**Title: Comparing trends in math test scores among New York City Boroughs**

The purpose of this project is to analyze city-wide trends in math scores in New York. The end product is an HTML-based app that reacts with the input of an end user. The app intends to produce a series of graphs allowing end users to compare and contrasts scores by districts and by year. Additionally, the app allows user to perform pair-wise comparisons.

Data Gathering

The bulk of the data was obtained from <http://data.nysed.gov/> , which is a data repository for all things education in New York. The data is provided in two format “xlsx” and “mdb”. In order to simplify the process, I decided to use the excel format. Once the files are downloaded, the data is cleaned up and rearranged into a “csv” format before moving to R studio.

Clean up

All the files are combined into one excel spreadsheet divided into the following columns: district, Grade, Year, Category, Number Tested, Mean Scale Score etc. A separate file contains a to information to help connect each school district to the corresponding borough.

App Development

The app was programmed in R studio with the help of a reactive package called shiny. Shiny a web application framework that allows you to turn statistical analysis into interactive web applications that performs exactly as if it were developed in with HTML, CSS and Javascript. With this library I was able to develop the entire app using two files: **ui.R** that plays the role of the front end part and **server.R** for the backend components. The source code is added in the github repository. The following graph illustrates the procedure followed in this analysis:

Hosting

UI.R

RStudio

Server.R

www.nyced.org

**Ansible Component**

In completing this project I used three different environments: Local environment, the @indiafuturesystems.org, three Ubuntu/servers by digitalocean.com and github. The local environment was used to program and test the the app in ‘**RStudio**’. All the files related to the app development were added to a local repository which is later linked to github. Through the indiafuturesystems.org environment ansible playbooks are used to properly configure all the ubuntu servers that will server as the server for the app. Please see below the steps followed to properly configure the india/system environment where ansible was being used:

# Loging into the india/system

[hsimeon@i136 ~]$ ssh [hsimeon@india.futuresystems.org](mailto:hsimeon@india.futuresystems.org)

# Loading virtual environment

[hsimeon@i136 ~]$ virtualenv bdossp\_sp16

[hsimeon@i136 ~]$ source bdossp\_sp16/bin/activate

# External step: Creating three ubuntu/droplets with digitalocean.com

# Using the inda/futures system to establish an ssh connection with each one of the servers

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh-copy-id -i ~/.ssh/id\_rsa.pub [root@107.170.75.21](mailto:root@107.170.75.21)

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh-copy-id -i ~/.ssh/id\_rsa.pub root@107.170.75.60

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh-copy-id -i ~/.ssh/id\_rsa.pub [root@107.170.75.143](mailto:root@107.170.75.143)

# Remotely logging in each server and adding a new user/password

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh root@107.170.65.21

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh root@107.170.65.60

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh [root@107.170.65.143](mailto:root@107.170.65.143)

# Creating an inventory file named hosts.txt

(bdossp\_sp16)[hsimeon@i136 ~]$ touch hosts.txt

(bdossp\_sp16)[hsimeon@i136 ~]$ nano hosts.txt

# Remotely install python in each one of the hosts

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh root@107.170.72.60

root@ubuntu-512mb-nyc2-02:~# sudo apt-get install python

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh root@107.170.72.21

root@ubuntu-512mb-nyc2-02:~# sudo apt-get install python

(bdossp\_sp16)[hsimeon@i136 ~]$ ssh root@107.170.72.143

root@ubuntu-512mb-nyc2-02:~# sudo apt-get install python

# Checking if all severs are correctly connected to:

(bdossp\_sp16)[hsimeon@i136 udemy\_ansible]$ ansible all -m ping

107.170.75.21 | SUCCESS => {

"changed": false,

"ping": "pong"

}

107.170.65.143 | SUCCESS => {

"changed": false,

"ping": "pong"

}

107.170.72.60 | SUCCESS => {

"changed": false,

"ping": "pong"

}

# Creating the ansible playbooks to remotely install R, R-packages and R-studio

(bdossp\_sp16)[hsimeon@i136 ~]$ nano ansible-r.yml

(bdossp\_sp16)[hsimeon@i136 ~]$ nano deploy-rstudio-server.yml

# Run ansible playbooks

(bdossp\_sp16)[hsimeon@i136 ~]$ ansible-playbook ansible-r.yml –check

PLAY [all] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

TASK [setup] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ok: [107.170.65.143]

ok: [107.170.75.21]

ok: [107.170.72.60]

TASK [Get update] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

skipping: [107.170.75.21]

skipping: [107.170.65.143]

skipping: [107.170.72.60]

TASK [Install R] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

skipping: [107.170.65.143]

skipping: [107.170.75.21]

skipping: [107.170.72.60]

TASK [Download the R-Studio package] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

skipping: [107.170.65.143]

skipping: [107.170.72.60]

skipping: [107.170.75.21]

TASK [Install the package] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

skipping: [107.170.65.143]

skipping: [107.170.75.21]

skipping: [107.170.72.60]

PLAY RECAP \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

107.170.65.143 : ok=1 changed=0 unreachable=0 failed=0

107.170.72.60 : ok=1 changed=0 unreachable=0 failed=0

107.170.75.21 : ok=1 changed=0 unreachable=0 failed=0

(bdossp\_sp16)[hsimeon@i136 ~]$ ansible-playbook deploy-rstudio-server.yml –check

TASK [setup] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ok: [107.170.75.21]

ok: [107.170.65.143]

ok: [107.170.72.60]

TASK [Setting up APT] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

changed: [107.170.65.143]

changed: [107.170.75.21]

changed: [107.170.72.60]

TASK [authenticate packages downloaded] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

changed: [107.170.75.21]

changed: [107.170.65.143]

changed: [107.170.72.60]

TASK [add key to apt] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

changed: [107.170.65.143]

changed: [107.170.75.21]

changed: [107.170.72.60]

TASK [get update] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

changed: [107.170.75.21]

[WARNING]: Consider using apt-get module rather than running apt-get

changed: [107.170.65.143]

changed: [107.170.72.60]

TASK [Install R] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

changed: [107.170.65.143]

changed: [107.170.75.21]

changed: [107.170.72.60]

PLAY RECAP \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

107.170.65.143 : ok=6 changed=5 unreachable=0 failed=0

107.170.72.60 : ok=6 changed=5 unreachable=0 failed=0

107.170.75.21 : ok=6 changed=5 unreachable=0 failed=0

(bdossp\_sp16)[hsimeon@i136 ~]$ ansible-playbook install-shiny.yml --check

PLAY [all] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

TASK [setup] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ok: [107.170.65.143]

ok: [107.170.75.21]

ok: [107.170.72.60]

TASK [Install shiny] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

skipping: [107.170.65.143]

skipping: [107.170.75.21]

skipping: [107.170.72.60]

TASK [download shiny server] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

skipping: [107.170.75.21]

skipping: [107.170.65.143]

skipping: [107.170.72.60]

TASK [Use GDebi to install the file] \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

skipping: [107.170.65.143]

skipping: [107.170.75.21]

skipping: [107.170.72.60]

PLAY RECAP \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

107.170.65.143 : ok=1 changed=0 unreachable=0 failed=0

107.170.72.60 : ok=1 changed=0 unreachable=0 failed=0

107.170.75.21 : ok=1 changed=0 unreachable=0 failed=0