatively higher conversions to clicks.

*https://instapage.com/blog/key-advertising-metrics

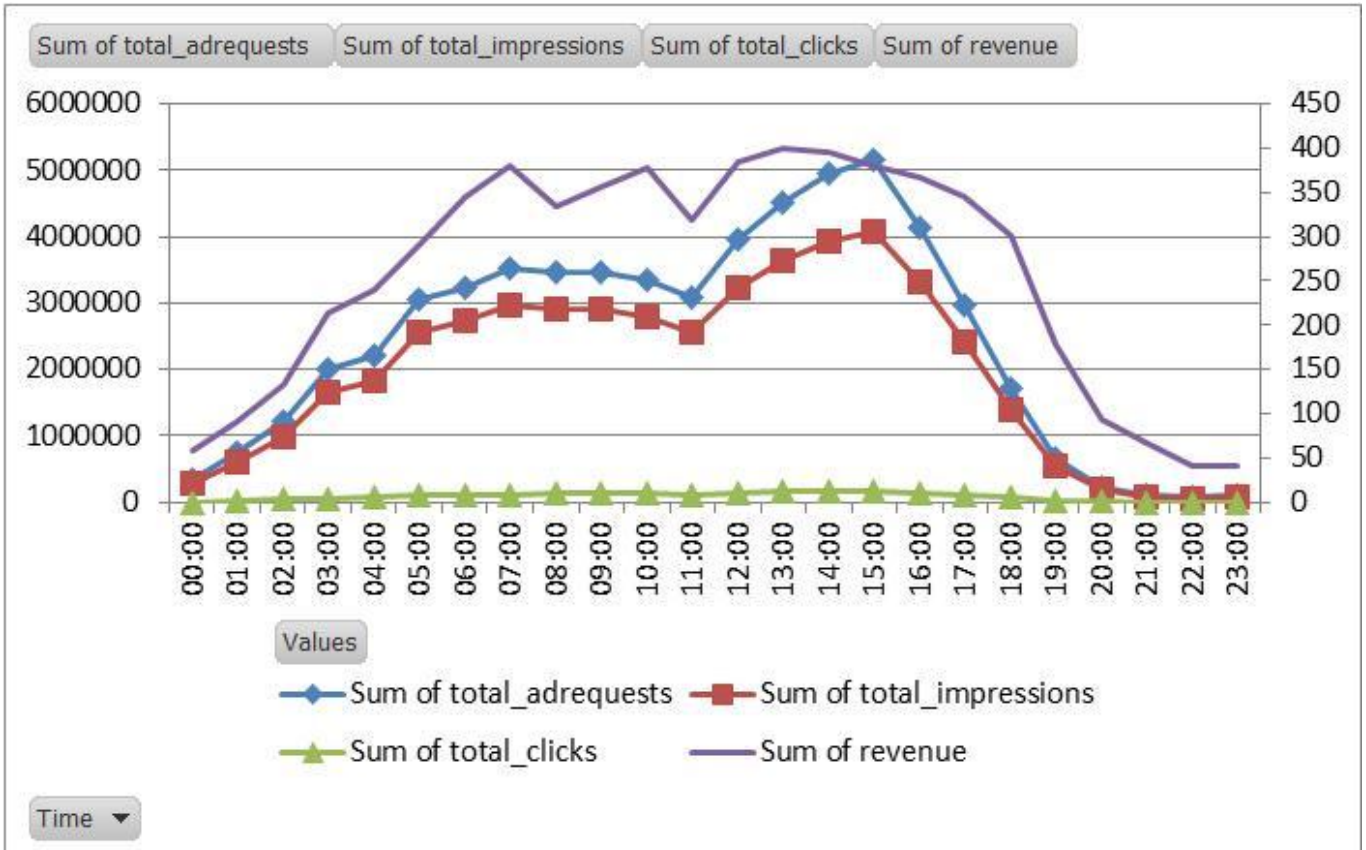
Analysis



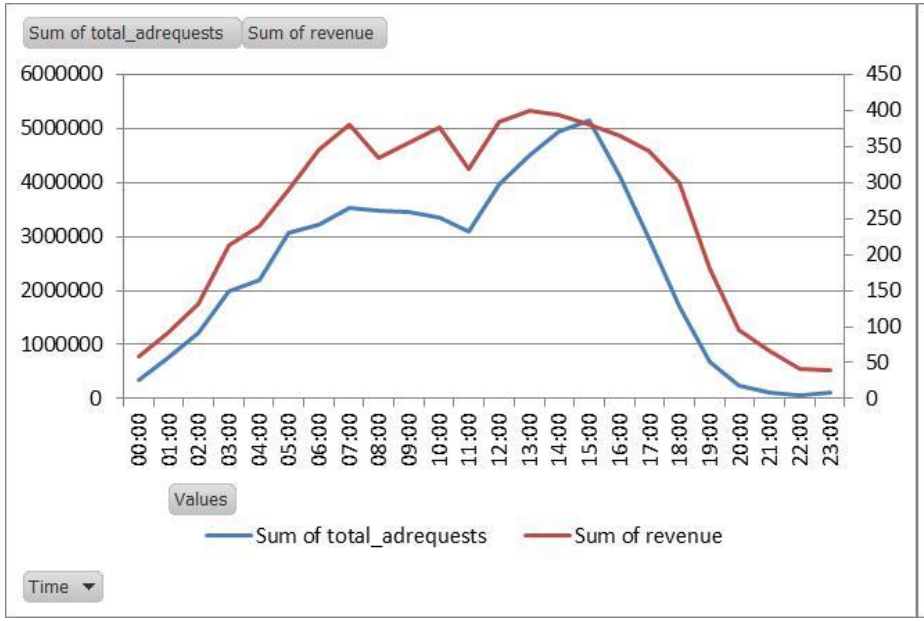
Time split of ad requests, impressions and clicks

