COMP SCI 7098 Master of Computing & Innovation Project 2021 Semester 1

Project: A Map Management Platform for Self-Driving Cars

User Guide Document

Version 1.0

Revision History

Date	Version	Description	Author
23/May/21	0.1	Document creation	Nhu Quynh Hoa
25/May/21	0.2	Document amendment: section 1. Introduction, section 2. Process overview, section 3. Django administration site	Nhu Quynh Hoa
27/May/21	0.3	Document amendment: section 4. Map management platform	Huu Thanh Nguyen
29/May/21	1.0	Document finalisation	Nhu Quynh Hoa

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User Guide Document

1. Introduction

The user guide document provides a manual on how to use the main processes of the Map Management Platform. The platform is the result of the project "A Map Management Platform for Self-Driving Cars" carried out by a group of 4 students (Aryaman Dhawan, Huu Thanh Nguyen, Jonhatan Cotes Calderon, Nhu Quynh Hoa) taking the course COMP SCI 7098 Master of Computing & Innovation Project during semester 1, 2021 at The University of Adelaide.

2. Process overview

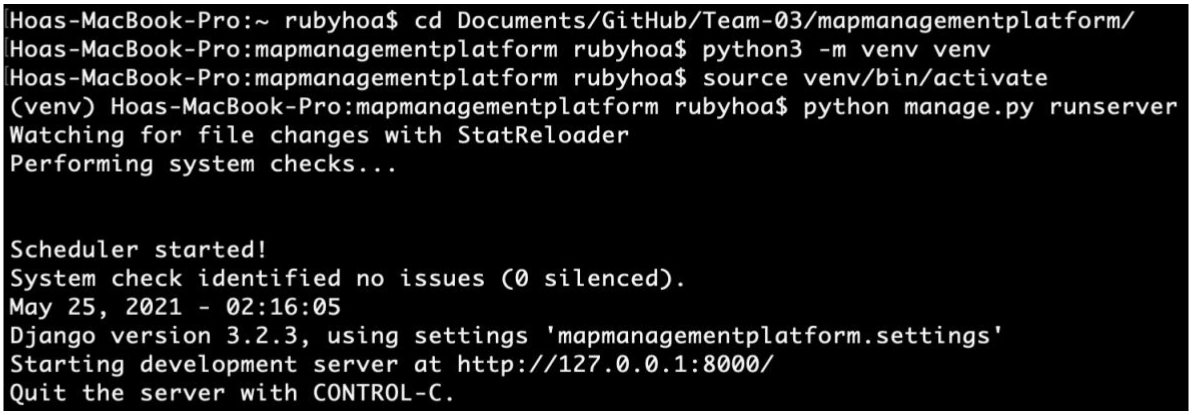
There are 2 main processes of the platform:

1. Using Django admin site to add a new region and manually execute the scheduler to fetch data from Mapillary
2. Using the Map Management Webapp to interact with the data and functionalities developed in Django and React

To start using the platform in development mode, we have to start the server, using the following commands in the *mapmangementplatform* directory:

$ python3 -m venv venv (for MacOS/Linux) or *$ python -m venv venv* (for Windows)
$ source venv/bin/activate (for MacOS/Linux) or *$ venv\Scripts\activate* (for Windows)
$ python manage.py runserver

Open http://127.0.0.1:8000/ or http://localhost:8000/ to view the Map Management Webapp in the browser.



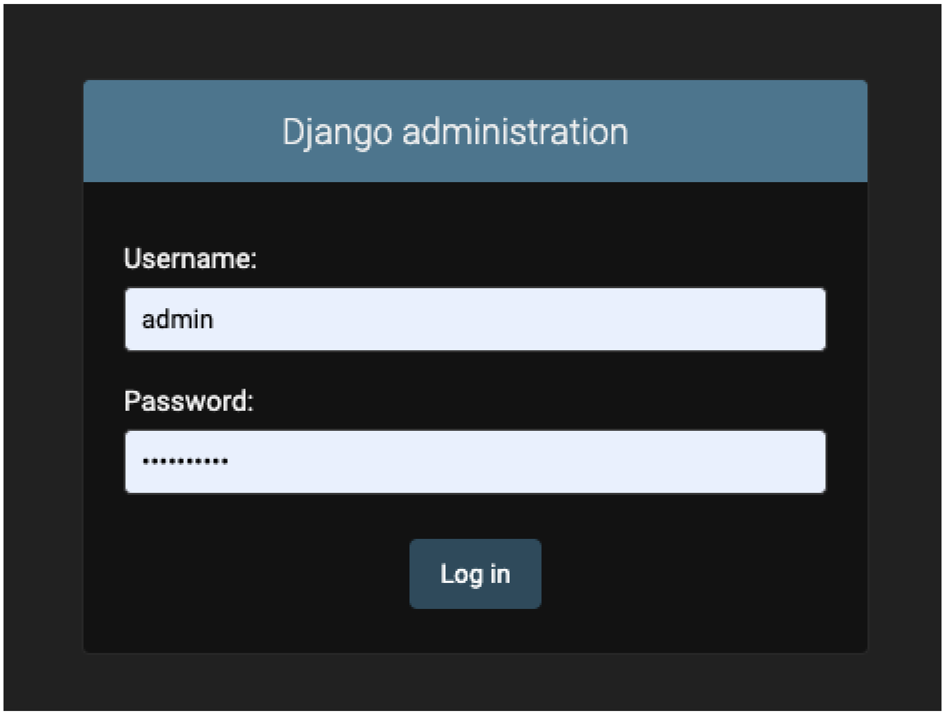
```
Hoas-MacBook-Pro:~ rubyhoa$ cd Documents/GitHub/Team-03/mapmanagementplatform/
Hoas-MacBook-Pro:mapmanagementplatform rubyhoa$ python3 -m venv venv
Hoas-MacBook-Pro:mapmanagementplatform rubyhoa$ source venv/bin/activate
(venv) Hoas-MacBook-Pro:mapmanagementplatform rubyhoa$ python manage.py runserver
Watching for file changes with StatReloader
Performing system checks...


Scheduler started!
System check identified no issues (0 silenced).
May 25, 2021 - 02:16:05
Django version 3.2.3, using settings 'mapmanagementplatform.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CONTROL-C.
```

3. Django administration site

3.1 How to access

- Step 1: Go to http://127.0.0.1:8000/admin/ or http://localhost:8000/admin/
- Step 2: Log in with user: *admin*, password: *MCIproject*, then click “Log in”

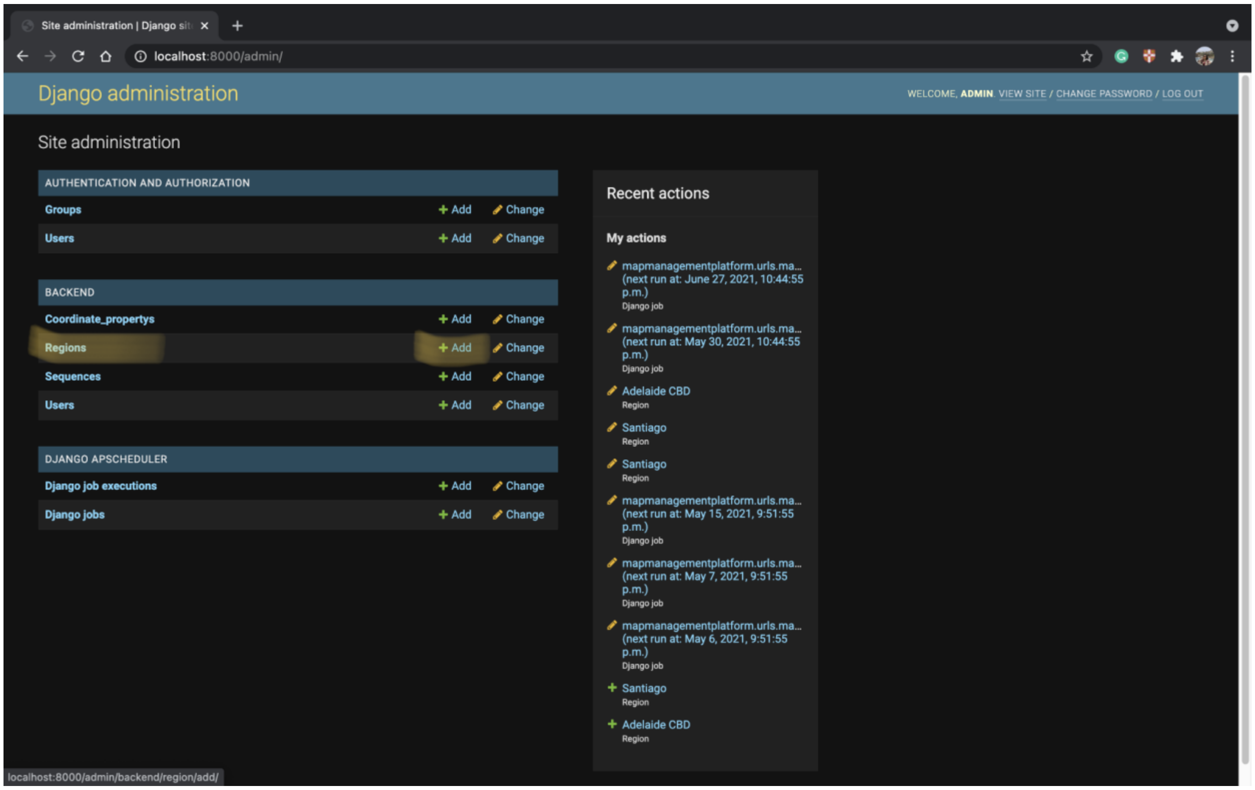


Username: admin

Password: ••••••••••

3.2 Add a new region

- Step 1: Click at “Add” button next to “Regions” under BACKEND section



Site administration | Django site
localhost:8000/admin/
Django administration
WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT
localhost:8000/admin/backend/region/add/

