Communications at DinoFun World

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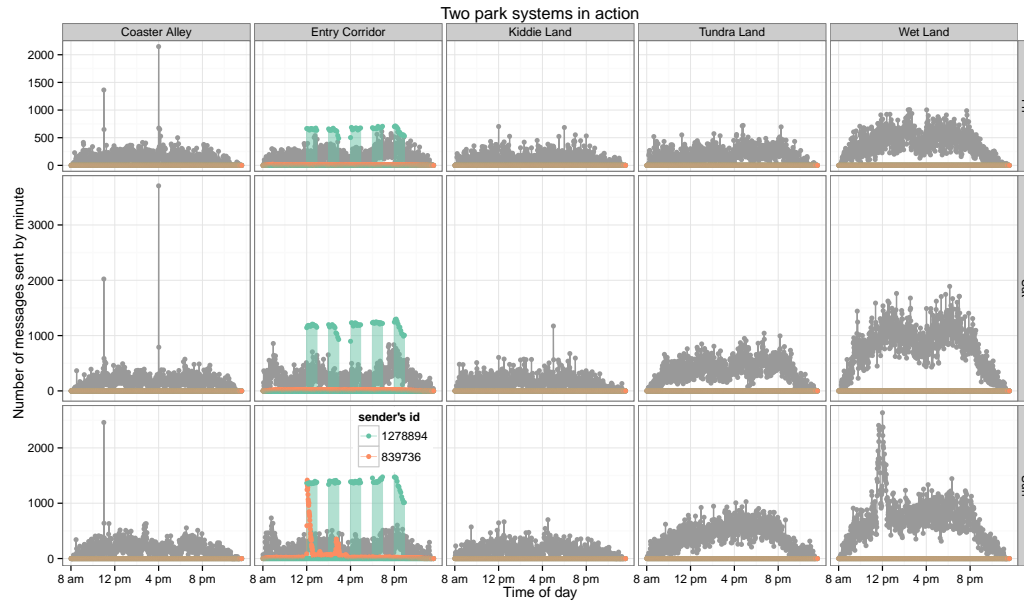
Fig. 1: Number of messages sent from the park for each minute of the day. Two park systems in action: the park's help line gets very busy twice on Sunday, once at 11 am, and once at 3 pm (shown in orange). Points in green are trivia questions sent out at five minute intervals to park goers by the DinoFun World app. About a quarter of park goers opt to get the app. Cell phones likely have to be turned off in the Scott Jones show, accounting for the dip in messages from 3-4 pm on Friday and Saturday. The flare-ups in the number of messages sent from Coaster Alley are related to Scott Jones sightings throughout the park, while the spike of messages from the Wet Land is triggered by the discovery of the act of vandalism.

Index Terms—Keywords that describe your work. Will show as 'Index Terms' in journal please capitalize first letter and insert punctuation after last keyword

✦

1 DATA MANIPULATION

Some of our analysis is based on merging the communication information with the movements in the park. The common factor between the data sets is the timeline.

2 RESULTS

```
## Error:  '../data/comm-data-Fri.csv'
does not exist in current working directory
('/Users/heike/papers/vast-writeup/mc2').
## Error:  '../data/comm-data-Sat.csv'
does not exist in current working directory
('/Users/heike/papers/vast-writeup/mc2').
## Error:  '../data/comm-data-Sun.csv'
does not exist in current working directory
('/Users/heike/papers/vast-writeup/mc2').
```

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```
## Error in rbind(fri, sat, sun):  object
'fri' not found
## Error in lapply(list(...), .num_to_date):
object 'com' not found
## Error in wday(com$Timestamp, label = TRUE):
object 'com' not found
## Error in factor(com$day, levels = c("Fri",
"Sat", "Sun")):  object 'com' not found
## Error in eval(expr, envir, enclos):  object
'com' not found
## Error in minute(mins$open) <- 0:  object
'mins' not found
## Error in second(mins$open) <- 0:  object
'mins' not found
## Error in merge(com, mins, by = "day"):
object 'com' not found
## Error in eval(expr, envir, enclos):  object
'com' not found
## Error in hour(com$Timestamp):  object 'com'
not found
## Error in minute(com$Timestamp):  object
'com' not found
## Error in with(com, hour * 60 + min):
object 'com' not found
## Error in eval(expr, envir, enclos):  object
'com' not found
```

```
## Error in terms.formula(formula, data =
data):  object 'com' not found
## Error in eval(expr, envir, enclos):  object
'dc' not found
```

