

# VISUAL ANALYTICS INTRODUCTION TO R TUTORIAL 1

Petra Isenberg

# INSTALLATION

<http://tinyurl.com/VADresden>

The screenshot shows a course management system interface. At the top, there is a navigation bar with three items: 'MAIN', 'SCHEDULE', and 'ASSIGNMENTS'. The 'ASSIGNMENTS' item is highlighted with a red circle. Below the navigation bar, the main content area has a light blue header with the text 'Tutorial 1 -- Building a Webscraper'.

In this tutorial you build a basic R web scraper to download and process data. You will work on the first part of the assignment together in class, and you will complete the second part on your own.

You should submit the completed assignment to us before 23:00 on Monday.

## Getting Started

- Install R from [this website](#) or from [this website](#) (mirrors)
- Install RStudio from [its website](#)

R version 3.1.1 (2014-07-10) -- "Sock it to Me"  
Copyright (C) 2014 The R Foundation for statistical computing  
Platform: x86\_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.  
You are welcome to redistribute it under certain conditions.  
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.  
Type 'contributors()' for more information and  
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or  
'help.start()' for an HTML browser interface to help.  
Type 'q()' to quit R.

[workspace loaded from ~/.RData]

Loading required package: RCurl  
Loading required package: bitops

> |

**R is an interpreted language. Type code here and have it executed**

The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Project, Build, Tools, and Help. The top right corner shows "Project: (None)". The left pane contains the "Console" tab with the following R session output:

```
R version 3.0.0 (2013-04-03) -- "Masked Marvel"
Copyright (C) 2013 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

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Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> getwd()
[1] "H:/MyData/RFiles"
> 5*5
[1] 25
> A <- matrix(c(1,2,3,4,5,6,7,8), nrow=4, ncol=2)
> A
 [,1] [,2]
[1,]    1    5
[2,]    2    6
[3,]    3    7
[4,]    4    8
> B <- matrix(c(1,2,3,4,5,6,7,8), nrow=4, ncol=2, byrow=TRUE)
> B
 [,1] [,2]
[1,]    1    2
[2,]    3    4
[3,]    5    6
[4,]    7    8
>
```

The middle section shows the "Workspace" tab with two objects defined:

Data	Type
A	4x2 double matrix
B	4x2 double matrix

The right section shows the "Files" tab with a single file listed:

Name	Size	Modified
.Rhistory	34 bytes	Aug 23, 2013, 1:26 PM

**The console** is where you can type commands and see output

The **workspace** tab shows all the active objects (see next slide). The **history** tab shows a list of commands used so far.

The **files** tab shows all the files and folders in your default workspace as if you were on a PC/Mac window. The **plots** tab will show all your graphs. The **packages** tab will list a series of packages or add-ons needed to run certain processes. For additional info see the **help** tab

# HELLO WORLD

- Type into your console

```
> print("Hello world!")
```

output:

```
[1] "Hello world!"
```

# QUICK R TUTORIALS

**Let's get you to work:**

```
> install.packages("swirl")  
  
> library(swirl)  
> install_from_swirl("R Programming")  
> swirl()
```

Choose "R Programming"

If you are new to R complete the following lessons:  
**1, 2, 4, 7**

If you are already a proficient R user pick a lesson that interests you

- | when you are at the R prompt (>): |
- Typing skip() allows you to skip the current question.  
|
  - Typing play() lets you experiment with R on your own;  
swirl | will ignore what you do... |
  - UNTIL you type nxt() which will regain swirl's  
attention. |
  - Typing bye() causes swirl to exit. Your progress will  
be | saved. |
  - Typing main() returns you to swirl's main menu. |
  - Typing info() displays these options again.

# **DATA ANALYSIS**

**Challenge**

# MAYHEM AT DINOFUN WORLD

- DinoFun World is a typical modest-sized amusement park
- One event last year was a weekend tribute to Scott Jones, internationally renowned football star.

