[1] "----------" [1] "----------" [1] ""

COMPARISON OF AUG v. JUL MONTHS

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REMARKS:

**.... This analysis studies the variable timedelay(invite-to-quote).
I measure this metric in terms of hours and as follows: for each
invite having a matching quote, substract the invite's sent_time
from the quote's sent_time. Then, for each day of the months in
question, we focus on only those invites that were initiated that
day and had a matching quote anywhere into the future. This analysis
has a weakness with respect to long-term outlooks in quote reply
time (e.g., weeks later, spanning into the next month, etc), however,
the data reflects tht average time delay typically within a single
day. I will refer from here on to this metric as i2q_hrs. The
goal is to determine whether the i2q_hrs for July and August represent
different distributions and hopefully identify any relevant business
insight related to emerging differences. My approach will be to
perform t_tests and explore component effects via aggregation with
respect to various factors of interest such as day of the month of
the invite, category of the invite, location, day of the week, hour
of the day for both months and determine if significant differences
with respect to this small dataset appear to emerge.**

A1: THE INPUT DATA

TABLE categories FIRST ROWS:

---

	category_id	name
1	1	Photography
2	2	Window Installation
3	3	Portrait Photography
4	4	Wedding Band
5	5	Home Security and Alarms

TABLE invites FIRST ROWS:

---

	invite_id	request_id	user_id	sent_time
1	1	1	312	2013-07-01 13:20:05.072029
2	2	1	850	2013-07-01 15:49:33.110849
3	3	1	555	2013-07-01 13:39:18.608330
4	4	1	917	2013-07-01 08:56:11.751781
5	5	1	215	2013-07-01 08:40:24.151670

TABLE locations FIRST ROWS:

---

	location_id	name
1	1	New York-Newark-Jersey City, NY-NJ-PA
2	2	Los Angeles-Long Beach-Anaheim, CA
3	3	Chicago-Naperville-Elgin, IL-IN-WI
4	4	Dallas-Fort Worth-Arlington, TX
5	5	Houston-The Woodlands-Sugar Land, TX

TABLE quotes FIRST ROWS:

```
  quote_id invite_id                 sent_time
1        1         4 2013-07-01 11:04:44.204874
2        2         5 2013-07-01 10:39:30.083032
3        3         6 2013-07-01 16:43:37.668191
4        4         8 2013-07-01 22:10:35.168437
5        5         9 2013-07-01 13:02:03.174618
```

TABLE requests FIRST ROWS:

```
  request_id user_id category_id location_id              creation_time
1          1    1001          46          35 2013-07-01 07:48:54.000000
2          2    1002          83          19 2013-07-01 04:55:25.000000
3          3    1003          63          91 2013-07-01 09:34:53.000000
4          4    1004          56           2 2013-07-01 10:16:40.000000
5          5    1005          64          11 2013-07-01 03:45:47.000000
```

TABLE users FIRST ROWS:

```
  user_id               email
1       1   william@idxydp.com
2       2   william@dhgtae.com
3       3      liam@aqpvfh.com
4       4 elizabeth@hpgruv.com
5       5  isabella@omwtoj.com
```

REMARKS:

.... The input data comprises five tables. for this analysis, I will focus on just three of the tables: request, quotes, and invites and augment then with some derived data to analyze the variable of concern: timedelay(invite-to-quote). Next, I construct the design matrix derived via a series of left joins

A2: DESIGN MATRIX: MERGE INVITES, REQUEST, QUOTES

REMARKS:

.... Above, I added several derived fields: day, month, day-of-week (all these being defined with respect to invite's sent_time). I also added a replied field which simply codifies whether the invite was answered with a quote. Finally, the i2q_hrs metric was added as defined above

DESIGN MATRIX SUMMARY:

```
   request_id     invite_id       user_id.x      sent_time.x           quote_id     sent_time.y            ts.x
 Min.   :   1   Min.   :    4   Min.   :   1.0   Length:12790       Min.   :    1   Length:12790       Min.   :1.373e+09
 1st Qu.:1299   1st Qu.: 6574   1st Qu.: 235.0   Class :character   1st Qu.: 3198   Class :character   1st Qu.:1.374e+09
 Median :2520   Median :12636   Median : 500.0   Mode  :character   Median : 6396   Mode  :character   Median :1.375e+09
 Mean   :2511   Mean   :12537   Mean   : 497.2                      Mean   : 6396                      Mean   :1.375e+09
 3rd Qu.:3733   3rd Qu.:18598   3rd Qu.: 746.0                      3rd Qu.: 9593                      3rd Qu.:1.377e+09
 Max.   :4961   Max.   :24622   Max.   :1000.0                      Max.   :12819                      Max.   :1.378e+09

      ts.y              i2q_hrs         replied      time_hrs             date              month                dow
 Min.   :1.373e+09   Min.   : 0.0614   0:    0   Min.   :   0.8839   Length:12790       Length:12790       Monday   :2189
```

```
 1st Qu.:1.374e+09   1st Qu.: 1.3968   1:12790   1st Qu.: 384.1797   Class :character   Class :character   Tuesday  :2247
 Median :1.375e+09   Median : 2.7253             Median : 748.1650   Mode  :character   Mode  :character   Wednesday:2042
 Mean   :1.375e+09   Mean   : 4.4825             Mean   : 750.5901                                         Thursday :1929
 3rd Qu.:1.377e+09   3rd Qu.: 5.3659             3rd Qu.:1116.4666                                         Friday   :1741
 Max.   :1.378e+09   Max.   :98.5258             Max.   :1487.5520                                         Saturday :1422
                                                                                                           Sunday   :1220
    daynum             hour           i2q_hrs_log        user_id.y     category_id      location_id     creation_time
 Length:12790       Length:12790       Min.   :-2.7904   Min.   :1001   Min.   :  1.00   Min.   :  1.00   Length:12790
 Class :character   Class :character   1st Qu.: 0.3342   1st Qu.:2299   1st Qu.: 28.00   1st Qu.:  2.00   Class :character
 Mode  :character   Mode  :character   Median : 1.0026   Median :3520   Median : 63.00   Median :  8.00   Mode  :character
                                       Mean   : 1.0057   Mean   :3511   Mean   : 60.43   Mean   : 19.06
                                       3rd Qu.: 1.6801   3rd Qu.:4733   3rd Qu.: 89.00   3rd Qu.: 28.00
                                       Max.   : 4.5903   Max.   :5961   Max.   :113.00   Max.   :100.00
```

A: VISUALIZATION: DATA INSPECTION AND CONDITIONING

```
null device
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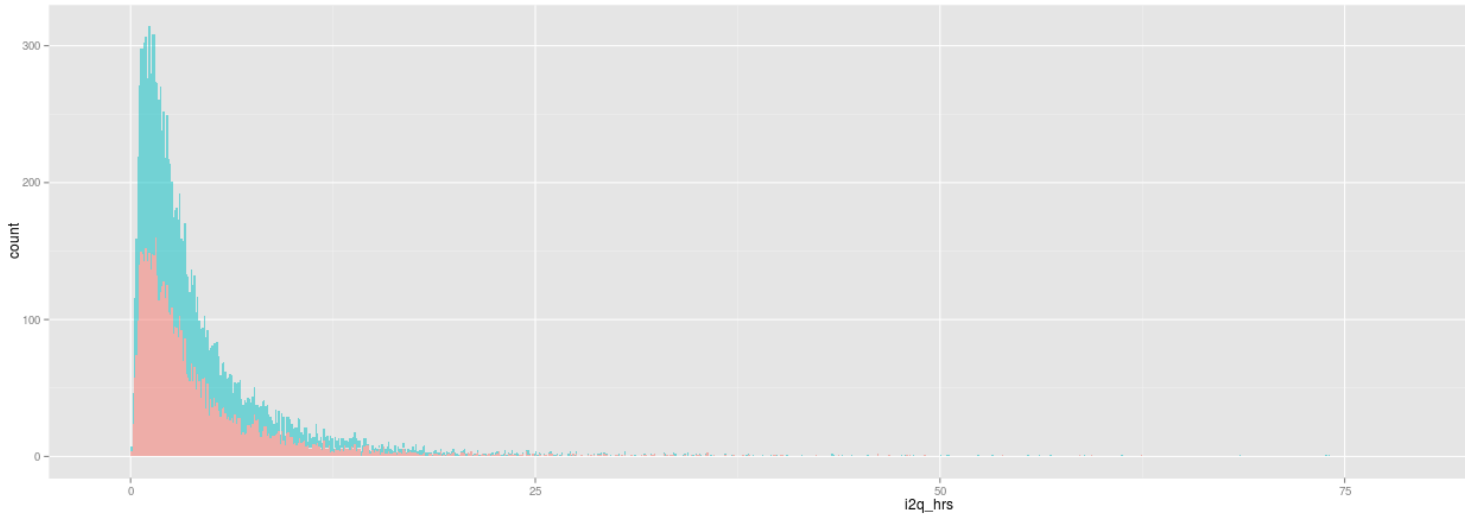
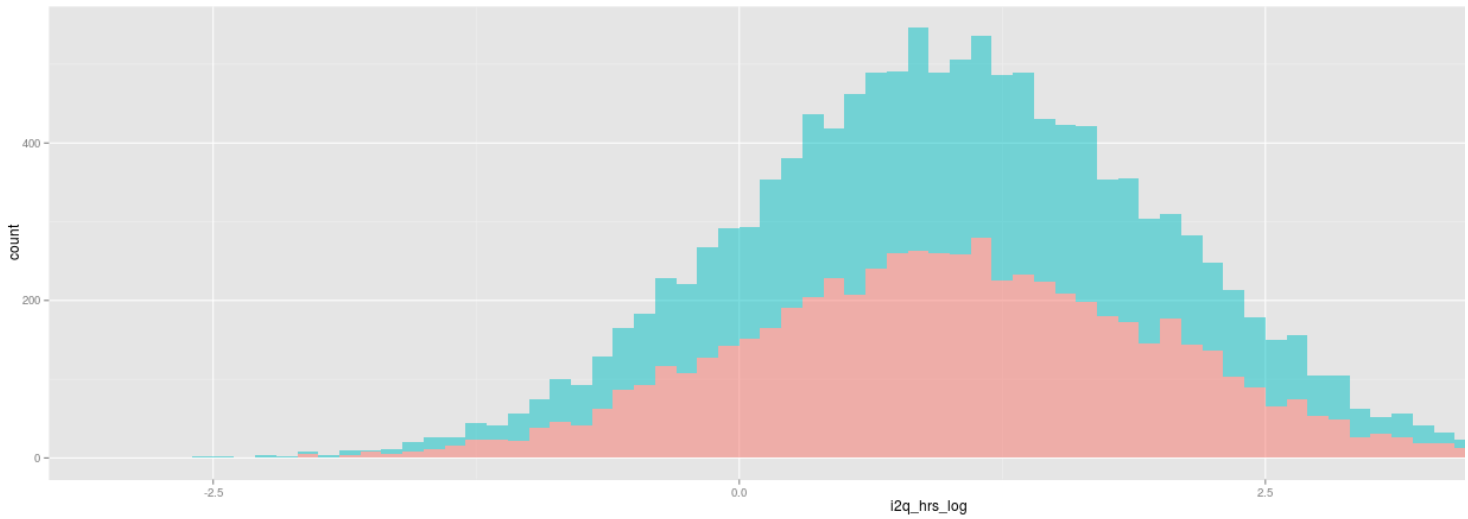
```





REMARKS:

.... The first plot shows that the i2q_hrs timeseries appears to be lognormally distributed; therefore, requiring a log() transform to bring the i2q_hrs time series into a normally distributed timeseries. As shown by the histogram on the second plot, after the log transform was applied, the log(i2q_hrs) significantly resembled a potentially

normal distribution. Of course, this normality assumption will be
shortly evaluated.