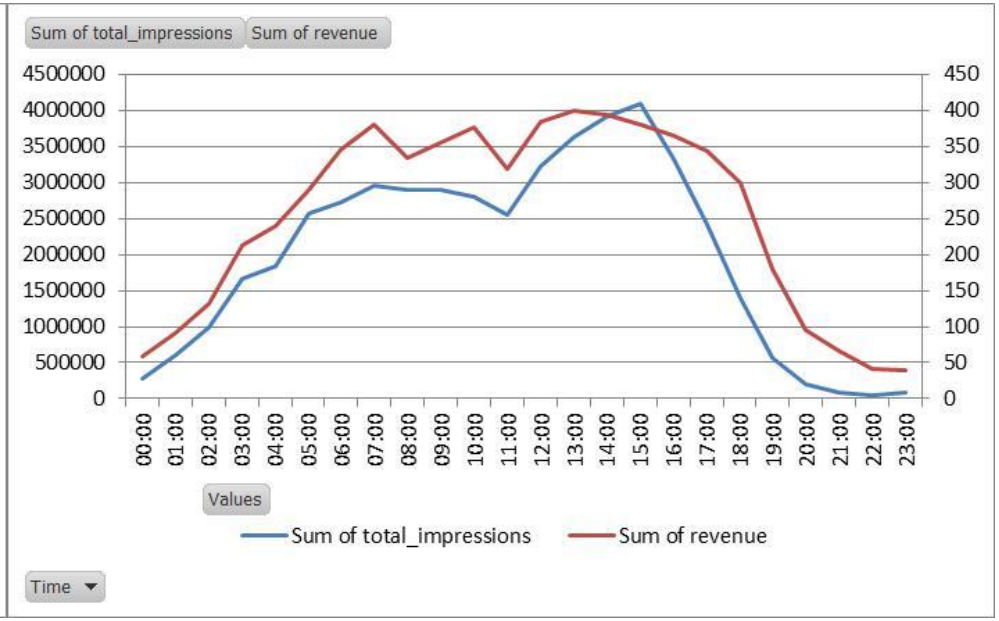
Analysis

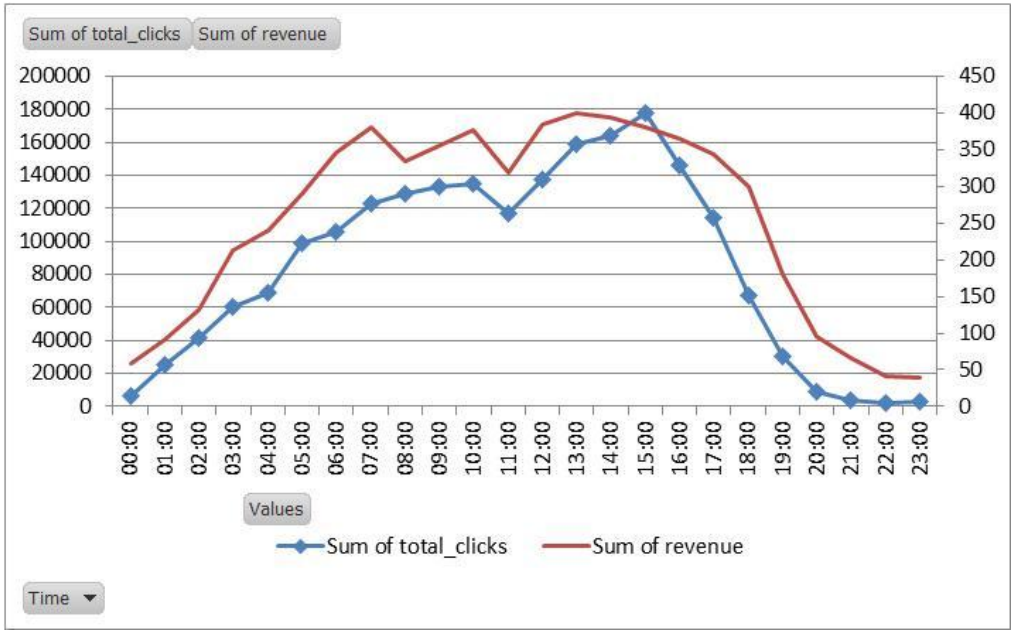
- Between 00:00hrs and 07:00hrs, 12:00hrs and 15:00hrs the number of ad requests, impressions and clicks rise sharply. However, the rise in number of clicks in not proportional.
- There is a sharp decline in the number of requests , impressions and clicks after 15:00hrs leading to decline in revenue.
- The requests, impressions and clicks are strongly correlated as shown in the previous chart, with more number of clicks after 06:00hrs



Analysis


Sum of total_adrequests
Sum of revenue
6000000
5000000
4000000
3000000
2000000
1000000
0
450
400
350
300
250
200
150
100
50
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Values
Sum of total_adrequests
Sum of revenue
Time


Sum of total_impressions
Sum of revenue
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
450
400
350
300
250
200
150
100
50
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Values
Sum of total_impressions
Sum of revenue
Time


Sum of total_clicks
Sum of revenue
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
450
400
350
300
250
200
150
100
50
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Values
Sum of total_clicks
Sum of revenue
Time

Linear Model

Since, a particular variable is to be maximised over other variables, linear regression technique is used to figure out which would be the significant variables contributing to the revenue.

It was found that the there are certain campaigns and adgroups which contribute to the model. Apart from these the total number of ad requests and total number of clicks help in driving positive revenue growth.

Hence, a maximization of these variables will lead to positive growth in the revenue.

Linear Model

```
lm(formula = revenue ~ game_id + campaign_id + adgroup_id + country_id +
    category + total_adrequests + total_impressions + total_clicks,