```
## Error in com$id <- "others":  object 'com'
not found
## Error in com$id[com$from == "1278894"] <-
1278894:  object 'com' not found
## Error in com$id[com$from == "839736"] <-
839736:  object 'com' not found
## Error in com$back <- "others":  object
'com' not found
## Error in com$back[com$to == "839736"] <-
839736:  object 'com' not found
## Error in com$back[com$to == "1278894"] <-
1278894:  object 'com' not found
## Error in terms.formula(formula, data =
data):  object 'com' not found
## Error in eval(expr, envir, enclos):  object
'domni' not found
```

2.1 Two park systems in action

Two IDs are notable for their large volume of messages: 1278894 and
839736. These IDs are responsible for almost 80% of the message
volume. Both these ids are stationary, sending messages from the En-
try Corridor only. From the pattern of messages sent and received
we are able to identify these ids as the park's help line (839736) and
the Cindysaurus trivia game (1278894), which is part of the DinoFun
World app (how do we cite the auxiliary file?):

During the even hours between noon and 8 pm questions are sent
from the Cindysaurus trivia game (1278894) at five minute intervals
to just over 25% of all park goers. Judging from the large number of
messages and the relatively low percentage of recipients this looks like
an opt-in service. Besides these questions exactly at the top of every
five minutes there are no other messages from this id. Almost all of the
recipients quickly respond to each of the questions (while they wait in
the very long lines).

Id 839736 on the other hand, has a very different pattern. Every
single one of the messages sent from this id is solicited by a previous
message by a park goer. On Friday and Saturday about 85% of all park
goers make use of the park's help line, on Sunday this number spikes
to 95% of all park goers.

The spikes at 10am, 11am, 3pm and 4pm are all related to Scott
Jones sightings, who makes his way from the East entrance entering
Kiddie Land to Grinosaurus Stage in the Coaster Alley. The spikes in
the Wet Land area and the Entry Corridor between 10:30 am and 12
pm on Sunday are related to the unfortunate events surrounding Scott
Jones.

2.2 A series of unfortunate events: who, when and where

Figure 2 shows the number of messages that originated from the Wet
Land area by minute on Sunday between 11:00 am and 12:59 pm de-
tailing the contributions of different groups to the peak in communi-
cation. A tight group of 37 park goers is responsible for a first peak in
messages around 11:30 - 11:45 am. This peak is made up of messages
going forth-and-back between members of this group. The decrease in
the number of messages among these guys goes hand-in-hand with a
spike in messages to external recipients. This peak is immediately fol-
lowed by a peak of messages right at noon spiking to over 1,500 mes-
sages to the park's help-line, likely related to the closing of Creighton
Pavilion for the remainder of the day. While messages to the help-line
calm down again over the next half an hour, the help-line stays busier
than on a regular day.

XXX We need a good name for the 37 guys from group 2566 -
neither one is good XXX

```
## Error in com$back <- "other park-goers":
object 'com' not found
## Error in com$back[com$to == "839736"] <-
"Park help-line":  object 'com' not found
## Error in com$back[com$to == "1278894"] <-
"DinoFun App":  object 'com' not found
## Error in subset(com, hour == 11 & day ==
"Sun" & min >= 30 & min <= 44):  object 'com'
not found
## Error in subset(peak, back %in%
c("external", "other park-goers")):  object
'peak' not found
## Error in subset(peak, id == "others"):
object 'peak' not found
## Error in table(peak$to):  object 'peak' not
found
## Error in dt >= 250:  comparison (5) is
possible only for atomic and list types
```

```
## Error in com$back <- "other park-goers":
object 'com' not found
## Error in com$back[com$to == "839736"] <-
"Park help-line":  object 'com' not found
## Error in com$back[com$to == "1278894"] <-
"DinoFun App":  object 'com' not found
## Error in com$back[com$to %in% x38] <- "37
chaps":  object 'com' not found
## Error in com$back[com$to == "external"] <-
"external":  object 'com' not found
## Error in terms.formula(formula, data =
data):  object 'com' not found
## Error in eval(expr, envir, enclos):  object
'domni' not found
## Error in eval(expr, envir, enclos):  object
'domni' not found
## Error in subset(domni, day == "Sun" &
location == "Wet Land" & hour %in% :  object
'domni' not found
```

Fig. 2: Zoom into communications out of the Wet Land area on Sunday between 11:00 am
and 12:59 pm. Several sources contribute to the spikes in sent messages.

```
## Error in subset(com, from %in% x38):
object 'com' not found
## Error in factor(s38$from):  object 's38'
not found
## Error in ggplot(aes(x = dmin/60, y = from,
colour = back), data = s38):  object 's38' not
found
```

Fig. 3: Messages sent from the chaps of group 2566. Between 11:30 and 11:45 am there
is a flurry of messages among the members of the group. About half of them take part in
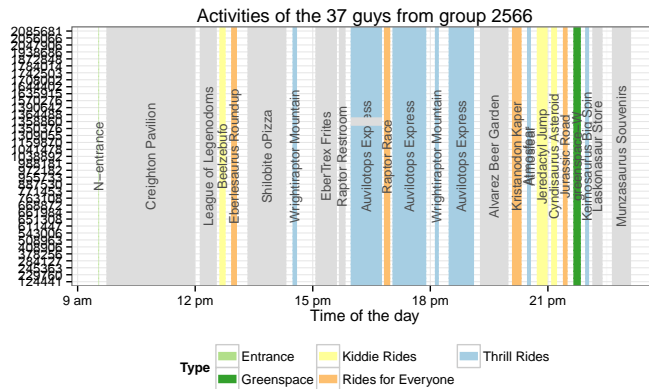the Cindysaurus Trivia game.

Fig. 4: What is group 2566 up to? These guys come into DinoFun World at around 9:30, but take their first ride after 12:30 pm - before that they spend a long time in or around Creighton Pavilion, however they never check into it! If they were not actively involved in the act of vandalism, they might have seen who was.

```
## Error in readJPEG("data/Park Map.jpg"):
       unable to open data/Park Map.jpg
```

```
## Error in eval(expr, envir, enclos):  object
                 'm38' not found
## Error in eval(expr, envir, enclos):  object
                 'm38' not found
  ## Error in match(x, table, nomatch = 0L):
            object 'park' not found
```

Fig. 5: Map of DinoFun World park. Sensors are keeping track of park-goers movements in cells $5m \times 5m$ along the park's pathways (overlaid in light yellow). The group of 37 chaps either stands like oil sardines for more than 2 hours in the cell marked by the red dot, or – much more likely – they are on the loose somewhere in the area around Creighton Pavilion (building no. 32).

```
## Error in match(x, table, nomatch = 0L):
object 'x38' not found
```

Interestingly, the sensors do not pick up on any movements for any one of the 37 members of the group between 9:45 until noon. They are either standing perfectly still in the same 5m x 5m cell (tile 32, 33), or they found a hole in the park's sensor system and are on the loose somewhere around the Creighton Pavilion (see figure 5).

ACKNOWLEDGMENTS

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