# Urban Forests on the UN Global Platform

Joe Peskett
@joepeskett

#UNGlobalPlatform

# Overview

- Data Science Campus project and methodology
- Implementation on the UN Global Platform services

# Urban Forests drivers

- Collaboration with the Natural Capital team within UK ONS.
  - There is a clear stakeholder.
  - There is are clear learnings that can be reused and novel techniques to be used.

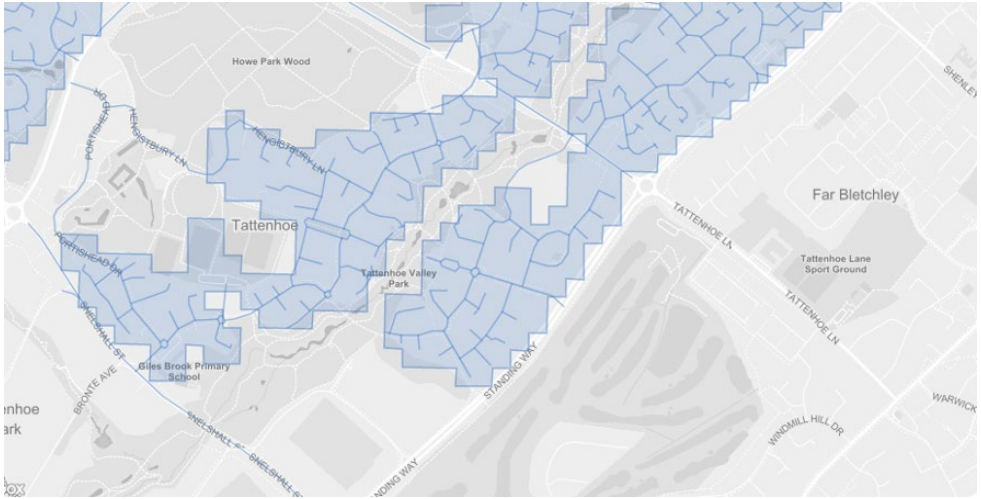
# Alternative methodologies

- Survey
- Crowdsourcing information
- Satellite imagery

# Urban Forests Methodology

1. Use Open Street Map (OSM) to generate sample points around 112 towns & cities in the UK
2. Street view images taken at these points
3. Images are segmented to provide a value for percentage vegetation

# Urban Forest Methodology

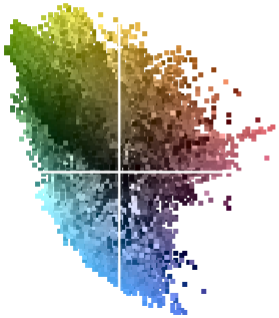


# Urban Forest Methodology

1. Percentage of green pixels
   a. Using LAB colour space, random forest used to increase accuracy
2. Pyramid -scene-parsing network (PSP -net) trained on CityScapes dataset to segment each image

# Urban Forest Methodology

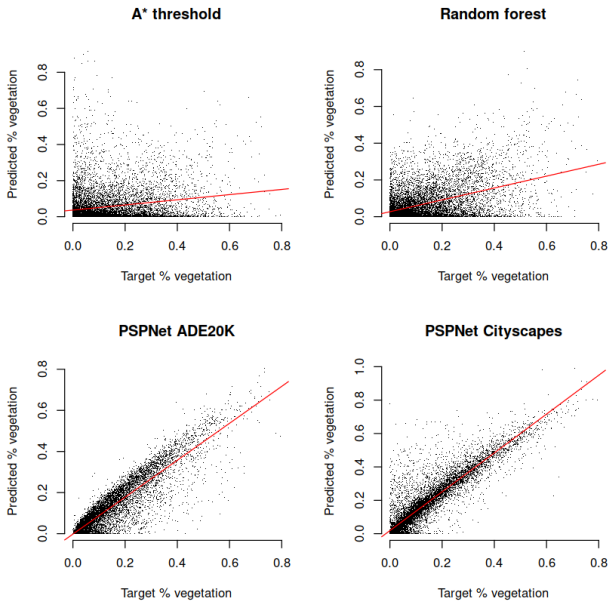
Vegetation



Cars

# PSP- net Segmentation

# Methodology Comparison



# Results from the Campus

- Total dataset ~17.1 million images
- Technical report
- Open source pipeline on GitHub
- Collaboration with ONS visualisation team
- Implementation on the UN Global Platform

# Implementation within the UNGP Methods Service

- Hosting algorithms, methods and microservices
- Dependencies managed per method using containers
- Run on cloud infrastructure, allowing quick scaling
- Methods are called using APIs
- Easy access to cloud datastores

# 1. Image processing

- Same PSPnet as used for the original pipeline
- You can see that Phil, one of the lead Data Scientists developed this code.
- The model file is loaded in using a function – the model file is saved in the developers storage, though is made available to be used in methods that he has developed.