Picture by Scott Smith

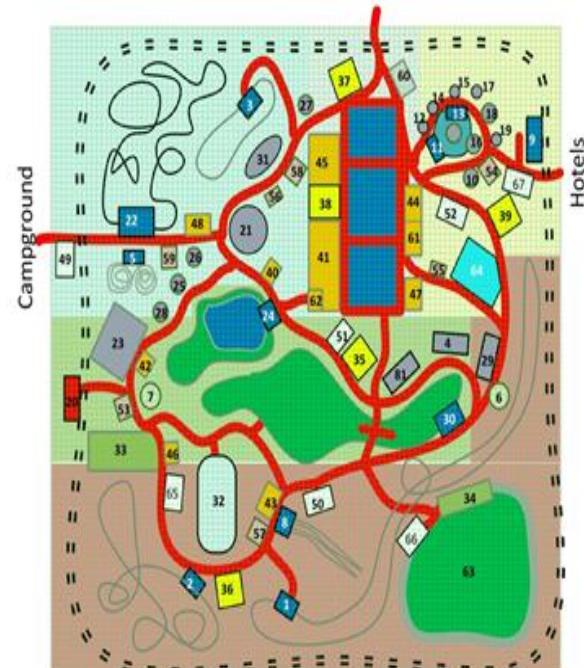
<https://www.flickr.com/photos/scottsmith/1449407456/in/pool-rollercoasters>

<https://creativecommons.org/licenses/by-nc-nd/2.0/>

# MAYHEM AT DINOFUN WORLD

- Scott was scheduled to appear in two stage shows each on
  - Friday, Saturday, and Sunday
- Show of memorabilia @Pavilion.
- But: a crime occurred on Sunday & memorabilia were stolen

Park is 100 x 5 meters = 500 meters wide = 1640 feet  
Each square is 5 meters on a side.



# MAYHEM AT DINOFUN WORLD

- Officials are interested in understanding just what happened during that weekend to better prepare themselves for future events.
- How were patterns on Sunday unusual?
- What are possible patterns that could indicate the crime?
- Who possibly committed the crime? Did he/she have help?

# CHALLENGE DATA

- Movement + communication data
- All visitors to the park use a park app
  - to check in to the park and rides
  - to communicate with fellow visitors.
- The park has sensor beacons. Sensors are sensitive within a 5m x 5m grid cell:
  - For all pathways
  - For all ride check-in locations
- Locations are not recorded while people are
  - on rides or inside attractions (including restaurants, stores, and rest rooms).
- App users may send text messages to anyone within their own designated group (for example, a family could have their own group).
- An app user may also make “a friend” at the park where they can send and receive texts, if both persons accept friend invitations.