B: VISUALIZATION: PLOT OF AVG(INVITE TO QUOTE DELAY I2Q FOR INVITES SENT IN GIVEN DAY

```
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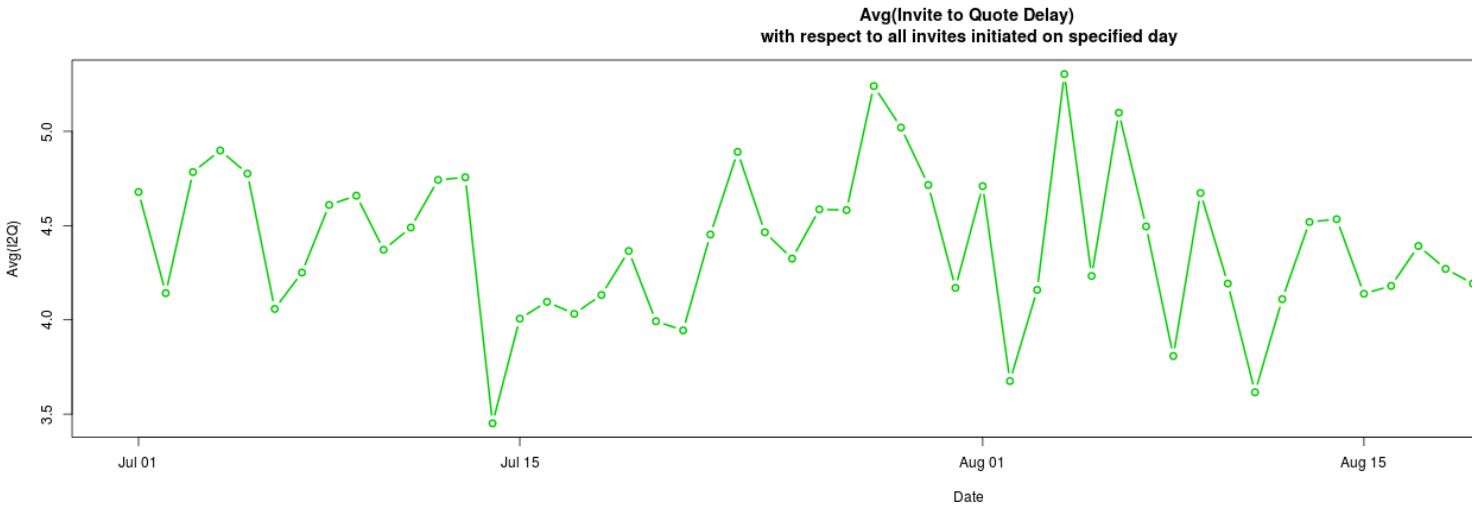
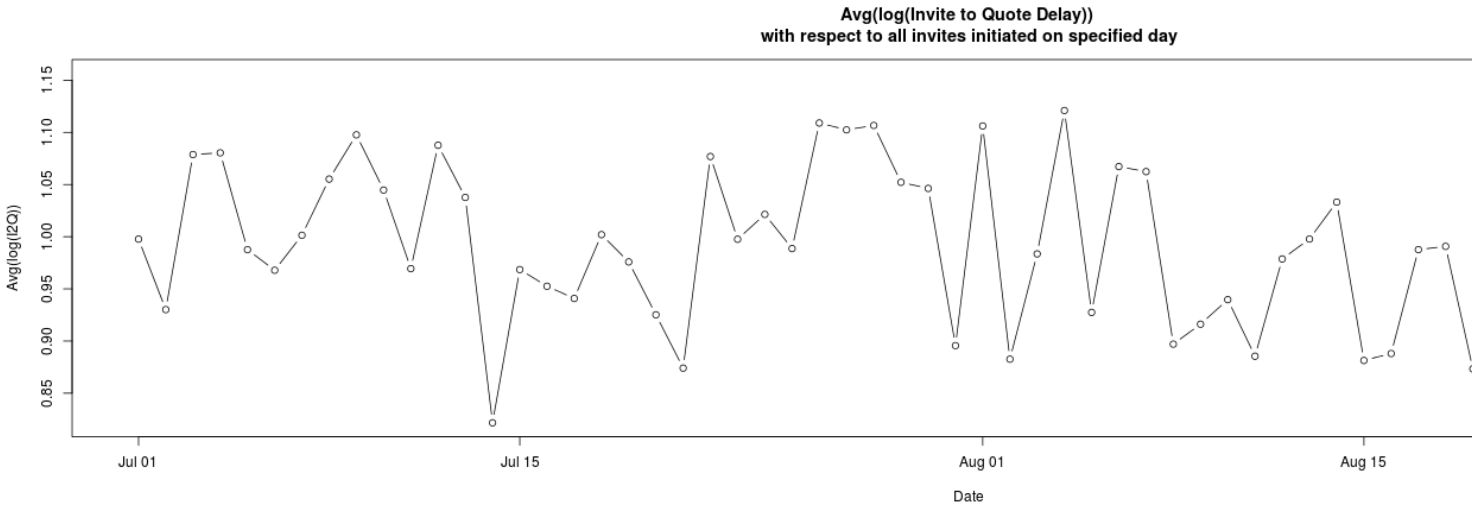
```





REMARKS:

.... The plot above shows the original i2q_hrs timeseries (i.e., delaytime(invite-to-quote) measured in hours. The second plot shows the log-transformed time timeseries, i.e., log(i2q_hrs). Note that the timeseries appears to have a potential monthly pattern (approximately stationary for first two weeks, followed by dip and then, an upwards rally for two weeks until the end of the month. However, with such little data is impossible to examine this and it is left as a pending issue for subsequent examination.

C1: CONFIDENCE INTERVALS FOR POPULATION MEANS: log(i2q) wrt JUL and AUG

CONFIDENCE INTERVAL FOR JUL MEAN:

```
        One Sample t-test

data:  exp(jul_samples)
t = 65.536, df = 6352, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 4.318109 4.584404
sample estimates:
mean of x
 4.451256
```

CONFIDENCE INTERVAL FOR AUG MEAN:

```
        One Sample t-test

data:  exp(aug_samples)
t = 63.322, df = 6436, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 4.373638 4.653089
sample estimates:
mean of x
 4.513364
```

REMARKS:

.... Both means are non-zero and the confidence intervals of the means allow the inclusion of the mean for Jul significantly overlaps with the confidence interval for the mean for Aug

C: TEST ASSUMPTION: log(i2q) data normality tests

```
        Shapiro-Wilk normality test

data:  jul_aug_samples[subset]
W = 0.9997, p-value = 0.8777
```

```
        Shapiro-Wilk normality test

data:  jul_samples[subset]
W = 0.9995, p-value = 0.4592
```

```
        Shapiro-Wilk normality test

data:  aug_samples[subset]
W = 0.9997, p-value = 0.758
```

REMARKS:

.... The null-hypothesis of this test is that the population is normally distributed. Resultant p-values for Jul, Aug, and Jul+Aug indicate that cannot be discarded that the samples were taken from normal distributions

D: TEST ASSUMPTION: homo/heteroskedasticity

VARIANCE OF POPULATION SAMPLES BY MONTH

```
  month i2q_hrs_log
1    07   0.9826153
2    08   1.0079729
```

REMARKS:

.... At first inspection, variance of the log(invite_to_quote delay time) appears similar enough. A variance test is applied next.

TEST WRT RATIO OF VARIANCES FROM SAMPLED POPULATIONS

```
        F test to compare two variances

data:  jul_samples and aug_samples
F = 0.9748, num df = 6352, denom df = 6436, p-value = 0.3084
alternative hypothesis: true ratio of variances is not equal to 1
99.9 percent confidence interval:
 0.8978175 1.0584952
sample estimates:
ratio of variances
         0.9748429
```

REMARKS:

.... The alternative hypothesis is rejected, that is, at reasonable confidence levels of 0.999 (or 1 out of 2000), a very high p-value (>0.3) indicates that there is NO evidence that a statistically significant difference between the ratio of the variances exists. Similarly, the confidence interval for the ratio of the variances spans the the ratio 1.

E1: APPLYING STANDARD TWO-SAMPLE T-TEST

TWO SAMPLE, TWO-SIDED, T-TEST FOR DIFFERENCE OF MEANS:

```
------------------------------------------------------------------------

        Two Sample t-test

data:  i2q_hrs_log by month
t = 0.3087, df = 12788, p-value = 0.7575
alternative hypothesis: true difference in means is not equal to 0
99.9 percent confidence interval:
 -0.05262445  0.06351876
sample estimates:
mean in group 07 mean in group 08
        1.008449         1.003001

------------------------------------------------------------------------
```

REMARKS:

.... A two-sided t-test for difference in the sample means from populations having equal variances was applies. The test indicated thati at a confidence interval of 0.999 (i.e., 1/2000), strongly failed to accept the alternative hypothesis that the difference between the means of the two sampled populations ougth to be zero and thus the same. A very strong p-value indicated this not to be the case. As expected, the confidence interval for the difference between these means spans zero, indicative that there is NO discernible difference between these sampled means for July and August.

E2: ANALYSIS OF VARIANCE: One Way Analysis of Variance

```
------------------------------------------------------------------------
```

ONE WAY ANOVA RESULTS:

```
------------------------------------------------------------------------
                   Df Sum Sq Mean Sq F value Pr(>F)
as.factor(month)    1      0  0.0643   0.065  0.799
Residuals       12704  12643  0.9952
------------------------------------------------------------------------
```

REMARKS:

.... A one-way anova test for testing whether samples in these two months are drawn from populations with the same mean values (H0) or (H1) they is statistically significance difference with respect to their means (that is, component effect). The analysis of variance fitted with respect to months, after removing NAs and balancing the data indicates that there is a significant component effect with respec to month towards invite-to-quote delay time (log scale). This is misleading with respect to other findings. Therefore, we review the assumptions necessary for the anova test to be meaningful.

1) the dependent variable Invite2QuoteDelayTime is continuous: OK,
2) the independent variable Month has two levels (Jul, Aug) OK,
3) the observed measurements are independent samples (TROUBLESOME). This means that there is no intuition or knowledge about a possible relationship between the observations within or between groups and this is contrary to known human nature in bidding and recommender systems).
4) there appear to be two significant outliers at 3 sigma levels (TROUBLESOME),
5) the dependent variable ought to be normally distributed (OK, wrt log(I2Q_hrs).
6) the variance of the groups is homogeneous (OK).

Assumption (3) is a known issue on this domain and the presence of apparent seasonality on the dependent variable time series indicates that even an ARIMA model may be better suited to explain recurring end-of-week behavior as hinted in findings below. Finally, this claim is consistent with the facts that the anova coefficients (component contributions) are esssentially the same.