Site administration

AUTHENTICATION AND AUTHORIZATION		
Groups	+ Add	Change
Users	+ Add	Change

BACKEND		
Coordinate_propertys	+ Add	Change
Regions	+ Add	Change
Sequences	+ Add	Change
Users	+ Add	Change

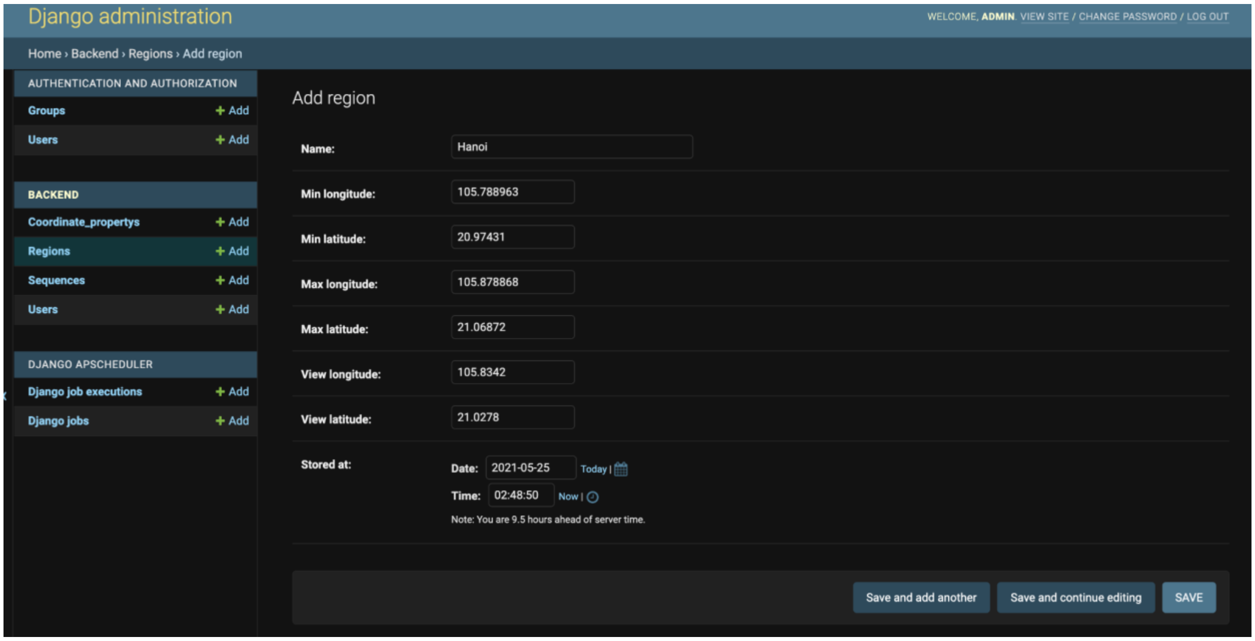
DJANGO APSCHEDULER		
Django job executions	+ Add	Change
Django jobs	+ Add	Change

Recent actions

My actions

- mapmanagementplatform.urls.ma... (next run at: June 27, 2021, 10:44:55 p.m.) Django job
- mapmanagementplatform.urls.ma... (next run at: May 30, 2021, 10:44:55 p.m.) Django job
- Adelaide CBD Region
- Santiago Region
- Santiago Region
- mapmanagementplatform.urls.ma... (next run at: May 15, 2021, 9:51:55 p.m.) Django job
- mapmanagementplatform.urls.ma... (next run at: May 7, 2021, 9:51:55 p.m.) Django job
- mapmanagementplatform.urls.ma... (next run at: May 6, 2021, 9:51:55 p.m.) Django job
- + Santiago Region
- + Adelaide CBD Region

- Step 2: Fill in the details of the new region, then click “SAVE”



Django administration
WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Backend › Regions › Add region
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
BACKEND
Coordinate_propertys + Add
Regions + Add
Sequences + Add
Users + Add
DJANGO APSCHEDULER
Django job executions + Add
Django jobs + Add
Today
Now
Save and add another
Save and continue editing
SAVE

Add region

Name: Hanoi

Min longitude: 105.788963

Min latitude: 20.97431

Max longitude: 105.878868

Max latitude: 21.06872

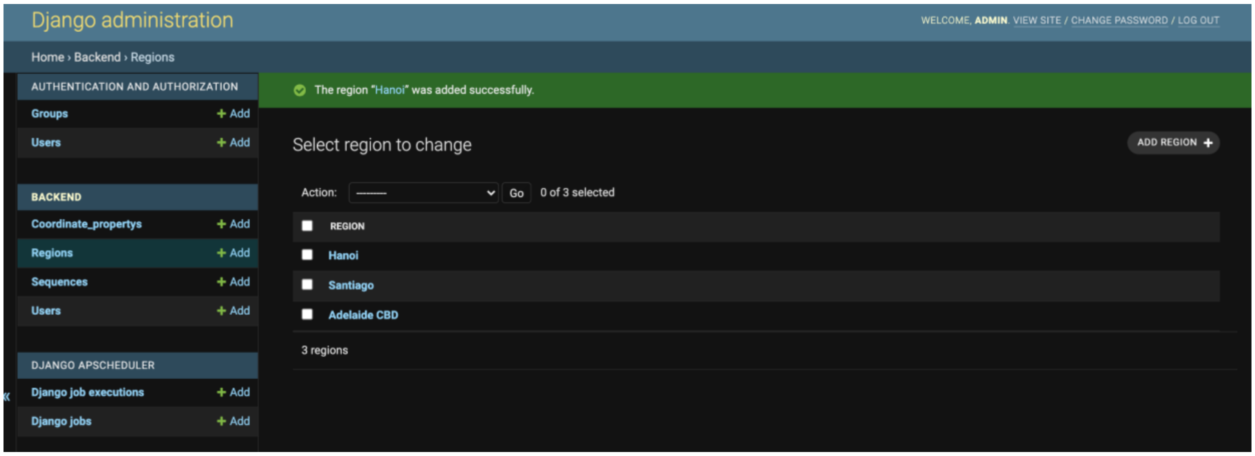
View longitude: 105.8342

View latitude: 21.0278

Stored at: Date: 2021-05-25 Time: 02:48:50

Note: You are 9.5 hours ahead of server time.

A message is displayed to inform us that the new region has been successfully added.



The region “Hanoi” was added successfully.