    data = f)

Residuals:
    Min      1Q  Median      3Q     Max
-2.4837 -0.5331 -0.1822  0.1945  8.2959

Coefficients: (1 not defined because of singularities)
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)        3.606e+02  9.111e+00  39.582  < 2e-16 ***
game_id            6.965e-10  1.282e-09   0.543 0.586974
campaign_id       -3.523e-02  8.930e-04 -39.455  < 2e-16 ***
adgroup_id         3.025e-02  4.508e-03   6.709  2.2e-11 ***
country_id         1.554e-08  3.075e-07   0.051 0.959707
category                  NA         NA      NA       NA
total_adrequests   1.854e-05  5.320e-06   3.485 0.000496 ***
total_impressions -1.426e-05  6.980e-06  -2.043 0.041154 *
total_clicks       6.113e-04  3.549e-05  17.227  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.9734 on 4445 degrees of freedom
Multiple R-squared:  0.4998,    Adjusted R-squared:  0.499
F-statistic: 634.5 on 7 and 4445 DF,  p-value: < 2.2e-16
```

Recommendations

- Given that 81.9% of the total ad requests are entertained, and a positive correlation between ad request and ad impression, increasing this value will have positive impact on the overall revenue
- For game id 43346372, the clicks/impression is highest however, the revenue is generated is not the highest. This implies that there is a possibility of increasing the revenue with modification in the pricing of the cost of clicks inviting more conversions to generate revenue.
- For game id 32359233, the clicks/impression must be increased to have a higher revenue.
- Game IDs 19383848, 52065646, 94757439 must have more ad requests so that the impressions are higher in count.
- Keeping the user engaged after 15:00hrs will help generate ad requests, impressions, clicks and thereby revenue. This can be done by scaling up the application to countries across different time zones.