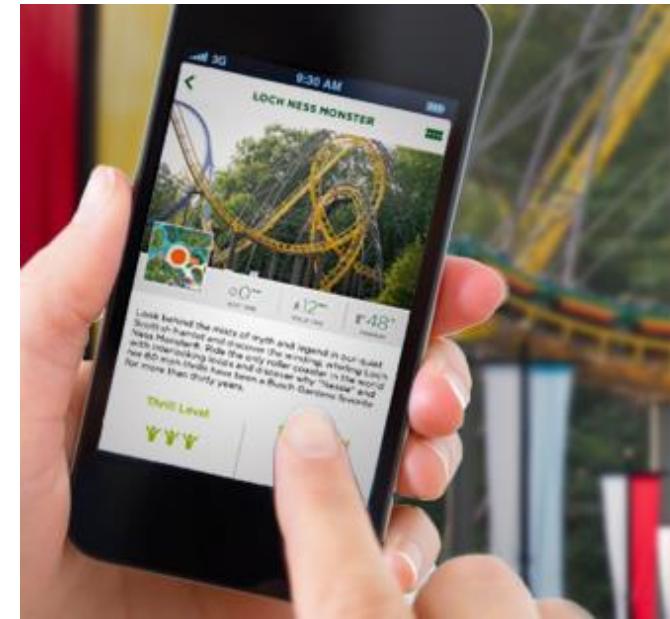
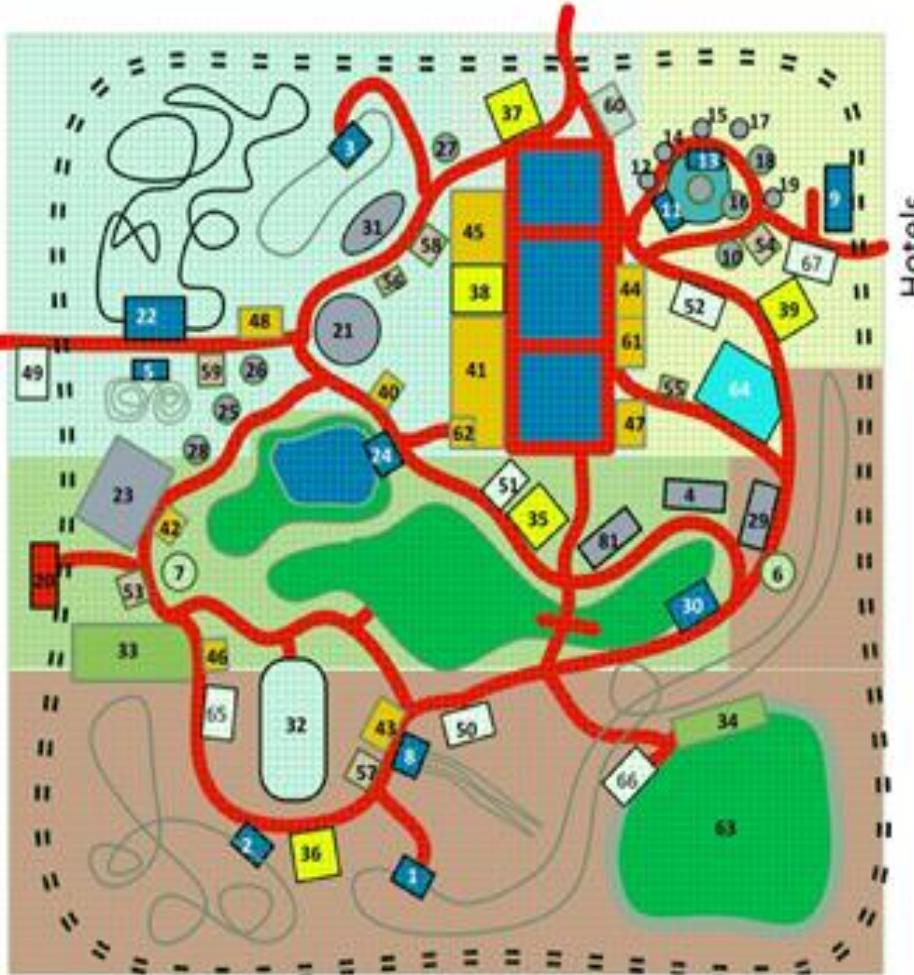


Image of Bushworld gardens app but Dinofun World app looks similar  
<https://seaworldparks.com/en/buschgardens-williamsburg/pages/mobile>

Park is 100 x 5 meters = 500 meters wide = 1640 feet  
Each square is 5 meters on a side.

Campground



- The attractions are numbered and coded according to type.
- The red line indicates the pathway through the park, although dark green areas are also areas where people can move.
- Attraction 30 in the middle of the map is a water rapids ride, so people can watch from the "inside" of the ride boundaries.
- For other rides, people are not allowed to wander inside of the ride footprint.
- Attraction 63 is a show stage area, so people populate this area during performances.

# CHALLENGE

- Can you identify unusual movement and communication patterns in the park?
- Can you identify suspicious/unusual behavior?
- Specific questions will be supplied as we delve deeper into the data