Select region to change

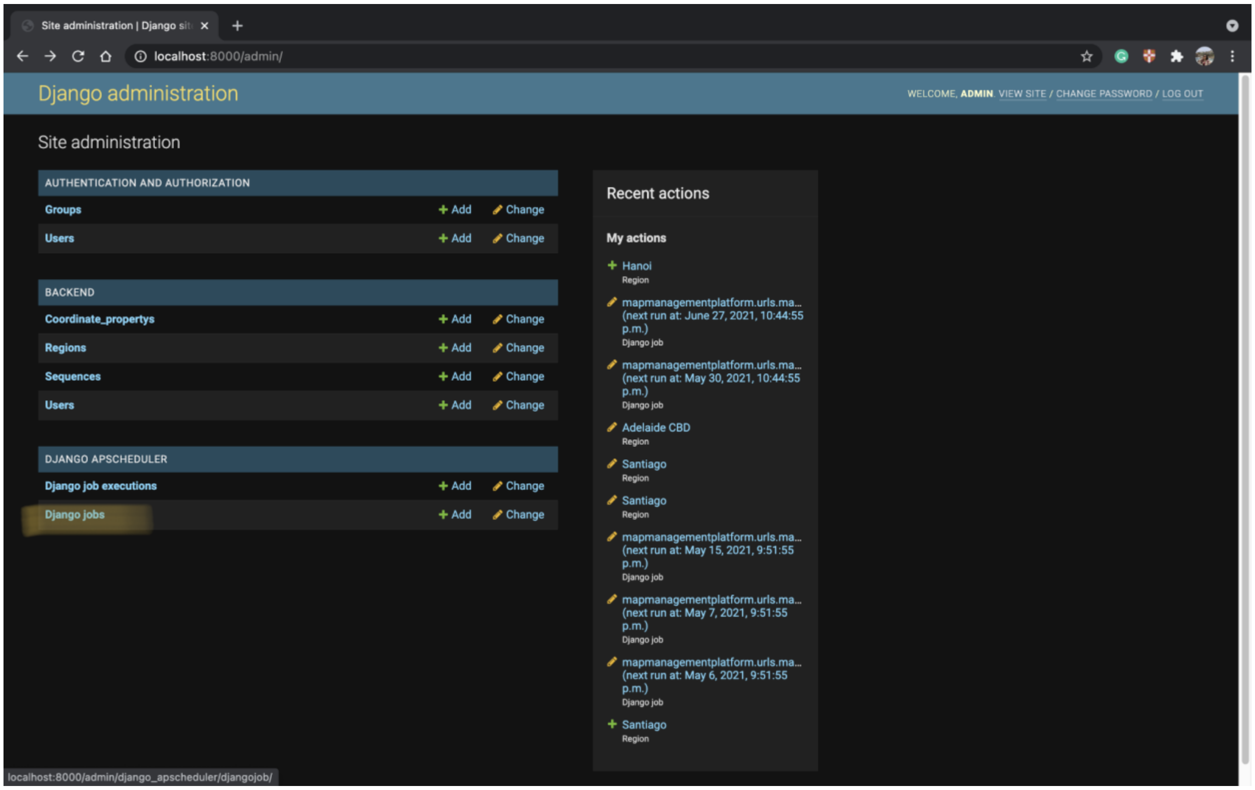
0 of 3 selected

☐	REGION
☐	Hanoi
☐	Santiago
☐	Adelaide CBD

3 regions

3.3 Scheduler

- Step 1: Click at “Django jobs” under “DJANGO APSCHEDULER” section



Site administration | Django sit
localhost:8000/admin/
Django administration
WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT

Site administration

AUTHENTICATION AND AUTHORIZATION

- Groups + Add Change
- Users + Add Change

BACKEND

- Coordinate_propertys + Add Change
- Regions + Add Change
- Sequences + Add Change
- Users + Add Change

DJANGO APSCHEDULER

- Django job executions + Add Change
- Django jobs + Add Change

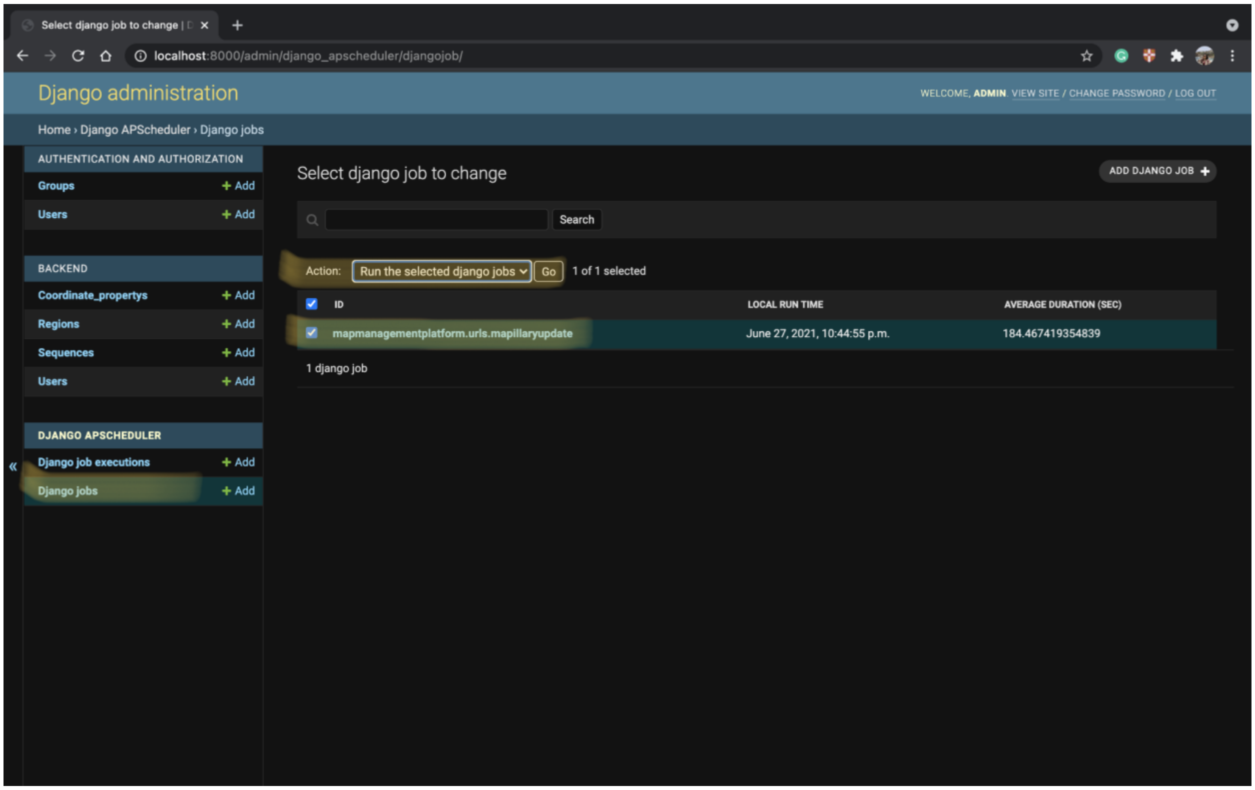
Recent actions

My actions

- + Hanoi
  Region
- mapmanagementplatform.urls.ma... (next run at: June 27, 2021, 10:44:55 p.m.)
  Django job
- mapmanagementplatform.urls.ma... (next run at: May 30, 2021, 10:44:55 p.m.)
  Django job
- Adelaide CBD
  Region
- Santiago
  Region
- Santiago
  Region
- mapmanagementplatform.urls.ma... (next run at: May 15, 2021, 9:51:55 p.m.)
  Django job
- mapmanagementplatform.urls.ma... (next run at: May 7, 2021, 9:51:55 p.m.)
  Django job
- mapmanagementplatform.urls.ma... (next run at: May 6, 2021, 9:51:55 p.m.)
  Django job
- + Santiago
  Region

localhost:8000/admin/django_apscheduler/djangojob/

- Step 2: Select the job “mapmanagementplatform.urls.mapillaryupdate”. From the dropdown list of “Action”, select “Run the selected django jobs”, then click “Go”.

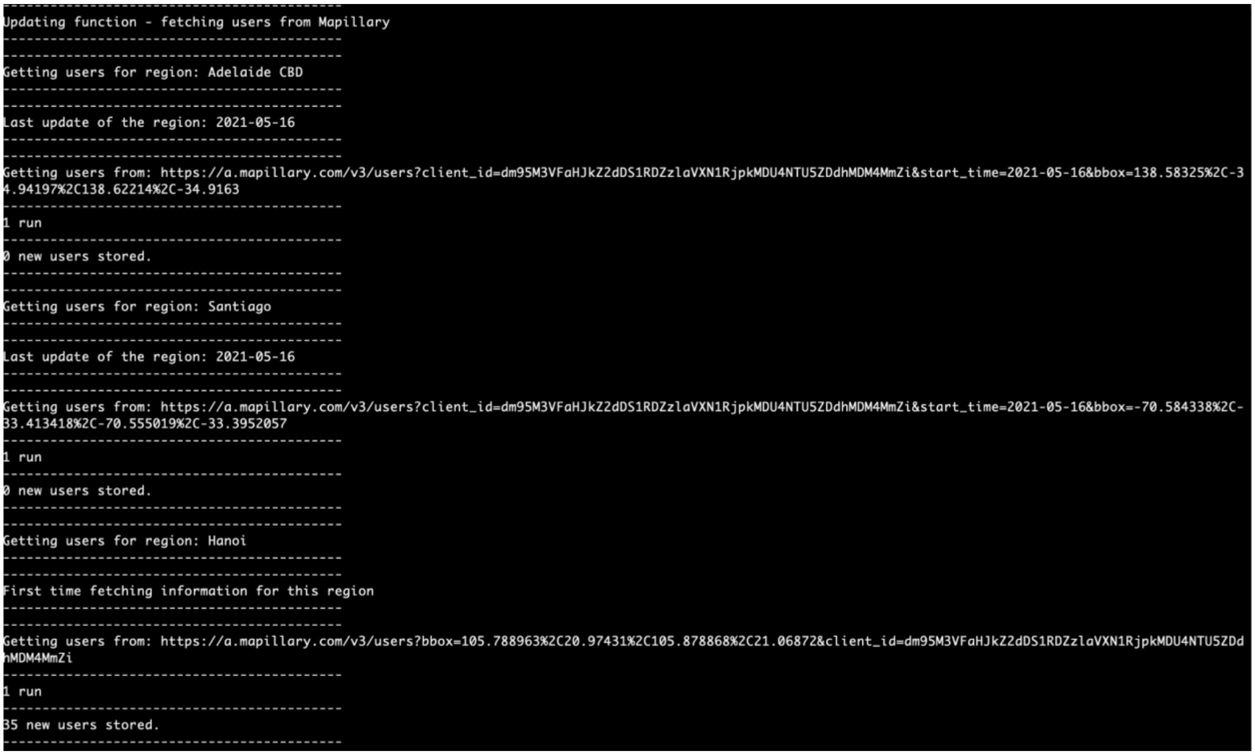

Select django job to change | D
localhost:8000/admin/django_apscheduler/djangojob/
Django administration
WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Django APScheduler › Django jobs
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
BACKEND
Coordinate_propertys + Add
Regions + Add
Sequences + Add
Users + Add
DJANGO APSCHEDULER
Django job executions + Add
Django jobs + Add
Select django job to change
ADD DJANGO JOB +
Search