E3: ANALYSIS OF VARIANCE: LM

ALTERNATIVE ANOVA JUL+AUG VIA LINEAR MODEL

```
Call:
lm(formula = i2q_hrs_log ~ month, data = riq)

Residuals:
    Min      1Q  Median      3Q     Max
-3.7989 -0.6701 -0.0032  0.6744  3.5819

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.008449   0.012517  80.566   <2e-16 ***
month08     -0.005447   0.017644  -0.309    0.758
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 0.9977 on 12788 degrees of freedom
Multiple R-squared:  7.453e-06, Adjusted R-squared:  -7.074e-05
F-statistic: 0.09531 on 1 and 12788 DF,  p-value: 0.7575
```

REMARKS:

.... Application of ANOVA equivalent techniques via the lm model to access individual component effects provides NO indication of a statistically significant effect due to month. Albeit the month8 is selected, the model is dominated by the intercept (i.e., a constant output of approx. 1). Finally, ,R2, F, and p values are indicative of a poor fit for which the month provides NO statistical significance component effect.

E4: EXAMINING PRESENCE OF PER FACTOR-LEVEL CHANGES

E5: FACTOR-LEVEL: CHANGES WRT HOUR OF DAY

```
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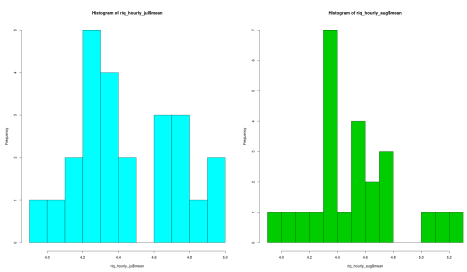
```



HOUR OF DAY: ANOVA JUL VIA AOV

```
------------------------------------------------------------------------
                 Df Sum Sq Mean Sq F value Pr(>F)
as.factor(hour)   23     17  0.7523   0.765  0.779
Residuals       6329   6224  0.9835
------------------------------------------------------------------------


------------------------------------------------------------------------
```

HOUR OF DAY: ANOVA AUG VIA AOV

```
------------------------------------------------------------------------
                 Df Sum Sq Mean Sq F value Pr(>F)
as.factor(hour)   23     26   1.139   1.131  0.301
Residuals       6413   6461   1.008
------------------------------------------------------------------------


------------------------------------------------------------------------
```

HOUR OF DAY: ANOVA JUL VIA LM

```
------------------------------------------------------------------------

Call:
lm(formula = i2q_hrs_log ~ as.factor(hour), data = riq[riq$month ==
    "07", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.9055 -0.6526 -0.0035  0.6769  3.4753

Coefficients:
                  Estimate Std. Error t value Pr(>|t|)
(Intercept)        1.049980   0.061502  17.072   <2e-16 ***
as.factor(hour)01 -0.069774   0.088298  -0.790   0.4294
as.factor(hour)02 -0.045700   0.087316  -0.523   0.6007
as.factor(hour)03 -0.044121   0.088298  -0.500   0.6173
as.factor(hour)04 -0.071337   0.084093  -0.848   0.3963
as.factor(hour)05  0.031687   0.085558   0.370   0.7111
as.factor(hour)06 -0.035910   0.084028  -0.427   0.6691
as.factor(hour)07 -0.015383   0.087665  -0.175   0.8607
as.factor(hour)08 -0.007874   0.085859  -0.092   0.9269
as.factor(hour)09 -0.062706   0.088580  -0.708   0.4790
as.factor(hour)10 -0.073080   0.088206  -0.829   0.4074
as.factor(hour)11 -0.169863   0.087577  -1.940   0.0525 .
as.factor(hour)12  0.065068   0.084629   0.769   0.4420
as.factor(hour)13 -0.067843   0.087145  -0.779   0.4363
as.factor(hour)14 -0.015608   0.085558  -0.182   0.8553
as.factor(hour)15 -0.028520   0.086811  -0.329   0.7425
as.factor(hour)16 -0.105024   0.084907  -1.237   0.2162
as.factor(hour)17 -0.007637   0.085558  -0.089   0.9289
as.factor(hour)18 -0.015856   0.086247  -0.184   0.8541
as.factor(hour)19  0.037208   0.086977   0.428   0.6688
as.factor(hour)20 -0.111580   0.086090  -1.296   0.1950
as.factor(hour)21 -0.043290   0.088298  -0.490   0.6240
as.factor(hour)22 -0.041494   0.087402  -0.475   0.6350
as.factor(hour)23 -0.121007   0.087932  -1.376   0.1688
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 0.9917 on 6329 degrees of freedom
Multiple R-squared:  0.002772,  Adjusted R-squared:  -0.0008517
F-statistic: 0.765 on 23 and 6329 DF,  p-value: 0.7788

------------------------------------------------------------------------


------------------------------------------------------------------------
```

HOUR OF DAY: ANOVA AUG VIA LM

```
------------------------------------------------------------------------

Call:
lm(formula = i2q_hrs_log ~ as.factor(hour), data = riq[riq$month ==
    "08", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.5279 -0.6712 -0.0057  0.6758  3.2890

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)       0.94156    0.06225  15.126   <2e-16 ***
as.factor(hour)01  0.03052    0.08737   0.349   0.7269
as.factor(hour)02 -0.03321    0.08466  -0.392   0.6949
as.factor(hour)03  0.00564    0.08795   0.064   0.9489
as.factor(hour)04  0.02768    0.08682   0.319   0.7499
as.factor(hour)05  0.12093    0.08855   1.366   0.1721
as.factor(hour)06  0.08416    0.08637   0.974   0.3299
as.factor(hour)07  0.07120    0.08975   0.793   0.4276
as.factor(hour)08  0.03039    0.08706   0.349   0.7270
```

```
as.factor(hour)09  0.21652    0.08937   2.423   0.0154 *
as.factor(hour)10  0.11769    0.09086   1.295   0.1953
as.factor(hour)11  0.07501    0.08690   0.863   0.3881
as.factor(hour)12  0.12837    0.08847   1.451   0.1468
as.factor(hour)13  0.15638    0.08847   1.768   0.0772 .
as.factor(hour)14  0.12458    0.08737   1.426   0.1540
as.factor(hour)15  0.01697    0.08909   0.190   0.8490
as.factor(hour)16 -0.05176    0.08803  -0.588   0.5566
as.factor(hour)17  0.06333    0.08698   0.728   0.4666
as.factor(hour)18 -0.01455    0.08511  -0.171   0.8643
as.factor(hour)19  0.06181    0.08623   0.717   0.4735
as.factor(hour)20  0.15703    0.08615   1.823   0.0684 .
as.factor(hour)21  0.02497    0.08559   0.292   0.7705
as.factor(hour)22  0.04679    0.08762   0.534   0.5933
as.factor(hour)23  0.05712    0.08587   0.665   0.5059
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

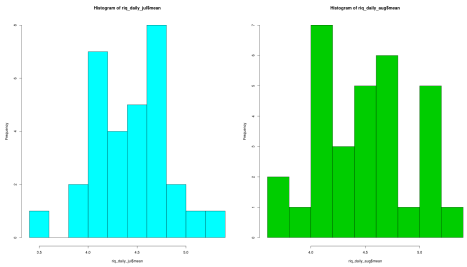
Residual standard error: 1.004 on 6413 degrees of freedom
Multiple R-squared:  0.00404,   Adjusted R-squared:  0.000468
F-statistic: 1.131 on 23 and 6413 DF,  p-value: 0.3007
```

REMARKS:

.... From examination of the hour-of-day based aggregation visualization, there are appear to be a handful of hours: (specifically, 1AM, 9AM, 1PM, 8PM) at which observable difference takes place, nevertheless, for the majority of hour of day, there is NO statistically significant component effect for hour-of-day for either Jul or Aug subsets. A MILD exception exist for the month of Aug at 9AM hour-of-day but this again occurs at weak R2, F, and p values. NO day of hour was found to have a strong stat. significant. component effect.

E6: FACTOR-LEVEL: CHANGES WRT DAY OF MONTH

```
png
  2
```



DAY OF MONTH: ANOVA JUL VIA AOV

```
                   Df Sum Sq Mean Sq F value Pr(>F)
as.factor(daynum)   30     29  0.9804   0.998  0.469
Residuals         6322   6212  0.9826
```

DAY OF MONTH: ANOVA AUG VIA AOV

```
                   Df Sum Sq Mean Sq F value Pr(>F)
as.factor(daynum)   30     42   1.400   1.392 0.0757 .
Residuals         6406   6445   1.006
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1
```

DAY OF MONTH: ANOVA JUL VIA LM

```
------------------------------------------------------------------------

Call:
lm(formula = i2q_hrs_log ~ as.factor(daynum), data = riq[riq$month ==
    "07", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.7313 -0.6624 -0.0046  0.6751  3.6209

Coefficients:
                      Estimate Std. Error t value Pr(>|t|)
(Intercept)          0.9977334  0.0758047  13.162   <2e-16 ***
as.factor(daynum)02 -0.0675810  0.0996380  -0.678    0.498
as.factor(daynum)03  0.0810537  0.1014669   0.799    0.424
as.factor(daynum)04  0.0827229  0.1050204   0.788    0.431
as.factor(daynum)05 -0.0101162  0.1067409  -0.095    0.924
as.factor(daynum)06 -0.0298644  0.1105034  -0.270    0.787
as.factor(daynum)07  0.0036958  0.1099357   0.034    0.973
as.factor(daynum)08  0.0575551  0.0982123   0.586    0.558
as.factor(daynum)09  0.0999518  0.0996380   1.003    0.316
as.factor(daynum)10  0.0470290  0.1036064   0.454    0.650
as.factor(daynum)11 -0.0283030  0.1034848  -0.273    0.784
as.factor(daynum)12  0.0899737  0.1041041   0.864    0.387
as.factor(daynum)13  0.0399372  0.1086827   0.367    0.713
as.factor(daynum)14 -0.1760760  0.1093869  -1.610    0.108
as.factor(daynum)15 -0.0292229  0.0992862  -0.294    0.769
as.factor(daynum)16 -0.0451747  0.0966052  -0.468    0.640
as.factor(daynum)17 -0.0569024  0.1026628  -0.554    0.579
as.factor(daynum)18  0.0042702  0.1033642   0.041    0.967
as.factor(daynum)19 -0.0218473  0.1022150  -0.214    0.831
as.factor(daynum)20 -0.0725285  0.1121166  -0.647    0.518
as.factor(daynum)21 -0.1236406  0.1132060  -1.092    0.275
as.factor(daynum)22  0.0791899  0.0970907   0.816    0.415
as.factor(daynum)23 -0.0001373  0.0991142  -0.001    0.999
as.factor(daynum)24  0.0236799  0.0970907   0.244    0.807
as.factor(daynum)25 -0.0090734  0.0962720  -0.094    0.925
as.factor(daynum)26  0.1112968  0.1065896   1.044    0.296
as.factor(daynum)27  0.1047262  0.1090310   0.961    0.337
as.factor(daynum)28  0.1089680  0.1085114   1.004    0.315
as.factor(daynum)29  0.0544534  0.0979785   0.556    0.578
as.factor(daynum)30  0.0485971  0.0999090   0.486    0.627
as.factor(daynum)31 -0.1020968  0.1009585  -1.011    0.312
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 0.9913 on 6322 degrees of freedom
Multiple R-squared:  0.004712,  Adjusted R-squared:  -1.057e-05
F-statistic: 0.9978 on 30 and 6322 DF,  p-value: 0.4693

------------------------------------------------------------------------
```