#UNGlobalPlatform

# 2. Considerations for cloud implementation

- Keep outputs small
- Can outputs be formatted as inputs for the following method in the pipeline?
- Keep scaling in mind

# 3. Methods for the pipeline

| | |
|---|---|
| OSM points | Generate points for requesting images |
| Street-view images | Download images into cloud storage, filed into way ids. |
| Segment images | Analyse images/return value of vegetation for each image |
| Create composites | Use segmentation data with original image to show classes with colours |

# 3. Methods for the pipeline

joepeskett_ungp/**HighwayScrapeR**/2.0.0 COPY

STAR 0 FOLLOW 1

Run Docs Discussion Source →

## HighwayScrapeR

Sample a queried area for OSM highways and return points at defined intervals(in metres) along these highways.

API calls 395

**Tags**

Experimental Geo geospatial OSM Urban Forests

**Permissions**

Algorithmia Platform License • Internet Access • Calls Other Algorithms

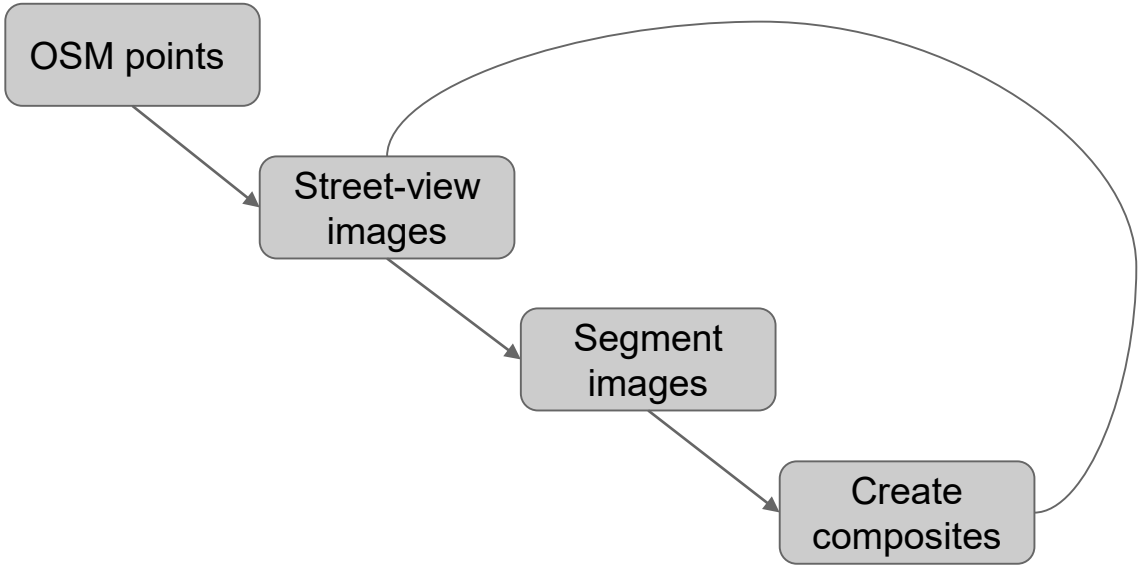
HighwayScrapeR method


#UNGlobalPlatform

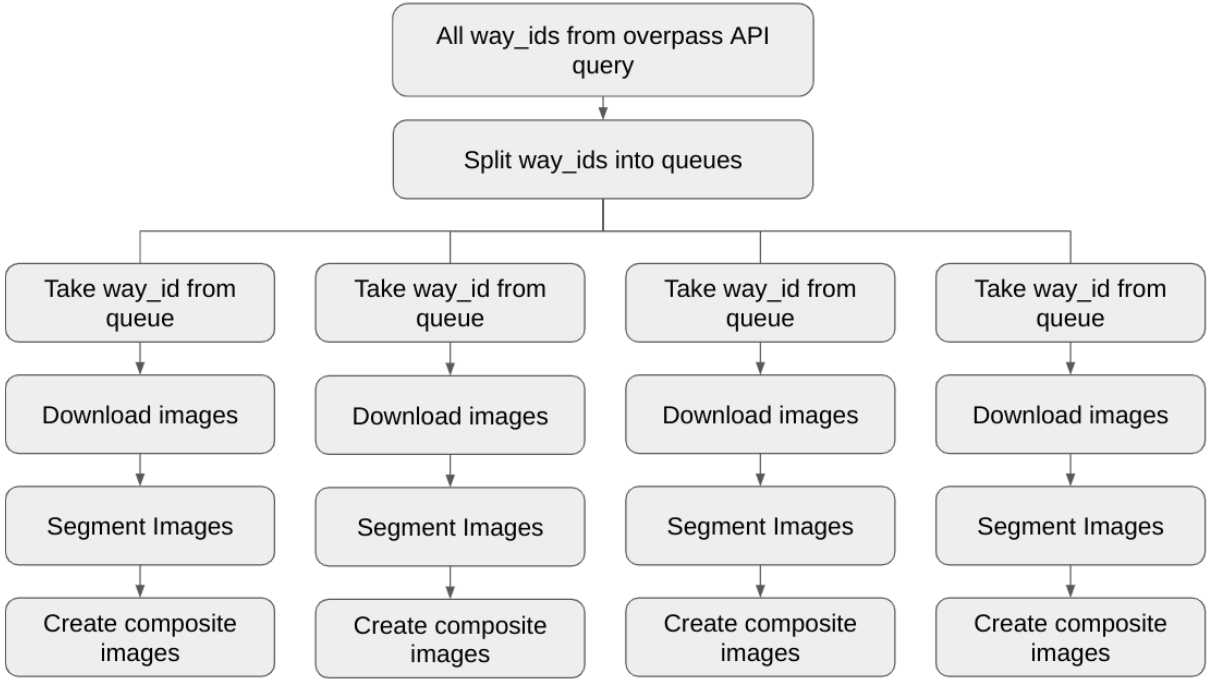
# 3. Methods for the pipeline: Image downloader