Action: Run the selected django jobs Go 1 of 1 selected

☑	ID	LOCAL RUN TIME	AVERAGE DURATION (SEC)
☑	mapmanagementplatform.urls.mapillaryupdate	June 27, 2021, 10:44:55 p.m.	184.467419354839

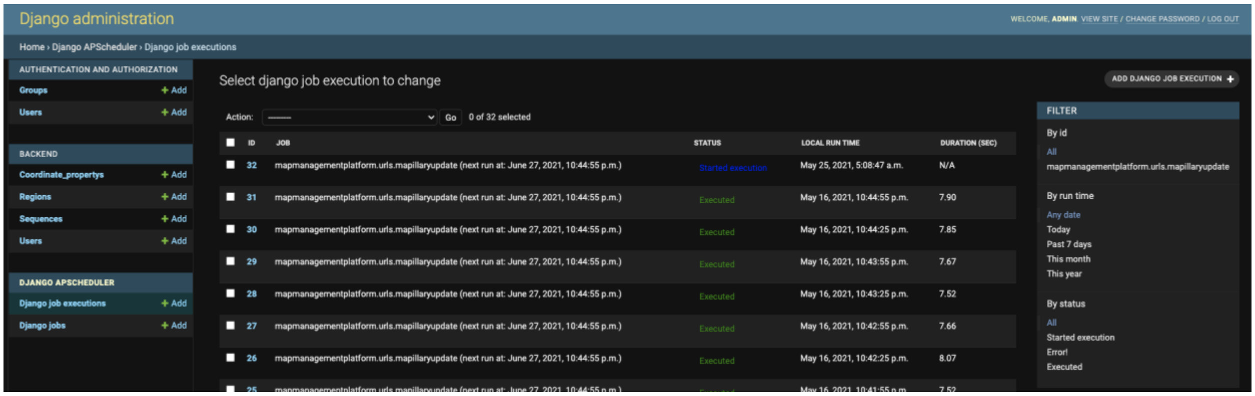
1 django job

- Step 3: Monitor the progress of the scheduler
    - ○ In the Terminal, details of the progress are shown:



```
-------------------------------------------
Updating function - fetching users from Mapillary
-------------------------------------------
-------------------------------------------
Getting users for region: Adelaide CBD
-------------------------------------------
-------------------------------------------
Last update of the region: 2021-05-16
-------------------------------------------
-------------------------------------------
Getting users from: https://a.mapillary.com/v3/users?client_id=dm95M3VFaHJkZ2dDS1RDZzlaVXN1RjpkMDU4NTU5ZDdhMDM4MmZi&start_time=2021-05-16&bbox=138.58325%2C-3
4.94197%2C138.62214%2C-34.9163
-------------------------------------------
1 run
-------------------------------------------
0 new users stored.
-------------------------------------------
-------------------------------------------
Getting users for region: Santiago
-------------------------------------------
-------------------------------------------
Last update of the region: 2021-05-16
-------------------------------------------
-------------------------------------------
Getting users from: https://a.mapillary.com/v3/users?client_id=dm95M3VFaHJkZ2dDS1RDZzlaVXN1RjpkMDU4NTU5ZDdhMDM4MmZi&start_time=2021-05-16&bbox=-70.584338%2C-
33.413418%2C-70.555019%2C-33.3952057
-------------------------------------------
1 run
-------------------------------------------
0 new users stored.
-------------------------------------------
-------------------------------------------
Getting users for region: Hanoi
-------------------------------------------
-------------------------------------------
First time fetching information for this region
-------------------------------------------
-------------------------------------------
Getting users from: https://a.mapillary.com/v3/users?bbox=105.788963%2C20.97431%2C105.878868%2C21.06872&client_id=dm95M3VFaHJkZ2dDS1RDZzlaVXN1RjpkMDU4NTU5ZDd
hMDM4MmZi
-------------------------------------------
1 run
-------------------------------------------
35 new users stored.
-------------------------------------------
```

- ○ On the Django admin site, click at "Django job executions" under "DJANGO APSCHEDULER" section, the job status is shown as "Started execution".



Django administration
WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Django APScheduler › Django job executions
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
BACKEND
Coordinate_propertys + Add
Regions + Add
Sequences + Add
Users + Add
DJANGO APSCHEDULER
Django job executions + Add
Django jobs + Add
ADD DJANGO JOB EXECUTION +
Action: --------- Go

Select django job execution to change

0 of 32 selected

□	ID	JOB	STATUS	LOCAL RUN TIME	DURATION (SEC)
□	32	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Started execution	May 25, 2021, 5:08:47 a.m.	N/A
□	31	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:44:55 p.m.	7.90
□	30	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:44:25 p.m.	7.85
□	29	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:43:55 p.m.	7.67
□	28	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:43:25 p.m.	7.52
□	27	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:42:55 p.m.	7.66
□	26	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:42:25 p.m.	8.07
□	25	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:41:55 p.m.	7.52