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------------------------------------------------------------------------
```

DAY OF MONTH: ANOVA AUG VIA LM

```
------------------------------------------------------------------------

Call:
lm(formula = i2q_hrs_log ~ as.factor(daynum), data = riq[riq$month ==
    "08", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.4686 -0.6752 -0.0080  0.6710  3.3193

Coefficients:
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)          1.106188   0.065294  16.942   <2e-16 ***
as.factor(daynum)02 -0.223566   0.096668  -2.313   0.0208 *
as.factor(daynum)03 -0.122616   0.102156  -1.200   0.2301
as.factor(daynum)04  0.014828   0.103108   0.144   0.8857
as.factor(daynum)05 -0.178719   0.091126  -1.961   0.0499 *
as.factor(daynum)06 -0.038905   0.087667  -0.444   0.6572
as.factor(daynum)07 -0.043758   0.092940  -0.471   0.6378
as.factor(daynum)08 -0.209118   0.095767  -2.184   0.0290 *
as.factor(daynum)09 -0.190008   0.097072  -1.957   0.0503 .
as.factor(daynum)10 -0.166501   0.098349  -1.693   0.0905 .
as.factor(daynum)11 -0.220687   0.104957  -2.103   0.0355 *
as.factor(daynum)12 -0.127479   0.092537  -1.378   0.1684
as.factor(daynum)13 -0.108389   0.092838  -1.168   0.2430
as.factor(daynum)14 -0.072994   0.091487  -0.798   0.4250
as.factor(daynum)15 -0.224797   0.099900  -2.250   0.0245 *
as.factor(daynum)16 -0.218157   0.096936  -2.251   0.0244 *
as.factor(daynum)17 -0.118538   0.104742  -1.132   0.2578
as.factor(daynum)18 -0.115441   0.107737  -1.072   0.2840
as.factor(daynum)19 -0.232832   0.091216  -2.553   0.0107 *
as.factor(daynum)20 -0.120774   0.089156  -1.355   0.1756
as.factor(daynum)21  0.050216   0.093250   0.539   0.5902
as.factor(daynum)22  0.029680   0.094567   0.314   0.7536
as.factor(daynum)23 -0.056540   0.094917  -0.596   0.5514
as.factor(daynum)24 -0.100428   0.107004  -0.939   0.3480
```

```
as.factor(daynum)25 -0.064808   0.102531  -0.632   0.5274
as.factor(daynum)26 -0.119278   0.089080  -1.339   0.1806
as.factor(daynum)27 -0.078302   0.092737  -0.844   0.3985
as.factor(daynum)28  0.006552   0.092537   0.071   0.9436
as.factor(daynum)29 -0.049113   0.092438  -0.531   0.5952
as.factor(daynum)30 -0.047850   0.097912  -0.489   0.6251
as.factor(daynum)31 -0.148732   0.101789  -1.461   0.1440
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

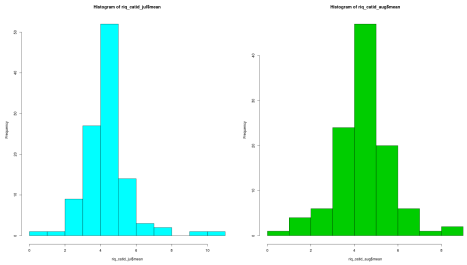
Residual standard error: 1.003 on 6406 degrees of freedom
Multiple R-squared:  0.006476,  Adjusted R-squared:  0.001823
F-statistic: 1.392 on 30 and 6406 DF,  p-value: 0.07574
```

REMARKS:

.... From examination of the day-of-month based aggregation visualization, there appear to be a handful of days, e.g., 6th, 11th, 14th, 20th, 21th, 22th, at which observable difference takes place. The great majority of day-of-month levels exhibit NO discernable effect. Furthermore, when the ANOVA test is applied to Jul and Aug subsets, MILD statistically significant effects are observed for the Aug.s day-of-month: 2, 5, 8, 11, 15, 16, 19). Nevertheless, this mild effect occurs at a relatively weak p-value and weak F-value. The particular sequence of days suggests the potential presence of an ARIMA weekly and monthly seasonal process, taking place the 1st, 2nd, and then 3rd week of the month.

E7: FACTOR-LEVEL: CHANGES WRT CATEGORY OF REQUEST/INVITE/QUOTE

```
png
  2
```



CATEGORY_ID: ANOVA JUL VIA AOV

```
                         Df Sum Sq Mean Sq F value Pr(>F)
as.factor(category_id)  110    118   1.075   1.096  0.234
Residuals              6242   6123   0.981
```

CATEGORY_ID: ANOVA AUG VIA AOV

```
                         Df Sum Sq Mean Sq F value Pr(>F)
as.factor(category_id)  110    115   1.049   1.041  0.366
Residuals              6326   6372   1.007
```

REMARKS:

.... Anova analysis of the Jul and Aug subsets indicate that there is NO statistically significant component effect for the category_id levels on either of the months.

CATEGORY_ID: INDIVIDUAL COMPONENT EFFECTS VIA LM FOR JUL

```
Call:
lm(formula = i2q_hrs_log ~ as.factor(category_id), data = riq[riq$month ==
    "07", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.7157 -0.6556 -0.0063  0.6695  3.7271

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)                0.69101    0.18392   3.757 0.000173 ***
as.factor(category_id)2   -0.12505    0.47961  -0.261 0.794313
as.factor(category_id)3    0.39741    0.29720   1.337 0.181205
as.factor(category_id)4    0.26660    0.25210   1.058 0.290314
as.factor(category_id)5    0.38368    0.21399   1.793 0.073020 .
as.factor(category_id)6    0.31157    0.19459   1.601 0.109389
as.factor(category_id)7    0.32928    0.21013   1.567 0.117152
as.factor(category_id)8   -0.22711    0.39554  -0.574 0.565872
as.factor(category_id)9    0.32831    0.20937   1.568 0.116921
as.factor(category_id)10   1.17195    0.44421   2.638 0.008354 **
as.factor(category_id)11   0.20383    0.47961   0.425 0.670855
as.factor(category_id)12   0.45236    0.25793   1.754 0.079508 .
as.factor(category_id)13   0.36658    0.21178   1.731 0.083507 .
as.factor(category_id)14   0.25546    0.21178   1.206 0.227769
as.factor(category_id)15   0.30132    0.20913   1.441 0.149688
as.factor(category_id)16   0.52482    0.25793   2.035 0.041916 *
as.factor(category_id)17   0.32902    0.23585   1.395 0.163057
as.factor(category_id)18   0.33675    0.21039   1.601 0.109511
as.factor(category_id)19   0.36110    0.28003   1.290 0.197272
as.factor(category_id)20   0.42040    0.23295   1.805 0.071169 .
as.factor(category_id)21   0.55970    0.23799   2.352 0.018717 *
as.factor(category_id)22   0.11467    0.36322   0.316 0.752232
as.factor(category_id)23  -0.35318    0.30254  -1.167 0.243109
as.factor(category_id)24   0.37473    0.25210   1.486 0.137216
as.factor(category_id)25   0.23693    0.20756   1.141 0.253718
as.factor(category_id)26   0.09684    0.22591   0.429 0.668190
as.factor(category_id)27   0.30345    0.23485   1.292 0.196361
as.factor(category_id)28   0.25043    0.25394   0.986 0.324069
as.factor(category_id)29   0.33858    0.21873   1.548 0.121681
as.factor(category_id)30   0.23070    0.20563   1.122 0.261950
as.factor(category_id)31  -0.07191    1.00738  -0.071 0.943094
as.factor(category_id)32   0.14926    0.24871   0.600 0.548440
as.factor(category_id)33   0.20670    0.33059   0.625 0.531829
as.factor(category_id)34   0.03835    0.39554   0.097 0.922763
as.factor(category_id)35   0.24737    0.21505   1.150 0.250054
as.factor(category_id)36   0.41357    0.36322   1.139 0.254898
as.factor(category_id)37   0.08523    0.33059   0.258 0.796553
as.factor(category_id)38   0.36585    0.19198   1.906 0.056736 .
as.factor(category_id)39   0.34774    0.24564   1.416 0.156928
as.factor(category_id)40  -0.87678    0.72410  -1.211 0.225999
as.factor(category_id)41  -0.12454    0.30254  -0.412 0.680622
as.factor(category_id)42   0.26233    0.32233   0.814 0.415763
as.factor(category_id)43   0.35257    0.20511   1.719 0.085675 .
as.factor(category_id)44   0.68038    0.33997   2.001 0.045401 *
as.factor(category_id)45   0.20546    0.29720   0.691 0.489396
as.factor(category_id)46   0.34349    0.27031   1.271 0.203876
as.factor(category_id)47   0.28031    0.20715   1.353 0.176045
as.factor(category_id)48   0.33941    0.22877   1.484 0.137959
as.factor(category_id)49   0.40065    0.24714   1.621 0.105034
as.factor(category_id)50   0.23440    0.25394   0.923 0.356006
as.factor(category_id)51   0.20531    0.23295   0.881 0.378157
as.factor(category_id)52   0.02364    0.36322   0.065 0.948119
as.factor(category_id)53   0.28225    0.21828   1.293 0.196028
as.factor(category_id)54   0.10456    0.36322   0.288 0.773457
as.factor(category_id)56   0.29528    0.20581   1.435 0.151413
as.factor(category_id)57   0.64167    0.39554   1.622 0.104794
as.factor(category_id)58   0.33711    0.27031   1.247 0.212396
as.factor(category_id)59   0.05959    0.22955   0.260 0.795186
as.factor(category_id)60   0.18124    0.24871   0.729 0.466195
as.factor(category_id)61   0.13861    0.28788   0.481 0.630191
as.factor(category_id)62   0.34038    0.21332   1.596 0.110625
as.factor(category_id)63   0.28051    0.19315   1.452 0.146469
as.factor(category_id)64   0.36667    0.19739   1.858 0.063273 .
as.factor(category_id)65   0.14594    0.36322   0.402 0.687848
as.factor(category_id)66   0.19646    0.30254   0.649 0.516120
as.factor(category_id)67   0.62963    0.24564   2.563 0.010395 *
as.factor(category_id)68   0.49154    0.19557   2.513 0.011982 *
as.factor(category_id)69  -0.39711    0.26010  -1.527 0.126882
as.factor(category_id)70   0.18972    0.20675   0.918 0.358841
as.factor(category_id)71   0.44154    0.25588   1.726 0.084465 .
as.factor(category_id)72  -0.05695    0.25588  -0.223 0.823878
as.factor(category_id)73   0.17217    0.24032   0.716 0.473767
as.factor(category_id)74   0.10783    0.30845   0.350 0.726656
as.factor(category_id)75   0.29104    0.25588   1.137 0.255395
as.factor(category_id)77   0.08081    0.33059   0.244 0.806900
as.factor(category_id)78   0.37325    0.20735   1.800 0.071897 .
as.factor(category_id)79   0.53720    0.20799   2.583 0.009822 **
```