- All images are saved in cloud -based storage
- Coordinates are kept in the image filename, way_id is in the folder name

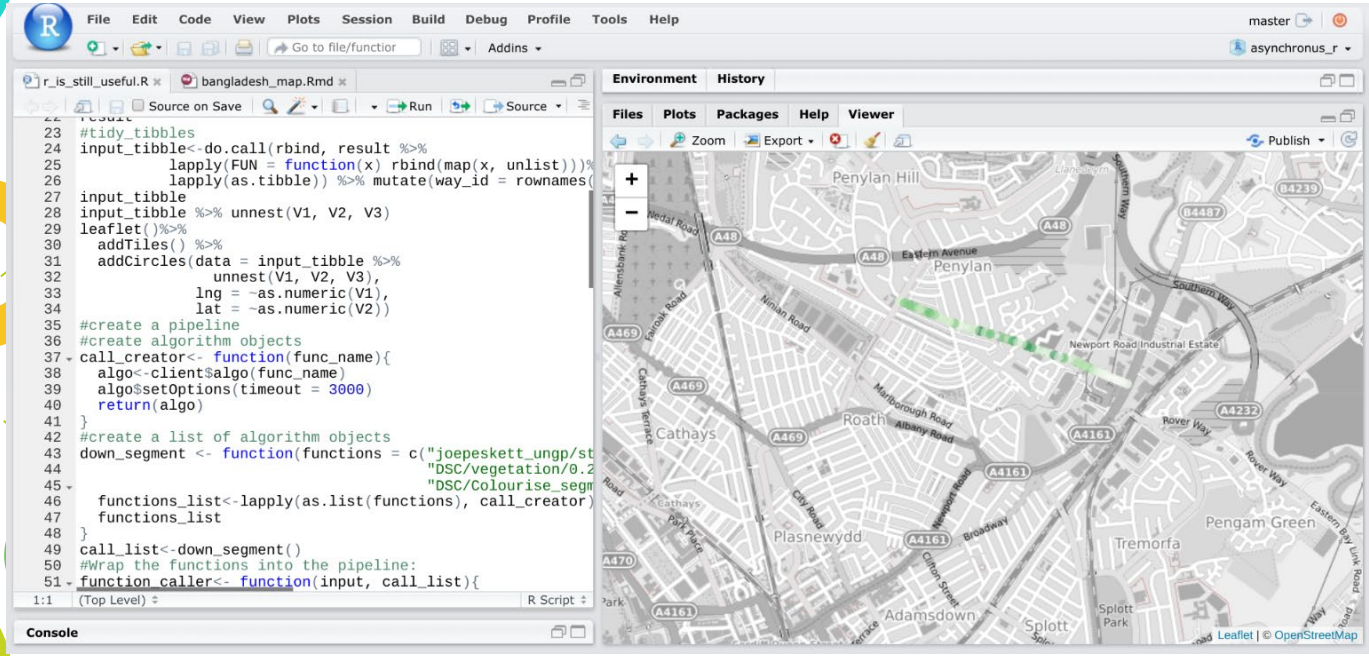
# 4. Composing the pipeline



# 5. Asynchronous processing



# 6. Calling the pipeline locally



# Pros and Cons of this pipeline

- Use of street -view images
- Incomplete coverage using street -view images
- Timing of street -view image capture
- Ensuring access to data

1. Learning how to work in new ways
2. Modular design of pipeline, allowing reuse of code

Thanks for listening.

Any questions?