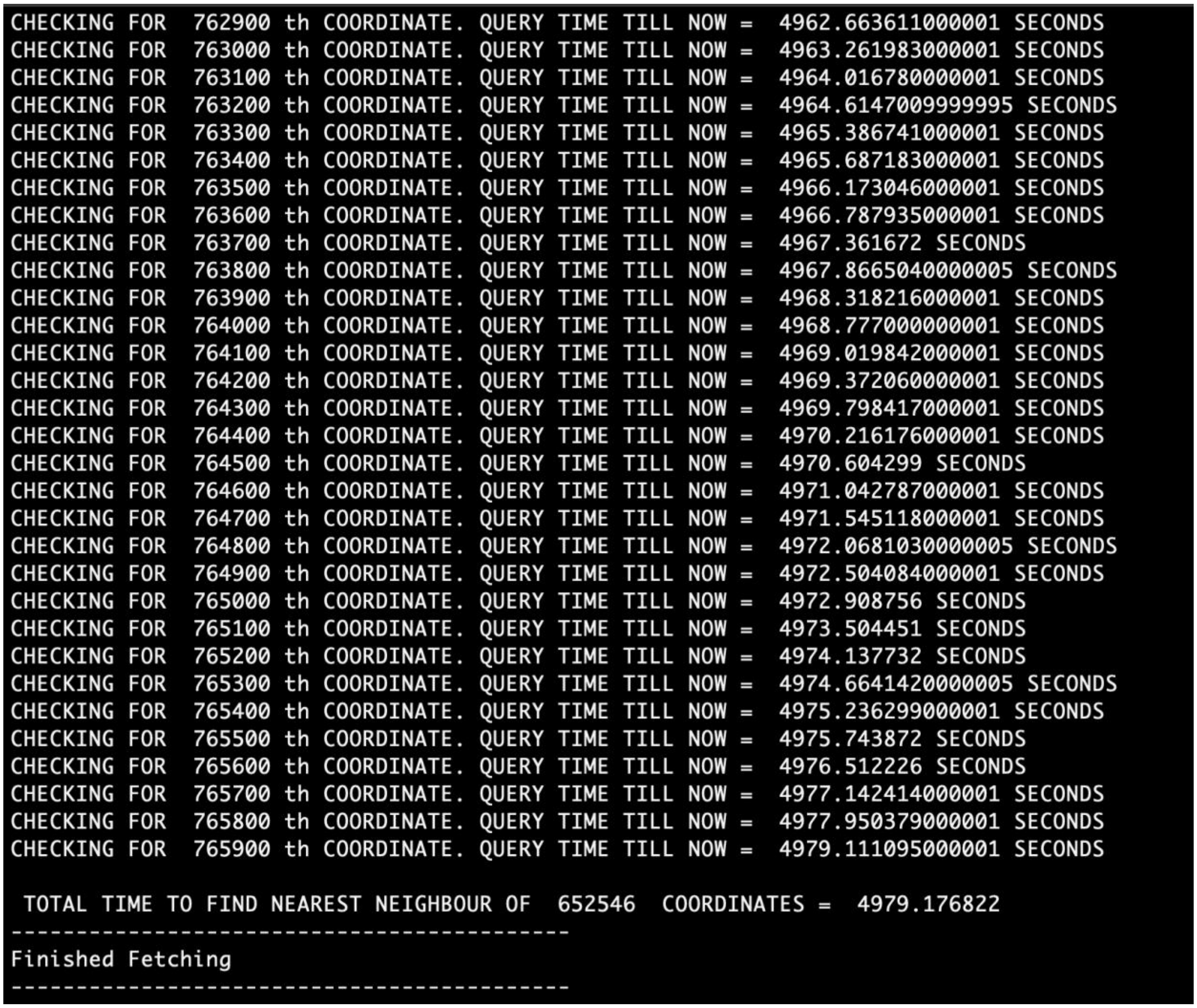
FILTER

By id
All
mapmanagementplatform.urls.mapillaryupdate

By run time
Any date
Today
Past 7 days
This month
This year

By status
All
Started execution
Error!
Executed

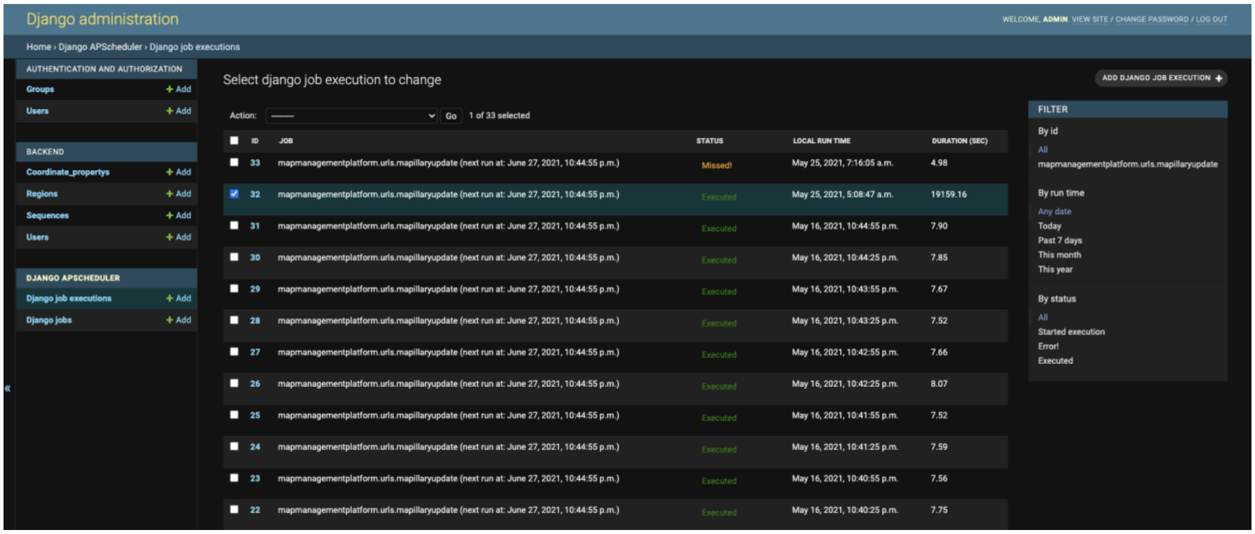
- Step 4: Verify if the scheduler is completed
    - ○ The scheduler is completed once all the users and sequences belonging to the new region are fetched from Mapillary; direction is calculated for all the sequences; and all nearest neighbours are determined.
    - ○ In the Terminal, the message “Finished Fetching” is displayed.



```
CHECKING FOR  762900 th COORDINATE. QUERY TIME TILL NOW =  4962.663611000001 SECONDS
CHECKING FOR  763000 th COORDINATE. QUERY TIME TILL NOW =  4963.261983000001 SECONDS
CHECKING FOR  763100 th COORDINATE. QUERY TIME TILL NOW =  4964.016780000001 SECONDS
CHECKING FOR  763200 th COORDINATE. QUERY TIME TILL NOW =  4964.6147009999995 SECONDS
CHECKING FOR  763300 th COORDINATE. QUERY TIME TILL NOW =  4965.386741000001 SECONDS
CHECKING FOR  763400 th COORDINATE. QUERY TIME TILL NOW =  4965.687183000001 SECONDS
CHECKING FOR  763500 th COORDINATE. QUERY TIME TILL NOW =  4966.173046000001 SECONDS
CHECKING FOR  763600 th COORDINATE. QUERY TIME TILL NOW =  4966.787935000001 SECONDS
CHECKING FOR  763700 th COORDINATE. QUERY TIME TILL NOW =  4967.361672 SECONDS
CHECKING FOR  763800 th COORDINATE. QUERY TIME TILL NOW =  4967.8665040000005 SECONDS
CHECKING FOR  763900 th COORDINATE. QUERY TIME TILL NOW =  4968.318216000001 SECONDS
CHECKING FOR  764000 th COORDINATE. QUERY TIME TILL NOW =  4968.777000000001 SECONDS
CHECKING FOR  764100 th COORDINATE. QUERY TIME TILL NOW =  4969.019842000001 SECONDS
CHECKING FOR  764200 th COORDINATE. QUERY TIME TILL NOW =  4969.372060000001 SECONDS
CHECKING FOR  764300 th COORDINATE. QUERY TIME TILL NOW =  4969.798417000001 SECONDS
CHECKING FOR  764400 th COORDINATE. QUERY TIME TILL NOW =  4970.216176000001 SECONDS
CHECKING FOR  764500 th COORDINATE. QUERY TIME TILL NOW =  4970.604299 SECONDS
CHECKING FOR  764600 th COORDINATE. QUERY TIME TILL NOW =  4971.042787000001 SECONDS
CHECKING FOR  764700 th COORDINATE. QUERY TIME TILL NOW =  4971.545118000001 SECONDS
CHECKING FOR  764800 th COORDINATE. QUERY TIME TILL NOW =  4972.0681030000005 SECONDS
CHECKING FOR  764900 th COORDINATE. QUERY TIME TILL NOW =  4972.504084000001 SECONDS
CHECKING FOR  765000 th COORDINATE. QUERY TIME TILL NOW =  4972.908756 SECONDS
CHECKING FOR  765100 th COORDINATE. QUERY TIME TILL NOW =  4973.504451 SECONDS
CHECKING FOR  765200 th COORDINATE. QUERY TIME TILL NOW =  4974.137732 SECONDS
CHECKING FOR  765300 th COORDINATE. QUERY TIME TILL NOW =  4974.6641420000005 SECONDS
CHECKING FOR  765400 th COORDINATE. QUERY TIME TILL NOW =  4975.236299000001 SECONDS
CHECKING FOR  765500 th COORDINATE. QUERY TIME TILL NOW =  4975.743872 SECONDS
CHECKING FOR  765600 th COORDINATE. QUERY TIME TILL NOW =  4976.512226 SECONDS
CHECKING FOR  765700 th COORDINATE. QUERY TIME TILL NOW =  4977.142414000001 SECONDS
CHECKING FOR  765800 th COORDINATE. QUERY TIME TILL NOW =  4977.950379000001 SECONDS
CHECKING FOR  765900 th COORDINATE. QUERY TIME TILL NOW =  4979.111095000001 SECONDS

 TOTAL TIME TO FIND NEAREST NEIGHBOUR OF  652546  COORDINATES =  4979.176822
-------------------------------------------
Finished Fetching
-------------------------------------------
```

- ○ On the Django admin site, click at "Django job executions" under "DJANGO APSCHEDULER" section, the job status is shown as "Executed".



Django administration
WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Django APScheduler › Django job executions
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
BACKEND
Coordinate_propertys + Add
Regions + Add
Sequences + Add
Users + Add
DJANGO APSCHEDULER
Django job executions + Add
Django jobs + Add
«
ADD DJANGO JOB EXECUTION +
FILTER
By id
All
mapmanagementplatform.urls.mapillaryupdate
By run time
Any date
Today
Past 7 days
This month
This year
By status
All
Started execution
Error!
Executed

Select django job execution to change

Action: --------- Go 1 of 33 selected

□	ID	JOB	STATUS	LOCAL RUN TIME	DURATION (SEC)
□	33	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Missed!	May 25, 2021, 7:16:05 a.m.	4.98
☑	32	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 25, 2021, 5:08:47 a.m.	19159.16
□	31	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:44:55 p.m.	7.90
□	30	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:44:25 p.m.	7.85
□	29	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:43:55 p.m.	7.67
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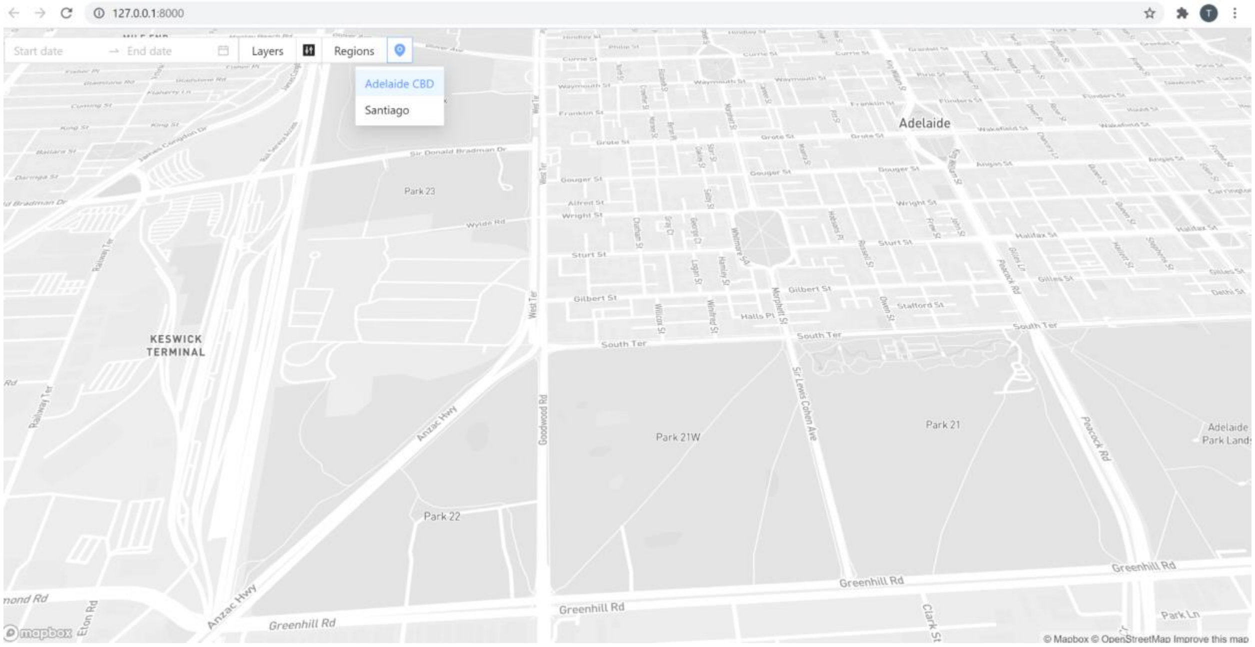
□	26	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:42:25 p.m.	8.07
□	25	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:41:55 p.m.	7.52
□	24	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:41:25 p.m.	7.59
□	23	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:40:55 p.m.	7.56
□	22	mapmanagementplatform.urls.mapillaryupdate (next run at: June 27, 2021, 10:44:55 p.m.)	Executed	May 16, 2021, 10:40:25 p.m.	7.75