```
as.factor(category_id)80   0.34740    0.20889   1.663 0.096358 .
as.factor(category_id)81   0.22071    0.20675   1.068 0.285772
as.factor(category_id)82   0.42370    0.20446   2.072 0.038275 *
as.factor(category_id)83   0.33684    0.25036   1.345 0.178541
as.factor(category_id)84   0.53632    0.28003   1.915 0.055512 .
as.factor(category_id)85   0.04191    0.30254   0.139 0.889834
as.factor(category_id)86   0.16714    0.23799   0.702 0.482536
as.factor(category_id)87   0.38781    0.21149   1.834 0.066742 .
as.factor(category_id)88   0.58856    0.25793   2.282 0.022530 *
as.factor(category_id)89   0.36452    0.25793   1.413 0.157628
as.factor(category_id)90   0.35149    0.29233   1.202 0.229267
as.factor(category_id)91   0.23429    0.24871   0.942 0.346220
as.factor(category_id)92   0.35221    0.24286   1.450 0.147031
as.factor(category_id)93   0.53828    0.33997   1.583 0.113392
as.factor(category_id)94   0.38465    0.22591   1.703 0.088685 .
as.factor(category_id)95   1.60499    0.72410   2.217 0.026692 *
as.factor(category_id)96   0.21868    0.30254   0.723 0.469818
as.factor(category_id)97   0.53476    0.32233   1.659 0.097162 .
as.factor(category_id)98   0.32530    0.23388   1.391 0.164308
as.factor(category_id)99   0.63339    1.00738   0.629 0.529534
as.factor(category_id)100  0.43825    0.33997   1.289 0.197411
as.factor(category_id)101  0.22396    0.20171   1.110 0.266916
as.factor(category_id)102  0.51130    0.41710   1.226 0.220296
as.factor(category_id)103  0.28814    0.23485   1.227 0.219895
as.factor(category_id)104  0.33884    0.20384   1.662 0.096506 .
as.factor(category_id)105  0.30180    0.20369   1.482 0.138482
as.factor(category_id)106  0.29830    0.21093   1.414 0.157347
as.factor(category_id)107  0.02681    0.25210   0.106 0.915300
as.factor(category_id)108  0.36674    0.19668   1.865 0.062277 .
as.factor(category_id)109  0.42451    0.27655   1.535 0.124831
as.factor(category_id)110  0.49400    0.21268   2.323 0.020228 *
as.factor(category_id)111  0.84228    0.29233   2.881 0.003975 **
as.factor(category_id)112  0.35760    0.20843   1.716 0.086277 .
as.factor(category_id)113  0.30085    0.21237   1.417 0.156644
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 0.9904 on 6242 degrees of freedom
Multiple R-squared:  0.01894,   Adjusted R-squared:  0.001655
F-statistic: 1.096 on 110 and 6242 DF,  p-value: 0.2341
```

CATEGORY_ID: INDIVIDUAL COMPONENT EFFECTS VIA LM FOR AUG

```
Call:
lm(formula = i2q_hrs_log ~ as.factor(category_id), data = riq[riq$month ==
    "08", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.5153 -0.6681 -0.0073  0.6662  3.2288

Coefficients:
                           Estimate Std. Error t value Pr(>|t|)
(Intercept)                1.0609411  0.1548627   6.851 8.03e-12 ***
as.factor(category_id)2   -0.2953022  0.4097282  -0.721   0.4711
as.factor(category_id)3   -0.2833009  0.4748000  -0.597   0.5507
as.factor(category_id)4   -0.1798962  0.1975253  -0.911   0.3625
as.factor(category_id)5    0.0942174  0.2190089   0.430   0.6671
as.factor(category_id)6    0.0673980  0.2019163   0.334   0.7385
as.factor(category_id)7   -0.0748535  0.1692504  -0.442   0.6583
as.factor(category_id)8    0.2856792  0.2948498   0.969   0.3326
as.factor(category_id)9   -0.0982730  0.1699880  -0.578   0.5632
as.factor(category_id)10  -0.6995213  0.7263704  -0.963   0.3356
as.factor(category_id)11   0.5751813  0.5997806   0.959   0.3376
as.factor(category_id)12   0.1451591  0.3097254   0.469   0.6393
as.factor(category_id)13  -0.5081162  0.2131046  -2.384   0.0171 *
as.factor(category_id)14  -0.2248770  0.2040925  -1.102   0.2706
as.factor(category_id)15  -0.0610745  0.2177319  -0.281   0.7791
as.factor(category_id)16  -0.1637484  0.2203403  -0.743   0.4574
as.factor(category_id)17  -0.2035532  0.2603392  -0.782   0.4343
as.factor(category_id)18   0.0231101  0.2165059   0.107   0.9150
as.factor(category_id)19  -0.0784830  0.2048641  -0.383   0.7017
as.factor(category_id)20  -0.3184204  0.3531413  -0.902   0.3673
as.factor(category_id)21  -0.0981537  0.1774805  -0.553   0.5803
as.factor(category_id)22  -0.3381682  0.4748000  -0.712   0.4763
as.factor(category_id)23  -0.0586469  0.2315337  -0.253   0.8000
as.factor(category_id)24  -0.1257508  0.3686470  -0.341   0.7330
as.factor(category_id)25   0.0389700  0.1677128   0.232   0.8163
as.factor(category_id)26  -0.0978398  0.1829889  -0.535   0.5929
as.factor(category_id)27  -0.0851762  0.1834875  -0.464   0.6425
as.factor(category_id)28   0.0631389  0.1827461   0.346   0.7297
as.factor(category_id)29   0.2029052  0.2177319   0.932   0.3514
as.factor(category_id)30  -0.0247521  0.2682301  -0.092   0.9265
as.factor(category_id)31   0.3383615  0.5251650   0.644   0.5194
as.factor(category_id)32  -0.0575234  0.2262869  -0.254   0.7993
as.factor(category_id)33  -0.2590251  0.5997806  -0.432   0.6659
as.factor(category_id)34  -1.0556643  0.7263704  -1.453   0.1462
as.factor(category_id)35  -0.1743614  0.1868983  -0.933   0.3509
as.factor(category_id)36  -0.4767172  0.3531413  -1.350   0.1771
```

```
as.factor(category_id)37  -0.3824953  0.2885017  -1.326   0.1850
as.factor(category_id)38   0.0328927  0.2012336   0.163   0.8702
as.factor(category_id)39  -0.4660643  0.3871567  -1.204   0.2287
as.factor(category_id)40  -0.0799194  0.2504463  -0.319   0.7497
as.factor(category_id)41  -0.2940228  0.3018830  -0.974   0.3301
as.factor(category_id)42  -0.8912640  0.4748000  -1.877   0.0605 .
as.factor(category_id)43   0.0120201  0.1676621   0.072   0.9428
as.factor(category_id)44  -0.7039827  0.5251650  -1.340   0.1801
as.factor(category_id)45  -0.0003496  0.3531413  -0.001   0.9992
as.factor(category_id)46  -0.0717500  0.2948498  -0.243   0.8077
as.factor(category_id)47  -0.1409880  0.2141950  -0.658   0.5104
as.factor(category_id)48   0.5338563  0.3399292   1.570   0.1164
as.factor(category_id)49   0.0685554  0.1993011   0.344   0.7309
as.factor(category_id)50   0.0289840  0.2475651   0.117   0.9068
as.factor(category_id)51   0.4382623  0.2948498   1.486   0.1372
as.factor(category_id)52   0.9099420  0.5997806   1.517   0.1293
as.factor(category_id)53   0.0647448  0.1813733   0.357   0.7211
as.factor(category_id)54   0.0745543  0.2827393   0.264   0.7920
as.factor(category_id)55   0.0229233  0.2246984   0.102   0.9187
as.factor(category_id)56  -0.3549535  0.2141950  -1.657   0.0975 .
as.factor(category_id)57  -0.3668273  0.3018830  -1.215   0.2244
as.factor(category_id)58   0.2387652  0.2376443   1.005   0.3151
as.factor(category_id)59  -0.1421773  0.1848157  -0.769   0.4417
as.factor(category_id)60   0.0821201  0.2131046   0.385   0.7000
as.factor(category_id)61  -0.0165955  0.2100660  -0.079   0.9370
as.factor(category_id)62  -0.0220489  0.2203403  -0.100   0.9203
as.factor(category_id)63  -0.1456391  0.1912413  -0.762   0.4464
as.factor(category_id)64  -0.0856723  0.2110423  -0.406   0.6848
as.factor(category_id)65   0.0029067  0.3686470   0.008   0.9937
as.factor(category_id)66   0.3217876  0.7263704   0.443   0.6578
as.factor(category_id)67   0.1195300  0.2504463   0.477   0.6332
as.factor(category_id)68   0.1206668  0.1993011   0.605   0.5449
as.factor(category_id)69  -0.2363759  0.2535212  -0.932   0.3512
as.factor(category_id)70   0.2329894  0.2448594   0.952   0.3414
as.factor(category_id)71  -0.1123760  0.2315337  -0.485   0.6274
as.factor(category_id)72   0.0808948  0.4380179   0.185   0.8535
as.factor(category_id)73   0.0134580  0.2315337   0.058   0.9537
as.factor(category_id)74  -0.2856870  0.2827393  -1.010   0.3123
as.factor(category_id)75  -0.0547894  0.1948646  -0.281   0.7786
as.factor(category_id)76  -0.0567112  0.3686470  -0.154   0.8777
as.factor(category_id)77  -0.1984942  0.4097282  -0.484   0.6281
as.factor(category_id)78   0.1118434  0.1958875   0.571   0.5680
as.factor(category_id)79  -0.1287695  0.1719836  -0.749   0.4540
as.factor(category_id)80   0.0341814  0.1665560   0.205   0.8374
as.factor(category_id)81  -0.2439681  0.1689998  -1.444   0.1489
as.factor(category_id)82  -0.1534974  0.1829889  -0.839   0.4016
as.factor(category_id)83   0.0572609  0.4748000   0.121   0.9040
as.factor(category_id)84   0.2297776  0.2827393   0.813   0.4164
as.factor(category_id)85  -1.3266457  0.7263704  -1.826   0.0678 .
as.factor(category_id)86   0.1605689  0.1878830   0.855   0.3928
as.factor(category_id)87  -0.0817626  0.2217296  -0.369   0.7123
as.factor(category_id)88   0.0564071  0.2504463   0.225   0.8218
as.factor(category_id)89  -0.0009025  0.1853823  -0.005   0.9961
as.factor(category_id)90  -0.0310957  0.2774821  -0.112   0.9108
as.factor(category_id)91   0.1540936  0.2203403   0.699   0.4844
as.factor(category_id)92  -0.0108958  0.1900478  -0.057   0.9543
as.factor(category_id)93  -0.3579371  0.2475651  -1.446   0.1483
as.factor(category_id)94  -0.1313918  0.1708055  -0.769   0.4418
as.factor(category_id)96  -0.1210717  0.2535212  -0.478   0.6330
as.factor(category_id)97  -0.0923434  0.2948498  -0.313   0.7541
as.factor(category_id)98   0.1117920  0.3185345   0.351   0.7256
as.factor(category_id)99   0.2688480  0.3686470   0.729   0.4659
as.factor(category_id)100  0.0218970  0.2948498   0.074   0.9408
as.factor(category_id)101 -0.1630827  0.1842698  -0.885   0.3762
as.factor(category_id)103 -0.2379126  0.2246984  -1.059   0.2897
as.factor(category_id)104 -0.0695280  0.1651489  -0.421   0.6738
as.factor(category_id)105 -0.0377800  0.2203403  -0.171   0.8639
as.factor(category_id)106 -0.0393900  0.1702754  -0.231   0.8171
as.factor(category_id)107  0.0761646  0.1825074   0.417   0.6765
as.factor(category_id)108 -0.1083572  0.1627708  -0.666   0.5056
as.factor(category_id)109 -0.1356001  0.2603392  -0.521   0.6025
as.factor(category_id)110 -0.1122168  0.1892950  -0.593   0.5533
as.factor(category_id)111 -0.0067452  0.2827393  -0.024   0.9810
as.factor(category_id)112 -0.1254390  0.2475651  -0.507   0.6124
as.factor(category_id)113 -0.0261085  0.2279517  -0.115   0.9088
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 1.004 on 6326 degrees of freedom
Multiple R-squared:  0.01778,   Adjusted R-squared:  0.0007042
F-statistic: 1.041 on 110 and 6326 DF,  p-value: 0.3659