4. Map management platform

4.1 Select a region

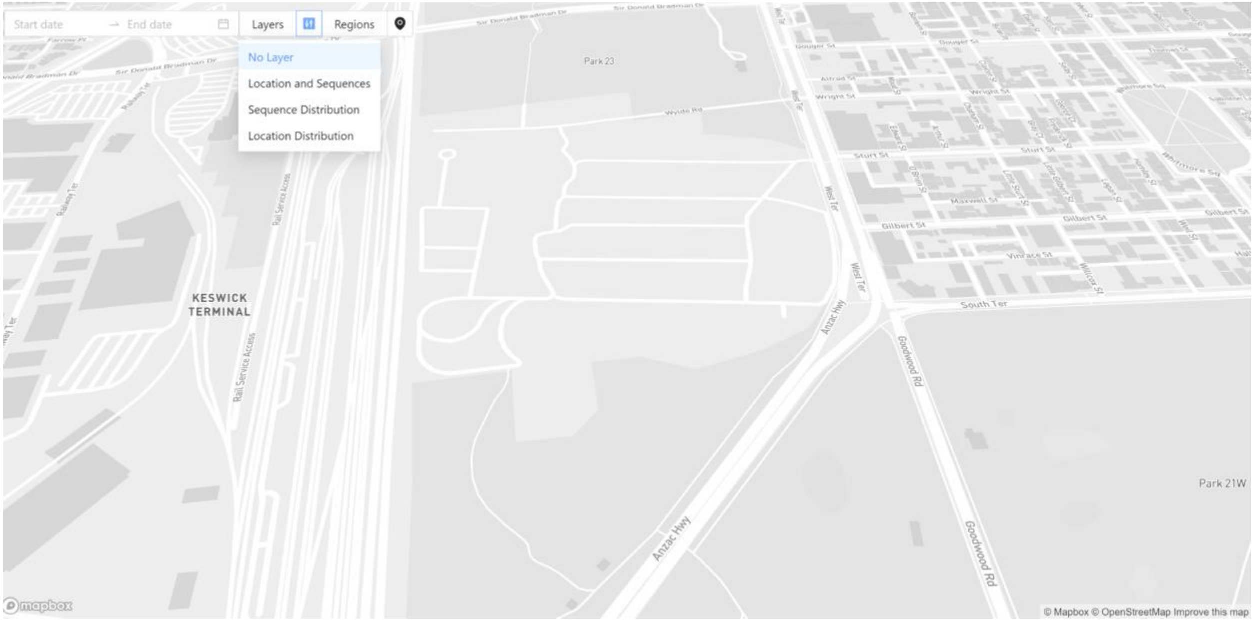
By default the website displays the Adelaide CBD region. In order to move to a new region, hover on the icon next to 'Regions'. A drop down list of regions will appear to choose the location. The map will move to a new position once a new region is selected.



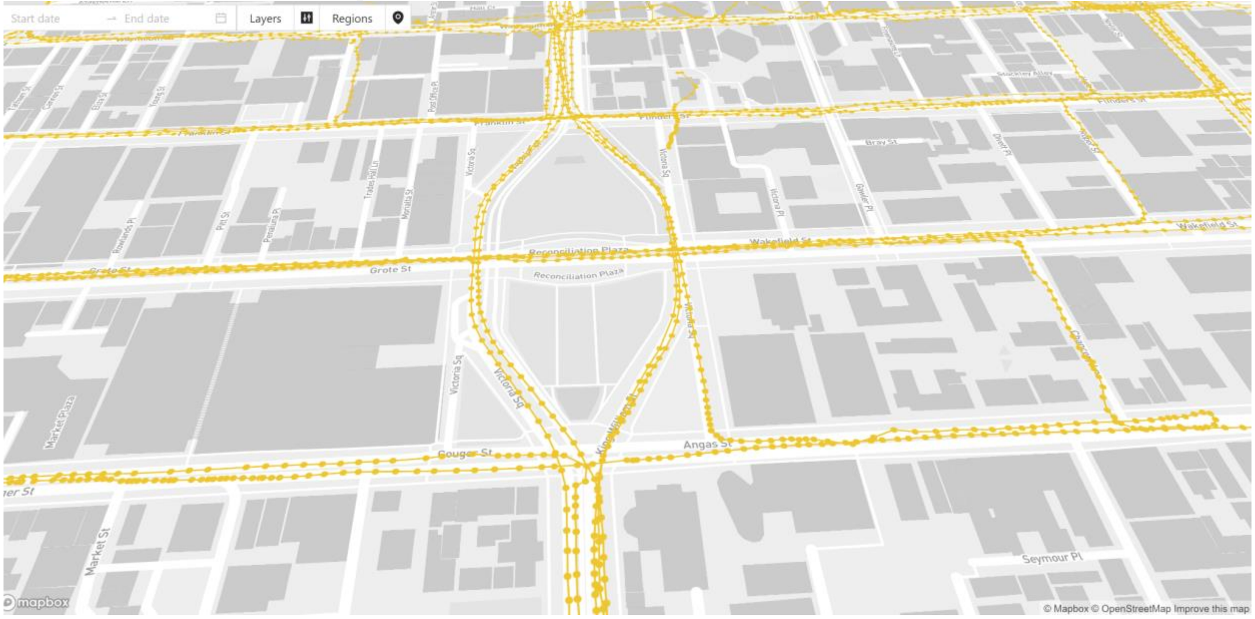
4.2 Select a layer

To display data in different layers, hover on the icon next to ‘Layers’, a drop down list appears with 4 layer options.

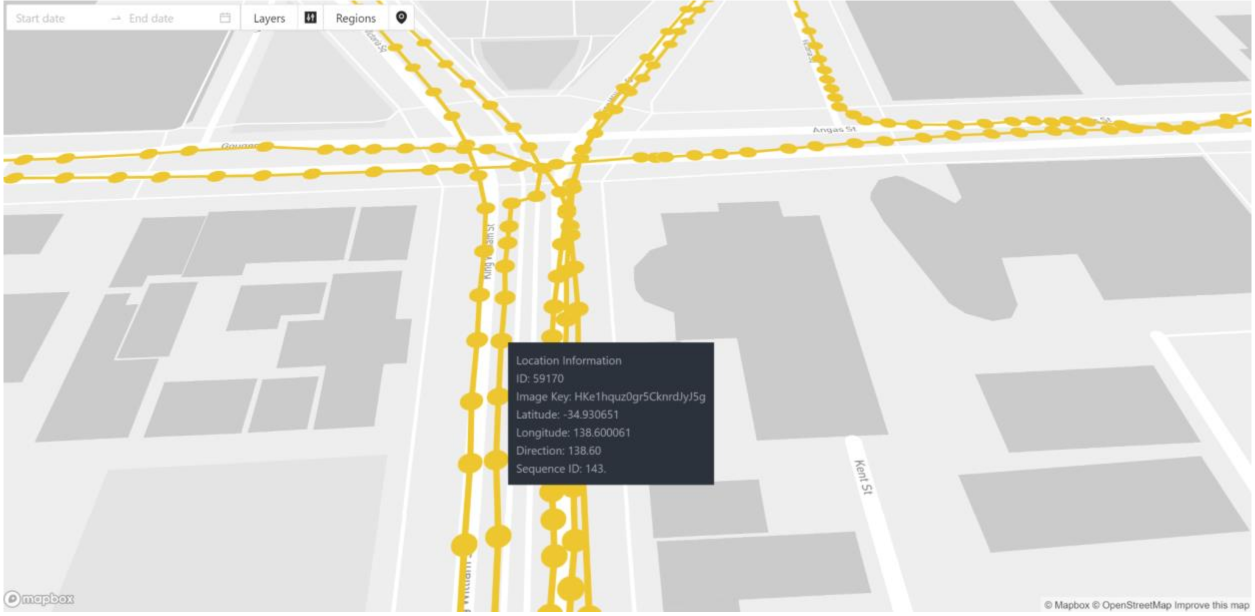
- The first option is ‘No Layer’, which removes the current layer displayed on the map.