-------------------------------------------------------------------------
```

REMARKS:

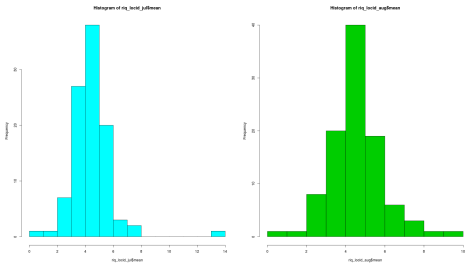
.... Anova analysis of the Jul and Aug subsets indicate that there NO statistical significant difference at specific category levels between the two months, specifically, though several categories (10, 16, 21 44, 67, 68, 79, 82, 88, 95, 110, 111) have MILDLY significant effects but at poor R2, F and p values.

REMARKS:

.... From examination of the category_id based aggregation visualization, it appears that there are a handful of categories, (e.g., 8, 10, etc.) at which significant difference appears to take place. HOWEVER, when the ANOVA test is applied, only a MILD statistically significant effect is observed in categories 67 (A/V), 68 (Tutoring), and 69 (Land Surveying).

E8: FACTOR-LEVEL: CHANGES WRT LOCATION OF REQUEST/INVITE/QUOTE

```
png
  2
```



LOCATION_ID: ANOVA JUL VIA AOV

```
                        Df Sum Sq Mean Sq F value Pr(>F)
as.factor(location_id)   99     96  0.9738   0.991  0.507
Residuals              6253   6145  0.9828
```

LOCATION_ID: ANOVA AUG VIA AOV

```
                        Df Sum Sq Mean Sq F value Pr(>F)
as.factor(location_id)   99     93  0.9428   0.934  0.663
Residuals              6337   6394  1.0090
```

LOCATION_ID: INDIVIDUAL COMPONENT EFFECTS VIA LM FOR JUL

```
Call:
lm(formula = i2q_hrs_log ~ as.factor(location_id), data = riq[riq$month ==
    "07", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.7687 -0.6637 -0.0018  0.6784  3.6014

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)               0.9782408  0.0277196  35.291  < 2e-16 ***
as.factor(location_id)2   0.1096253  0.0511775   2.142  0.03223 *
as.factor(location_id)3   0.0229102  0.0548361   0.418  0.67611
as.factor(location_id)4   0.0605619  0.0732168   0.827  0.40818
as.factor(location_id)5  -0.0326467  0.0680991  -0.479  0.63167
as.factor(location_id)6  -0.0449680  0.0674404  -0.667  0.50494
as.factor(location_id)7  -0.0591719  0.0783494  -0.755  0.45014
as.factor(location_id)8   0.0853288  0.0866001   0.985  0.32450
as.factor(location_id)9   0.0069376  0.1064690   0.065  0.94805
as.factor(location_id)10  0.0245010  0.0833620   0.294  0.76884
as.factor(location_id)11  0.0167658  0.0915786   0.183  0.85474
as.factor(location_id)12 -0.0443937  0.1019962  -0.435  0.66340
as.factor(location_id)13  0.0218901  0.0980919   0.223  0.82342
```

```
as.factor(location_id)14   0.0811668  0.1086765   0.747  0.45517
as.factor(location_id)15  -0.2014917  0.1054190  -1.911  0.05601 .
as.factor(location_id)16   0.0449159  0.1320047   0.340  0.73367
as.factor(location_id)17   0.1852186  0.1024628   1.808  0.07071 .
as.factor(location_id)18   0.0922897  0.1402409   0.658  0.51051
as.factor(location_id)19  -0.0747476  0.1309490  -0.571  0.56815
as.factor(location_id)20   0.0931876  0.1185279   0.786  0.43178
as.factor(location_id)21  -0.0134399  0.1353425  -0.099  0.92090
as.factor(location_id)22  -0.1658706  0.1330881  -1.246  0.21269
as.factor(location_id)23  -0.0955116  0.1611435  -0.593  0.55340
as.factor(location_id)24   0.3580136  0.1536983   2.329  0.01987 *
as.factor(location_id)25   0.1098921  0.1774246   0.619  0.53569
as.factor(location_id)26   0.1408609  0.1893853   0.744  0.45704
as.factor(location_id)27  -0.0633790  0.1429108  -0.443  0.65743
as.factor(location_id)28   0.2446136  0.1747823   1.400  0.16170
as.factor(location_id)29   0.0106744  0.1631881   0.065  0.94785
as.factor(location_id)30  -0.0225871  0.1698444  -0.133  0.89421
as.factor(location_id)31  -0.1507241  0.1861626  -0.810  0.41818
as.factor(location_id)32  -0.0006586  0.2291121  -0.003  0.99771
as.factor(location_id)33   0.1560756  0.1377227   1.133  0.25715
as.factor(location_id)34   0.0561853  0.1536983   0.366  0.71471
as.factor(location_id)35   0.0959925  0.1377227   0.697  0.48583
as.factor(location_id)36   0.1157578  0.1831035   0.632  0.52728
as.factor(location_id)37  -0.1635418  0.1927867  -0.848  0.39630
as.factor(location_id)38   0.0926153  0.1104344   0.839  0.40170
as.factor(location_id)39  -0.0150270  0.1536983  -0.098  0.92212
as.factor(location_id)40   0.0014234  0.2233968   0.006  0.99492
as.factor(location_id)41   0.1430285  0.1631881   0.876  0.38081
as.factor(location_id)42   0.2826116  0.1774246   1.593  0.11124
as.factor(location_id)43   0.1492196  0.1269800   1.175  0.23998
as.factor(location_id)44   0.3408008  0.1774246   1.921  0.05480 .
as.factor(location_id)45   0.2953363  0.2352996   1.255  0.20947
as.factor(location_id)46  -0.0426532  0.2131644  -0.200  0.84141
as.factor(location_id)47   0.8297656  0.4964446   1.671  0.09469 .
as.factor(location_id)48   0.1169735  0.1698444   0.689  0.49103
as.factor(location_id)49  -0.0899682  0.2085590  -0.431  0.66621
as.factor(location_id)50   0.4874565  0.2663929   1.830  0.06732 .
as.factor(location_id)51  -0.3414294  0.3001829  -1.137  0.25541
as.factor(location_id)52  -0.0548214  0.1747823  -0.314  0.75379
as.factor(location_id)53   0.1339373  0.2493804   0.537  0.59123
as.factor(location_id)54  -0.2291989  0.2042462  -1.122  0.26183
as.factor(location_id)55   0.0806130  0.3515861   0.229  0.81866
as.factor(location_id)56   0.2238512  0.2420279   0.925  0.35505
as.factor(location_id)57  -0.1150661  0.2001964  -0.575  0.56547
as.factor(location_id)58  -0.0434387  0.2420279  -0.179  0.85757
as.factor(location_id)59   0.0268766  0.1747823   0.154  0.87779
as.factor(location_id)60   0.0162387  0.2001964   0.081  0.93535
as.factor(location_id)61  -0.1568094  0.1611435  -0.973  0.33054
as.factor(location_id)62   0.0617808  0.3757153   0.164  0.86939
as.factor(location_id)63   0.0989737  0.1893853   0.523  0.60127
as.factor(location_id)64   0.0157274  0.1722584   0.091  0.92726
as.factor(location_id)65  -0.1117888  0.2233968  -0.500  0.61681
as.factor(location_id)66  -1.1698156  0.4442065  -2.633  0.00847 **
as.factor(location_id)67   0.1680715  0.2180969   0.771  0.44096
as.factor(location_id)68   0.2119584  0.2663929   0.796  0.42626
as.factor(location_id)69  -0.0573158  0.3515861  -0.163  0.87051
as.factor(location_id)70  -0.3655972  0.2875146  -1.272  0.20357
as.factor(location_id)71   0.1630614  0.2180969   0.748  0.45470
as.factor(location_id)72   0.8284879  0.4056611   2.042  0.04116 *
as.factor(location_id)73  -1.0638064  0.7015312  -1.516  0.12947
as.factor(location_id)74   0.3502501  0.2131644   1.643  0.10041
as.factor(location_id)75   0.3272917  0.2663929   1.229  0.21927
as.factor(location_id)76   0.1734402  0.2291121   0.757  0.44907
as.factor(location_id)77  -0.2256171  0.2131644  -1.058  0.28991
as.factor(location_id)78   0.3302152  0.2233968   1.478  0.13942
as.factor(location_id)79  -0.2210567  0.3147124  -0.702  0.48245
as.factor(location_id)80   0.4246742  0.4964446   0.855  0.39235
as.factor(location_id)81  -0.2838712  0.2574595  -1.103  0.27025
as.factor(location_id)82  -0.2653112  0.2493804  -1.064  0.28742
as.factor(location_id)83   0.1871083  0.3147124   0.595  0.55217
as.factor(location_id)84  -0.0087211  0.3757153  -0.023  0.98148
as.factor(location_id)85   0.4223008  0.2875146   1.469  0.14194
as.factor(location_id)86   0.1784715  0.2663929   0.670  0.50291
as.factor(location_id)87  -0.4511503  0.3316073  -1.360  0.17372
as.factor(location_id)88  -0.1366320  0.2763421  -0.494  0.62102
as.factor(location_id)89   0.5373310  0.3316073   1.620  0.10520
as.factor(location_id)90   0.1956859  0.3316073   0.590  0.55514
as.factor(location_id)91  -0.1693017  0.2085590  -0.812  0.41696
as.factor(location_id)92  -0.0133780  0.2574595  -0.052  0.95856
as.factor(location_id)93  -0.1757020  0.4056611  -0.433  0.66494
as.factor(location_id)94   0.0467332  0.2875146   0.163  0.87088
as.factor(location_id)95   0.0471492  0.1801948   0.262  0.79359
as.factor(location_id)96  -0.0728849  0.3515861  -0.207  0.83578
as.factor(location_id)97   0.4210526  0.2291121   1.838  0.06615 .
as.factor(location_id)98   0.2124621  0.2574595   0.825  0.40928
as.factor(location_id)99  -0.0068028  0.2085590  -0.033  0.97398
as.factor(location_id)100  0.4117733  0.2180969   1.888  0.05907 .
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 0.9913 on 6253 degrees of freedom
Multiple R-squared:  0.01545,   Adjusted R-squared:  -0.0001426
F-statistic: 0.9909 on 99 and 6253 DF,  p-value: 0.5071