- The second option is ‘Location and Sequences’, which displays all the locations and sequence data in a particular area.
    - Location objects are represented as yellow dots and sequence objects are yellow lines that connect multiple location objects.

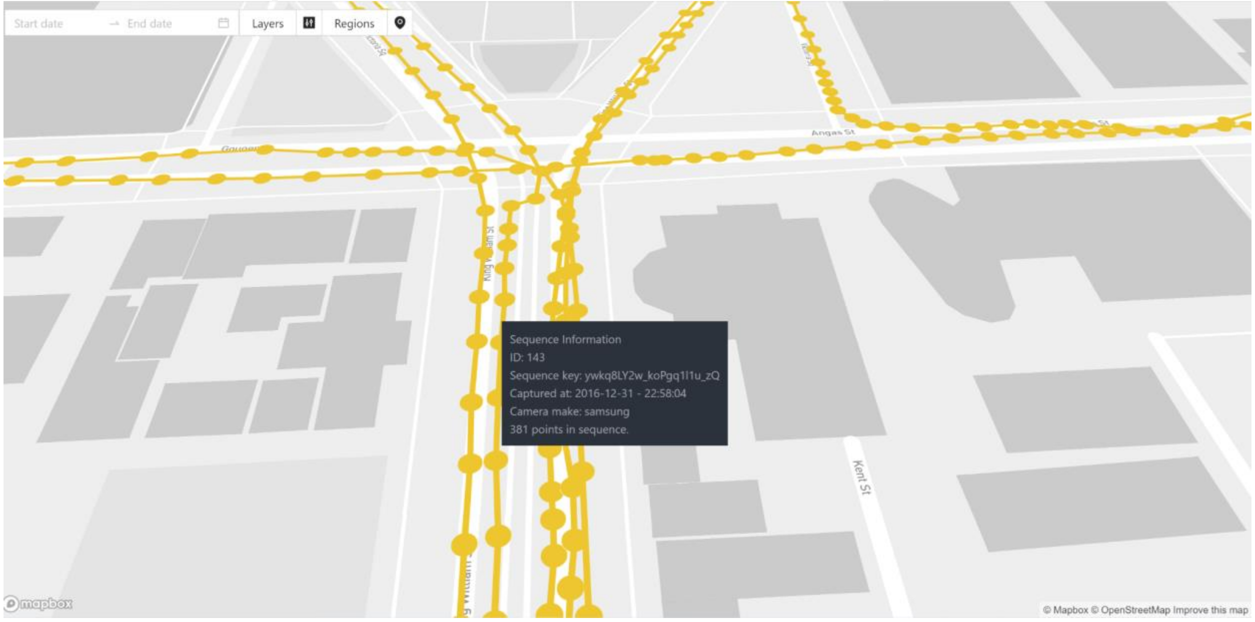


- Hover on a location object to see the key properties of that location such as id, image key, latitude, longitude, direction and the id of the sequence that traverses the object.



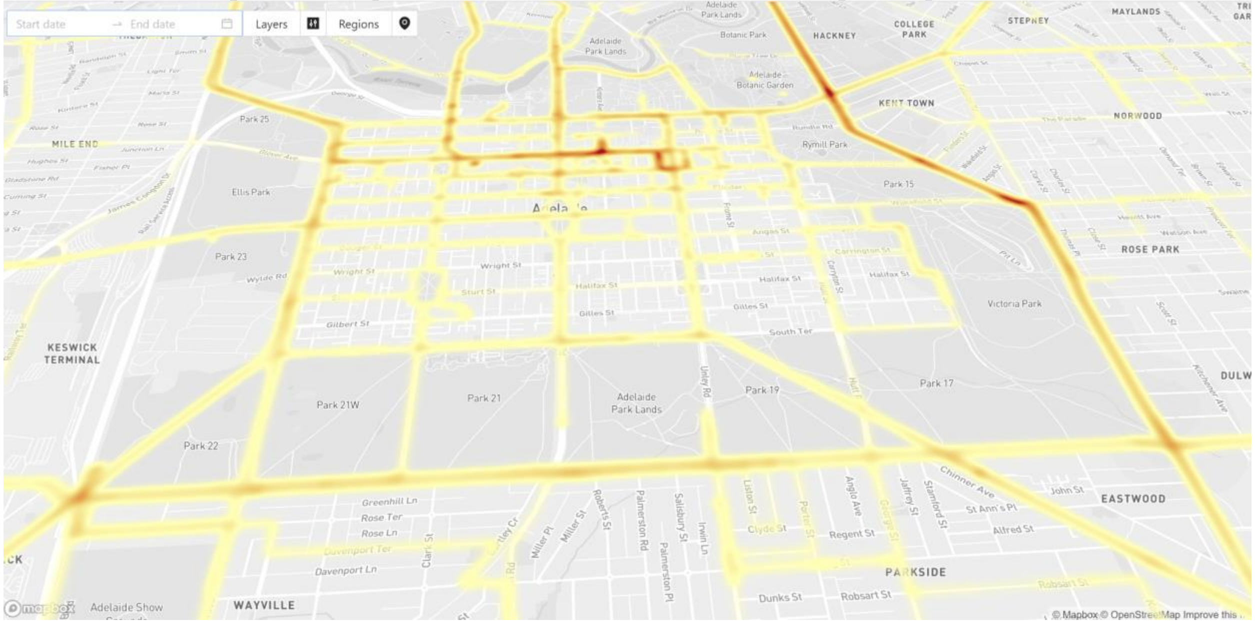
Location Information
ID: 59170
Image Key: HKe1hquz0gr5CknrdJyJ5g
Latitude: -34.930651
Longitude: 138.600061
Direction: 138.60
Sequence ID: 143.

  - ○ Hover on a sequence to see the key properties of that sequence such as id, sequence key, captured at (the time that sequence was captured), camera make (the device that captured the sequence) and the number of location objects in the sequence.

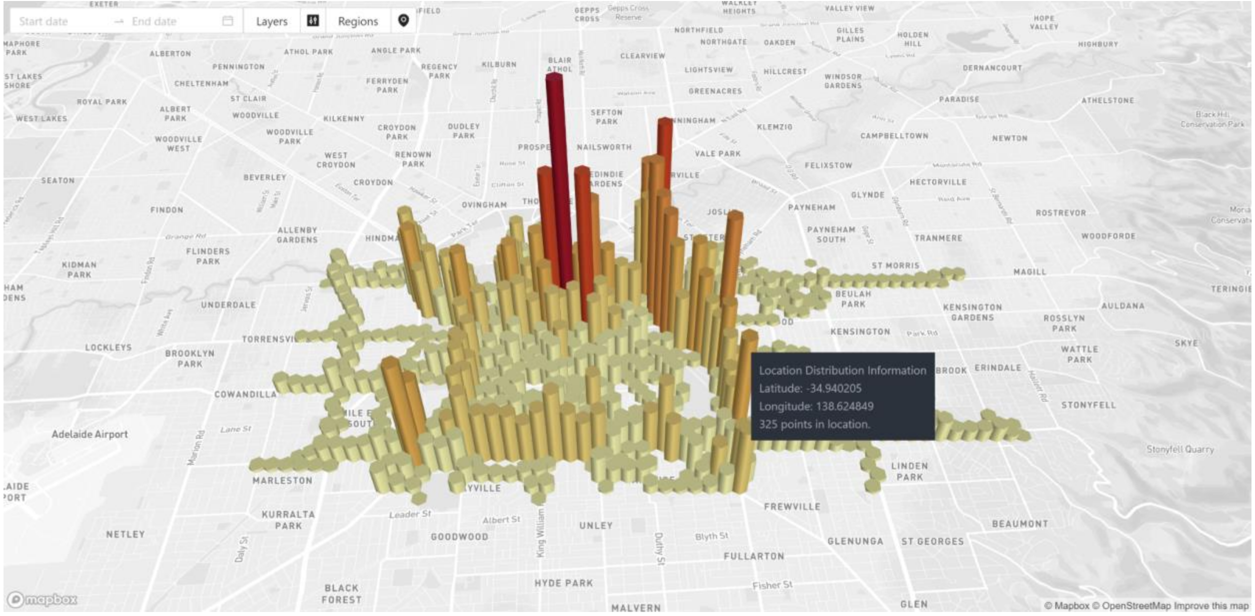


Sequence Information
ID: 143
Sequence key: ywkq8LY2w_koPgq1l1u_zQ
Captured at: 2016-12-31 - 22:58:04
Camera make: samsung
381 points in sequence.