------------------------------------------------------------------------
```

LOCATION_ID: INDIVIDUAL COMPONENT EFFECTS VIA LM FOR AUG

```
Call:
lm(formula = i2q_hrs_log ~ as.factor(location_id), data = riq[riq$month ==
    "08", ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.6758 -0.6681 -0.0031  0.6729  3.4115

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)               0.990786   0.028806  34.396  < 2e-16 ***
as.factor(location_id)2   0.050483   0.047380   1.065  0.28669
as.factor(location_id)3   0.017841   0.057953   0.308  0.75820
as.factor(location_id)4  -0.088976   0.069988  -1.271  0.20366
as.factor(location_id)5   0.063096   0.071074   0.888  0.37471
as.factor(location_id)6  -0.100570   0.074315  -1.353  0.17601
as.factor(location_id)7   0.036709   0.079270   0.463  0.64332
as.factor(location_id)8  -0.067295   0.082895  -0.812  0.41694
as.factor(location_id)9  -0.098463   0.095395  -1.032  0.30204
as.factor(location_id)10  0.063060   0.088525   0.712  0.47628
as.factor(location_id)11  0.056108   0.096115   0.584  0.55940
as.factor(location_id)12  0.156761   0.104018   1.507  0.13185
as.factor(location_id)13  0.208189   0.101290   2.055  0.03988 *
as.factor(location_id)14  0.184354   0.118769   1.552  0.12066
as.factor(location_id)15 -0.083853   0.125171  -0.670  0.50294
as.factor(location_id)16 -0.058252   0.149324  -0.390  0.69647
as.factor(location_id)17 -0.049644   0.113321  -0.438  0.66134
as.factor(location_id)18 -0.172186   0.142244  -1.210  0.22613
as.factor(location_id)19 -0.025711   0.127878  -0.201  0.84066
as.factor(location_id)20  0.121434   0.121044   1.003  0.31579
as.factor(location_id)21 -0.227262   0.131798  -1.724  0.08470 .
as.factor(location_id)22  0.155812   0.131798   1.182  0.23717
as.factor(location_id)23 -0.201218   0.128823  -1.562  0.11834
as.factor(location_id)24  0.009995   0.172215   0.058  0.95372
as.factor(location_id)25  0.029439   0.142244   0.207  0.83605
as.factor(location_id)26  0.031428   0.138474   0.227  0.82046
as.factor(location_id)27 -0.167793   0.185642  -0.904  0.36611
as.factor(location_id)28  0.099987   0.199091   0.502  0.61553
as.factor(location_id)29  0.010688   0.144947   0.074  0.94122
as.factor(location_id)30  0.334169   0.202952   1.647  0.09970 .
as.factor(location_id)31  0.024006   0.157649   0.152  0.87898
as.factor(location_id)32  0.096941   0.138474   0.700  0.48391
as.factor(location_id)33  0.197258   0.163405   1.207  0.22741
as.factor(location_id)34 -0.002567   0.143575  -0.018  0.98574
as.factor(location_id)35 -0.184146   0.126955  -1.450  0.14697
as.factor(location_id)36 -0.171191   0.136130  -1.258  0.20860
as.factor(location_id)37  0.038497   0.216086   0.178  0.85860
as.factor(location_id)38  0.050022   0.154147   0.325  0.74556
as.factor(location_id)39 -0.107492   0.147819  -0.727  0.46714
as.factor(location_id)40  0.080439   0.167630   0.480  0.63134
as.factor(location_id)41  0.041992   0.245321   0.171  0.86409
as.factor(location_id)42 -0.223598   0.182696  -1.224  0.22104
as.factor(location_id)43  0.123021   0.150879   0.815  0.41489
as.factor(location_id)44  0.172092   0.270001   0.637  0.52390
as.factor(location_id)45 -0.067849   0.174660  -0.388  0.69768
as.factor(location_id)46  0.097285   0.182696   0.532  0.59440
as.factor(location_id)47 -0.109303   0.154147  -0.709  0.47830
as.factor(location_id)48 -0.032012   0.216086  -0.148  0.88223
as.factor(location_id)49  0.020042   0.192003   0.104  0.91687
as.factor(location_id)50  0.392699   0.232238   1.691  0.09090 .
as.factor(location_id)51 -0.075142   0.172215  -0.436  0.66261
as.factor(location_id)52  0.029849   0.211421   0.141  0.88773
as.factor(location_id)53  0.169424   0.221081   0.766  0.44350
as.factor(location_id)54 -0.009878   0.211421  -0.047  0.96274
as.factor(location_id)55 -0.319807   0.185642  -1.723  0.08499 .
as.factor(location_id)56  0.085212   0.318950   0.267  0.78935
as.factor(location_id)57  0.280342   0.195448   1.434  0.15152
as.factor(location_id)58  0.114784   0.165476   0.694  0.48792
as.factor(location_id)59  0.136779   0.185642   0.737  0.46128
as.factor(location_id)60 -0.131800   0.318950  -0.413  0.67945
as.factor(location_id)61  0.104512   0.172215   0.607  0.54396
as.factor(location_id)62  0.022735   0.411090   0.055  0.95590
as.factor(location_id)63 -0.013517   0.165476  -0.082  0.93490
as.factor(location_id)64  0.236101   0.185642   1.272  0.20349
as.factor(location_id)65 -0.042391   0.304231  -0.139  0.88919
as.factor(location_id)66  0.096680   0.318950   0.303  0.76181
as.factor(location_id)67  0.177903   0.221081   0.805  0.42103
as.factor(location_id)68 -0.182870   0.318950  -0.573  0.56643
as.factor(location_id)69  0.123569   0.252768   0.489  0.62495
as.factor(location_id)70  1.072016   0.411090   2.608  0.00914 **
as.factor(location_id)71 -0.118838   0.232238  -0.512  0.60887
as.factor(location_id)72 -0.302808   0.291397  -1.039  0.29877
as.factor(location_id)73  0.196839   0.226449   0.869  0.38475
as.factor(location_id)74 -0.144797   0.245321  -0.590  0.55505
as.factor(location_id)75  0.161100   0.260952   0.617  0.53702
as.factor(location_id)76 -0.409967   0.380751  -1.077  0.28164
as.factor(location_id)77  0.264076   0.260952   1.012  0.31159
as.factor(location_id)78  0.571373   0.336065   1.700  0.08915 .
as.factor(location_id)79  0.418903   0.291397   1.438  0.15061
as.factor(location_id)80  0.222080   0.304231   0.730  0.46543
```

```
as.factor(location_id)81   0.187363   0.172215   1.088  0.27666
as.factor(location_id)82  -0.289318   0.270001  -1.072  0.28397
as.factor(location_id)83   0.101932   0.336065   0.303  0.76166
as.factor(location_id)84   0.247912   0.336065   0.738  0.46073
as.factor(location_id)85  -0.695365   0.503068  -1.382  0.16694
as.factor(location_id)86   0.090514   0.291397   0.311  0.75610
as.factor(location_id)87  -0.077342   0.245321  -0.315  0.75257
as.factor(location_id)88   0.052949   0.207053   0.256  0.79817
as.factor(location_id)89   0.227680   0.411090   0.554  0.57970
as.factor(location_id)90   0.279338   0.318950   0.876  0.38117
as.factor(location_id)91  -0.258649   0.580655  -0.445  0.65601
as.factor(location_id)92   0.061473   0.710862   0.086  0.93109
as.factor(location_id)93  -0.163912   0.280079  -0.585  0.55841
as.factor(location_id)94   0.048948   0.411090   0.119  0.90523
as.factor(location_id)95   0.110879   0.245321   0.452  0.65130
as.factor(location_id)96  -1.607287   0.580655  -2.768  0.00566 **
as.factor(location_id)97   0.098558   0.380751   0.259  0.79576
as.factor(location_id)98  -0.180904   0.411090  -0.440  0.65991
as.factor(location_id)99  -0.678341   0.450142  -1.507  0.13187
as.factor(location_id)100 -0.135009   0.221081  -0.611  0.54144
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 1.004 on 6337 degrees of freedom
Multiple R-squared:  0.01439,   Adjusted R-squared:  -0.00101
F-statistic: 0.9344 on 99 and 6337 DF,  p-value: 0.6635
```

REMARKS:

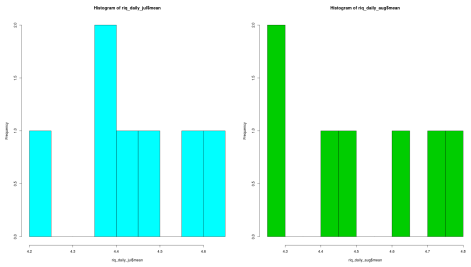
.... Anova analysis of the Jul and Aug subsets indicate there is NO statistically significant component effect for the location_id. When examining individul levels there is MILD component effects for location_id 2, 24, 66, and 72 but these occur at very weak R2, F and p-values. As a result, there is no evidence of a STRONG difference between Jul and Aug months in terms of components effects for location_id.

REMARKS:

.... From examination of the location_id based aggregation visualization, it appears that there are a handful of distinguishing categories for either Jul and Aug. HOWEVER, when the ANOVA test is applied, there is NO strong evidence of a significant effect being observed due to location_id or location_id levels.

E9: FACTOR-LEVEL: CHANGES WRT DAY OF WEEK

```
png
  2
```



DAY OF WEEK: ANOVA JUL VIA AOV

```
---------------------------------------------------------------------------
             Df Sum Sq Mean Sq F value Pr(>F)
dow           6      3  0.5697   0.579  0.747
Residuals  6346   6238  0.9830
---------------------------------------------------------------------------
```

```
------------------------------------------------------------------------
```

DAY OF WEEK: ANOVA AUG VIA AOV

```
------------------------------------------------------------------------
             Df Sum Sq Mean Sq F value Pr(>F)
dow           6     14   2.381   2.365 0.0277 *
Residuals  6430   6473   1.007
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1
------------------------------------------------------------------------


------------------------------------------------------------------------
```

DAY OF WEEK: ANOVA JUL VIA LM

```
------------------------------------------------------------------------

Call:
lm(formula = i2q_hrs_log ~ dow, data = riq[riq$month == "07",
    ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.7871 -0.6605 -0.0074  0.6785  3.5832

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)   1.033670   0.028814  35.874   <2e-16 ***
dowTuesday   -0.030620   0.040472  -0.757    0.449
dowWednesday -0.036961   0.041461  -0.891    0.373
dowThursday  -0.026539   0.044392  -0.598    0.550
dowFriday     0.004697   0.046251   0.102    0.919
dowSaturday  -0.022599   0.049202  -0.459    0.646
dowSunday    -0.079305   0.049281  -1.609    0.108
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 0.9915 on 6346 degrees of freedom
Multiple R-squared:  0.0005476, Adjusted R-squared:  -0.0003974
F-statistic: 0.5795 on 6 and 6346 DF,  p-value: 0.747

------------------------------------------------------------------------


------------------------------------------------------------------------
```

DAY OF WEEK: ANOVA AUG VIA LM

```
------------------------------------------------------------------------

Call:
lm(formula = i2q_hrs_log ~ dow, data = riq[riq$month == "08",
    ])

Residuals:
    Min      1Q  Median      3Q     Max
-3.5043 -0.6770 -0.0044  0.6763  3.3421

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.94225    0.03165  29.772  < 2e-16 ***
dowTuesday    0.07887    0.04449   1.773  0.07628 .
dowWednesday  0.14789    0.04558   3.245  0.00118 **
dowThursday   0.08184    0.04410   1.856  0.06355 .
dowFriday     0.01736    0.04493   0.386  0.69916
dowSaturday   0.03043    0.04747   0.641  0.52153
dowSunday     0.07007    0.05163   1.357  0.17478
---
Signif. codes:  0 â€˜***â€™ 0.001 â€˜**â€™ 0.01 â€˜*â€™ 0.05 â€˜.â€™ 0.1 â€˜ â€™ 1

Residual standard error: 1.003 on 6430 degrees of freedom
Multiple R-squared:  0.002202,  Adjusted R-squared:  0.001271
F-statistic: 2.365 on 6 and 6430 DF,  p-value: 0.0277

------------------------------------------------------------------------
```

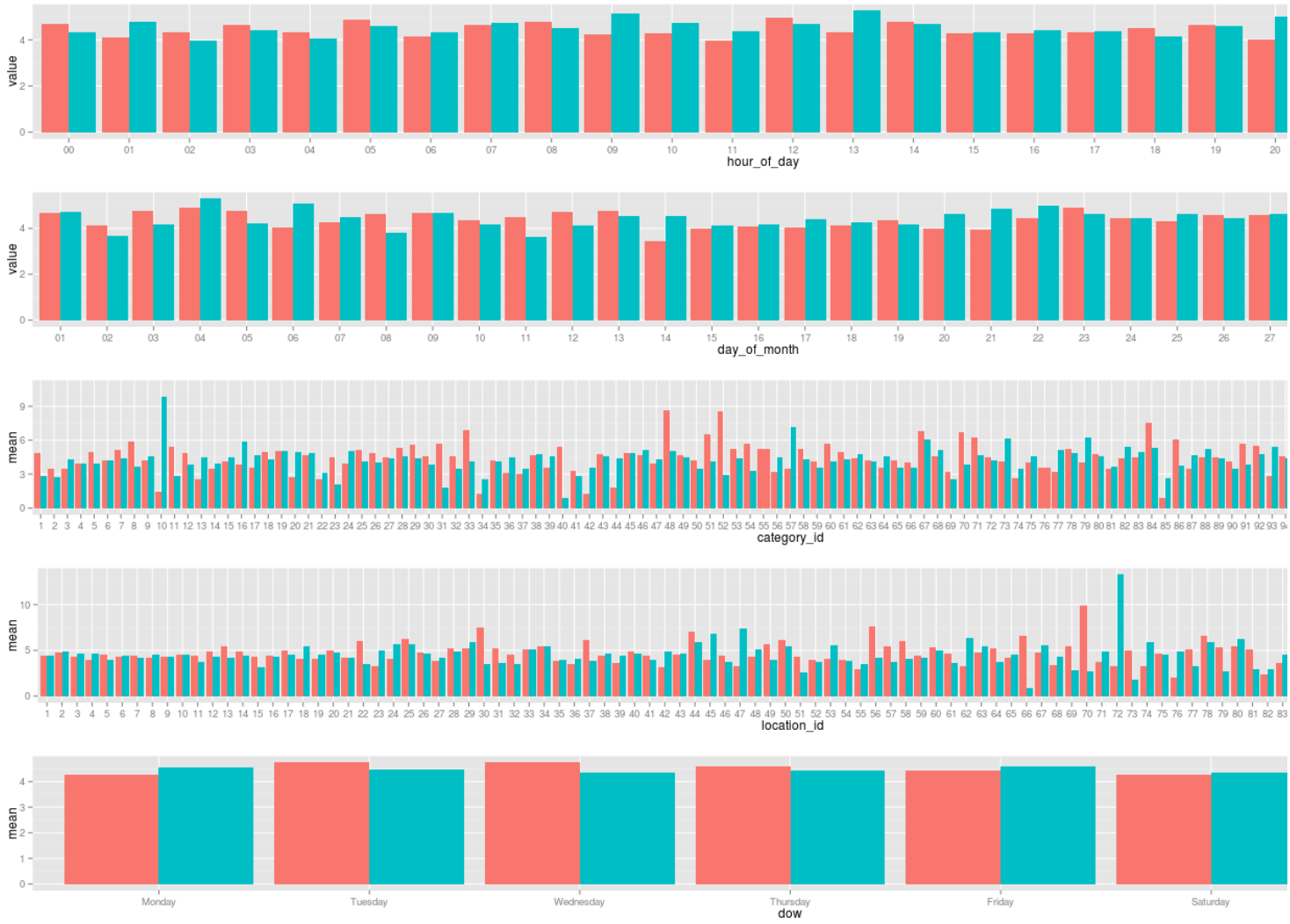
REMARKS:

.... One way anova analysis of the Jul and Aug subsets indicate that there is a not so MILD statistical significant difference at specific day-of-week levels but ONLY for the month of Aug. and not July, specifically, Wednesdays on August, which holds high statistical significance but at a relatively weak R2, F, and p-values. As a result, again, there is NO strong evidence of significant departure between Jul and Aug months when accounting for day-of-week component effects.

REMARKS:

.... From examination of the day-of-week based aggregation visualization, there appear to be differences for day-of-week with respect to the months of July and August. HOWEVER, when the ANOVA test is applied, it indicates that NO statistically significant component effects -- for any day of week -- is discernible, at all.

```
null device
          1
```



E10: EXAMINING PREDICTIVE MODEL FOR REPLY BIT FOR JUL/AUG CONCEPT DRIFT

REMARKS:

.... Often enough, it is desired to predict whether a quote will be produced. In this dataset this is represented by the REPLIED bit. A natural question here is whether the predictive model for the reply bit is noticeably impacted when switching from the July data to the August data (i.e., concept drift). To build a very basic model, I opted for a decision tree and used some basic factors which appear promising (e.g., category_id). HOWEVER, when leveraging these factors into simplistic predictive modeling, NO discernible predictive impact (logloss, confusion tables, tree structure, etc) is observed when training with Jul or Aug data.

E11: PREDICTIVE MODELING/DECISION TREE: WRT JULY

BASIC DECISION TREE FOR JUL WITH RESPECT TO HOUR AND CATEGORY

```
n= 12574

node), split, n, loss, yval, (yprob)
      * denotes terminal node

1) root 12574 6221 1 (0.4947511 0.5052489)
  2) as.factor(category_id)=1,2,3,6,10,11,12,13,14,15,16,17,18,20,22,24,29,30,31,33,37,38,39,42,44,45,46,50,51,52,54,56,57,61,62,64,65,66,67,
  3) as.factor(category_id)=4,5,7,8,9,19,21,23,25,26,27,28,32,34,35,36,40,41,43,47,48,49,53,58,59,60,63,69,75,78,79,80,81,82,84,86,88,89,91,9
```

JUL DECISION TREE CPTABLE:

```
         CP nsplit rel error   xerror        xstd
1 0.2986658      0 1.0000000 1.000000 0.009012029
2 0.0100000      1 0.7013342 0.709693 0.008603732
```

PREDICTED REPLIES PROBABILITIES CONFUSION MATRIX FOR JULY

```
       0    1
  0 5126 1095
  1 3268 3085
```

LOG_LOSS_VALUE:

```
[1] 0.6374
```

```
[1] 0.6374141
```

E12: PREDICTIVE MODELING/DECISION TREE: WRT AUGUST

BASIC DECISION TREE FOR AUG WITH RESPECT TO HOUR AND CATEGORY

```
n= 11990

node), split, n, loss, yval, (yprob)
      * denotes terminal node

1) root 11990 5553 1 (0.4631359 0.5368641)
  2) as.factor(category_id)=1,2,3,5,6,9,10,11,12,13,14,15,16,17,18,20,22,24,29,30,31,33,34,36,37,38,42,44,45,46,50,51,52,54,56,57,60,61,62,64
  3) as.factor(category_id)=4,7,8,19,21,23,25,26,27,28,32,35,39,40,41,43,47,48,49,53,55,58,59,63,69,75,78,79,80,81,82,84,86,88,89,91,92,93,94
```

```
------------------------------------------------------------------------
```

AUG DECISION TREE CPTABLE:

```
------------------------------------------------------------------------
        CP nsplit rel error    xerror        xstd
1 0.323969      0  1.000000 1.0000000 0.009832599
2 0.010000      1  0.676031 0.6837745 0.009172855
------------------------------------------------------------------------


------------------------------------------------------------------------
```

PREDICTED REPLIES PROBABILITIES CONFUSION MATRIX FOR AUG

```
------------------------------------------------------------------------

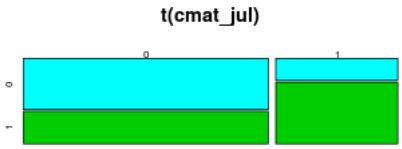
      0    1
  0 3569 1984
  1 1770 4667
------------------------------------------------------------------------

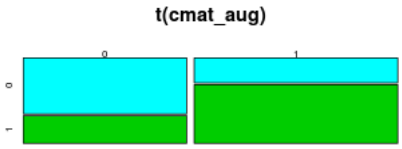

------------------------------------------------------------------------
```

LOG_LOSS_VALUE:

```
------------------------------------------------------------------------
[1] 0.6209
------------------------------------------------------------------------

[1] 0.6209214
null device
          1
```





REMARKS:

.... Confusion matrices for the two decision tree predictive models, one trained with the JUL dataset and the other trained with the AUG dataset. As also indicated by the overall LOGLOSS performance metric, and the structure of the decision trees, and now, the similarity between confusion matrices, the predictive modeling is training this most basid model with either the Jul or Aug datasets does NOT visibly impact the model's performance nor its construction.

E13: CONCLUSION

REMARKS:

.... In conclusion, even individual factor levels were accounted for, NO STRONG statistically significant effect was discernable when contrasting the invite-to-quote time-delay for the months of July vs. the month of Aug.. A variety of analysis techniques were used, most reaching a similarly strong conclusion about the lack of statistically significant effects. However, in a few cases, arguably mild statistically significant effects were observed for specific factor levels of day-of-month (e.g., the 16th of the month), hour-of-day (e.g., 9AM), and location-id (e.g., 68: PA-NJ). On all of these, the effects manifested on the month of Aug and NOT on Jul. However, the category_id provided a countering example, on which the strongest yet relatively mildly statistically significant effect was due to category_id 10 on Jul (Pest Control) and then, a similarly mild effect was observed on Aug but this timeon category_id 13 (Home Remodeling).

Because of time limitations, only one-way anova was applied. As a result, higher order effects were not examined. However, the indications so far point to the lack of evidence for the presence of a statistical strong effect distinguishing Jul from Aug.

One weakness of the analysis consists in the handling of the missing values for the i2q_hrs as two alternatives existed for its handling:

a) drop all such rows for which i2q_hrs does not exists (i.e., invites w/o quotes), or alternatively,
b) assign an Inf or large value to its i2q_hrs value to represent and penalize the fact that such row attributes lead to negative outcomes.

Such analysis is left as future work with respect to the stated time limits (approx. 6 hrs). The amount of time to produce this analysis so far was approx. 12 hrs.