- The third option is 'Sequence Distribution', which is a heat map of sequence data



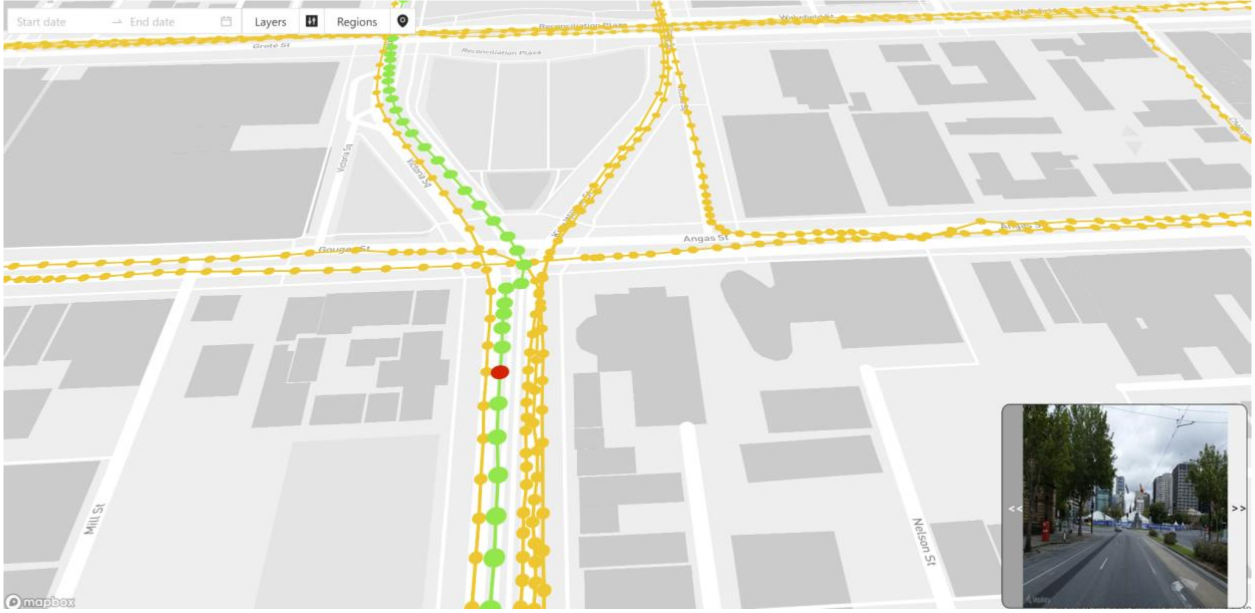
- The fourth option is ‘Location Distribution’, which shows the distribution of location objects in 3D hexagons. Hover on these hexagons to see the longitude, latitude and the density of the location objects.



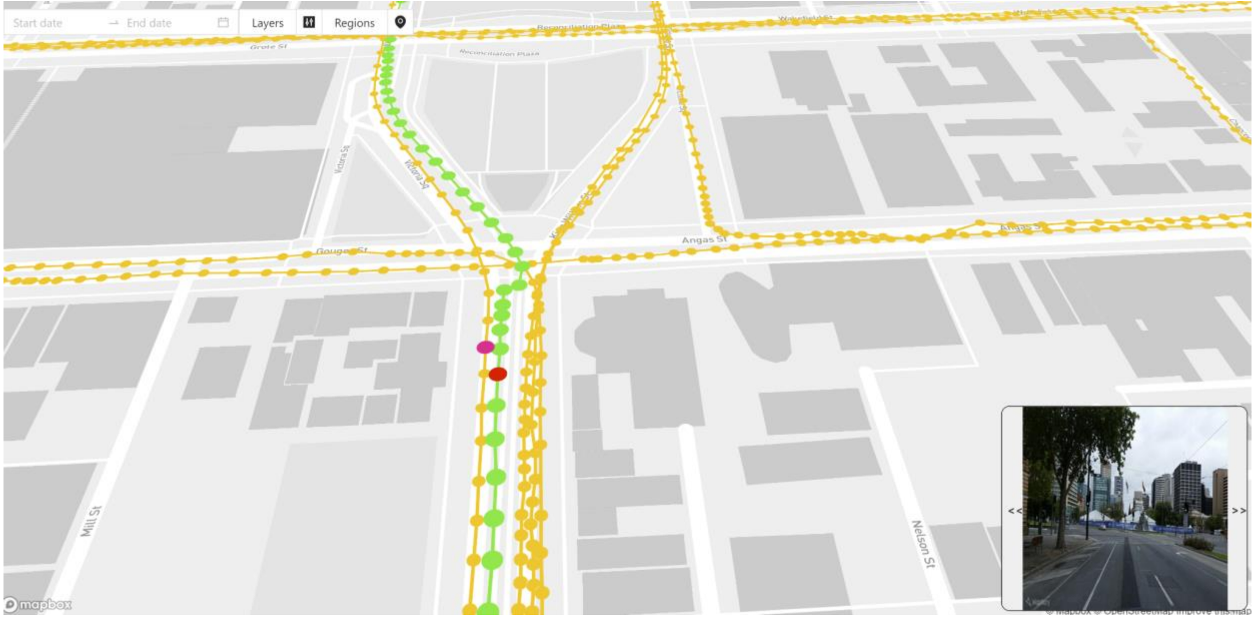
Location Distribution Information
Latitude: -34.940205
Longitude: 138.624849
325 points in location.

4.3 Display nearest neighbours

- Step 1: Click at a location object on the map. The location object will be highlighted in red. The sequence traverses the selected object and other location objects belonging to that sequence are highlighted in green. At the same time, the image of the selected object is displayed at the bottom right corner of the map.

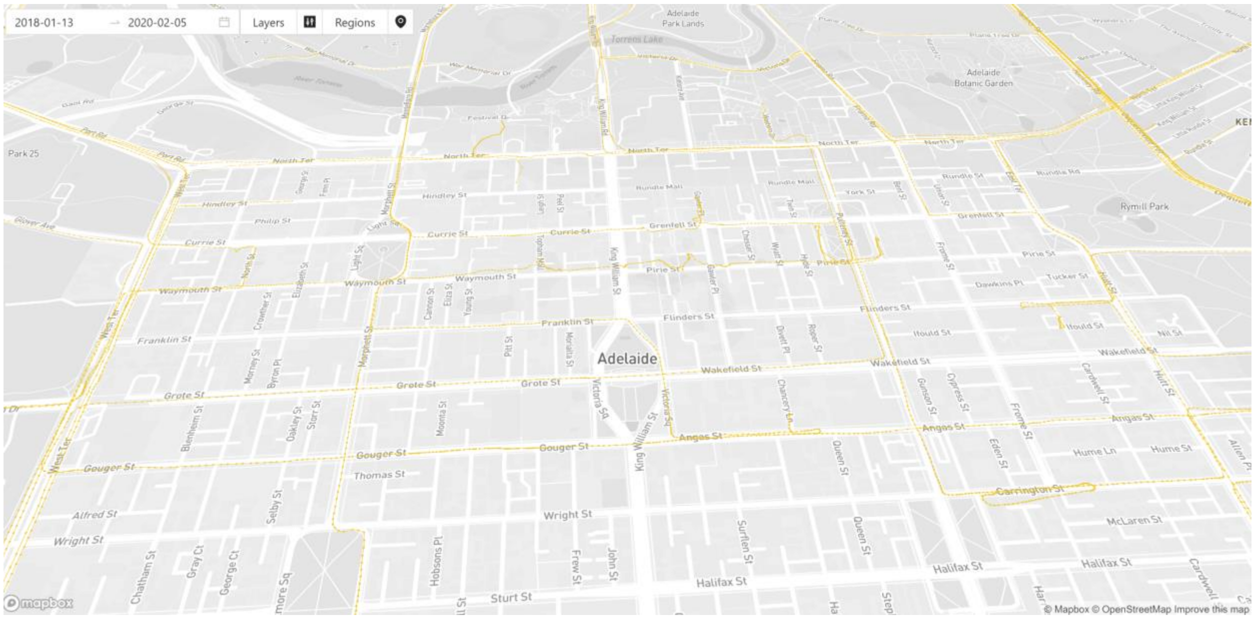


- Step 2: In the image frame at the bottom right corner, there are 2 buttons ‘<<’ and ‘>>’. Click at these buttons to navigate among the nearest neighbours’ images of the selected object (red dot). The neighbouring object equivalent to the image shown is highlighted in pink on the map. The nearest neighbours are displayed in distance order, which means that the closest neighbours of the selected object are displayed first.

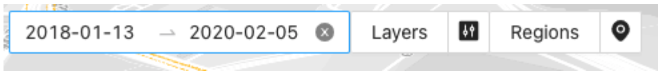


4.4 Filter data by a certain date range

To filter the data between a period of time, set the starting date and ending date in the top left of the website. In the below picture, the user chooses to display the data between 13 January 2018 and 5 February 2020 with the ‘Location and Sequences’ layer.



To reset the data filtering, hover over the calendar icon until the x button appears Click at the x button, the map will show all the data in the current position.


2018-01-13
2020-02-05
Layers
Regions