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Leeds Data Analytics and Society CDT

LEEDS Institute for Data Analytics

Data Analytics & Society

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Overview

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- A bit about us
- Masters overview
- PhD work to date
- Progress and plans

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A bit about us…

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Keiran Suchak
Leeds City Council

Fran Pontin
Active Inspiration

Victoria Jenneson
Leading Supermarket

Jennie Gray
TransUnion, formerly Callcredit

Eugeni Vidal Tortosa

Annabel Whipp
Leeds City Council

Ryan Urquhart
Sainsburys

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Masters modules

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Programming for Social Science: Core Skills

Researching Society and Culture

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Masters modules

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Manchester: Understanding Data and their Environment

- Ethical and legal issues when using data in research
- Disclosure control
- Anonymisation
- Data pre-processing
- Data linkage
- Identification of appropriate data sources for projects and the issues associated with using them

Liverpool: Geographic Data Science in Python

- Python as a tool for data science
- Data wrangling
- Working with APIs
- Exploratory data visualisation
- Supervised vs unsupervised learning
- Modelling: prediction vs inference
- Overfitting and cross-validation
- Model predictive performance

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Data Science in Python: Pokemon Battles

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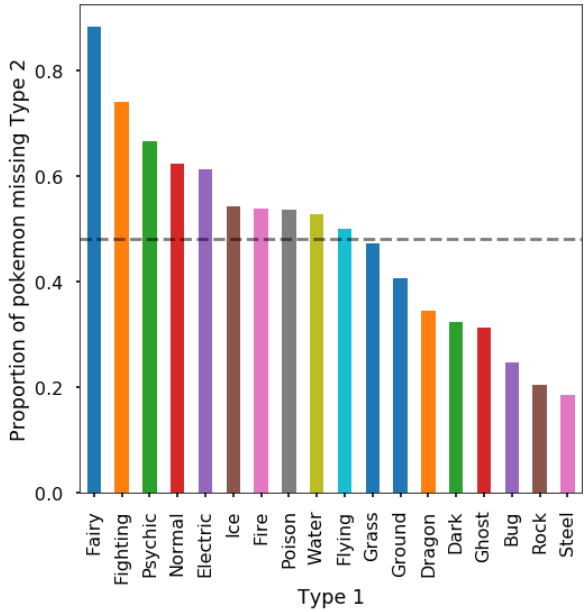
- Data pre-processing
  - Identifying missing values
  - Creating compound variables
- Exploratory data visualisation
  - Identifying trends in pokemon attributes
- Unsupervised learning
  - Clustering pokemon based on numerical attributes
- Supervised learning
  - Predicting the outcome in 1-on-1 battles between pokemon

```
[23]: def plotMissingType2ProportionBy(column):
          """Function to visualise how the proportion of pokemon that don't have a Type 2 varies."""

          # Make dataframe of proportion of pokemon missing Type 2 by chosen column
          missingColumn = missingType2[column].value_counts().to_frame()
          missingColumn['Total'] = pokemon[column].value_counts()
          # Calculate proportion
          missingColumn['Proportion'] = missingColumn[column] / missingColumn['Total']
          missingColumn = missingColumn.sort_values(by='Proportion', ascending=False)
          print(missingColumn)

          # Plot bar chart
          missingColumn['Proportion'].plot.bar(y=column,
                                               legend=False,
                                               figsize=(8, 8))
          # Plot horizontal line of mean proportion
          plt.axhline(y=missingColumn['Proportion'].mean(), color='black',
                      linestyle='--', alpha=0.5)
          # Add axis labels
          plt.xlabel(column)
          plt.ylabel('Proportion of pokemon missing Type 2')
          plt.show()
```



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Masters modules

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Optional

- Big Data and Consumer Analytics
- Predictive Analytics
- Data Visualisation and Analysis
- Applied Population and Demographic Analysis
- Forecasting and Advanced Business Analytics

Internship

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- 10 day placement with our data partner
- Component of the Masters course
- A project is designed in collaboration
- A report summarising findings is produced and any other outputs are also supplied to the partner

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Cycling rates, cycle-friendly infrastructure, and deprivation in the South London Partnership area

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Internship: *Cycling rates, cycle-friendly infrastructure, and deprivation in the South London Partnership area*

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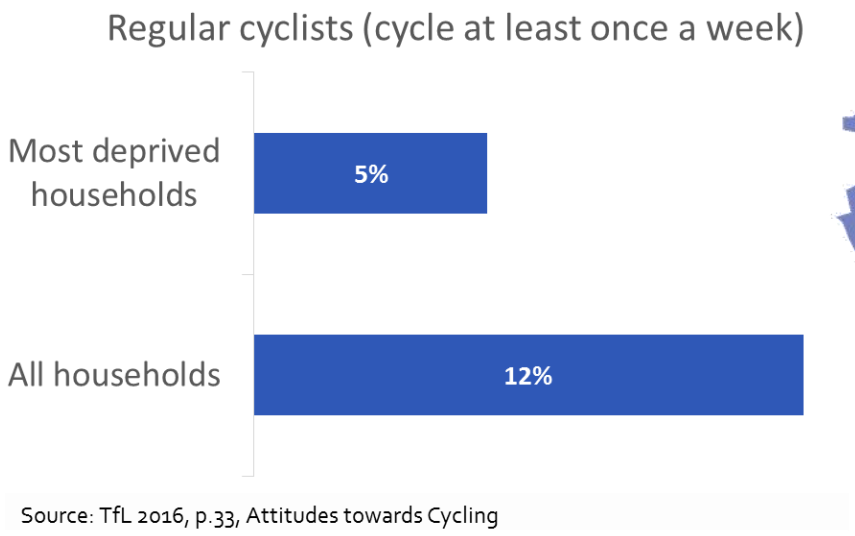
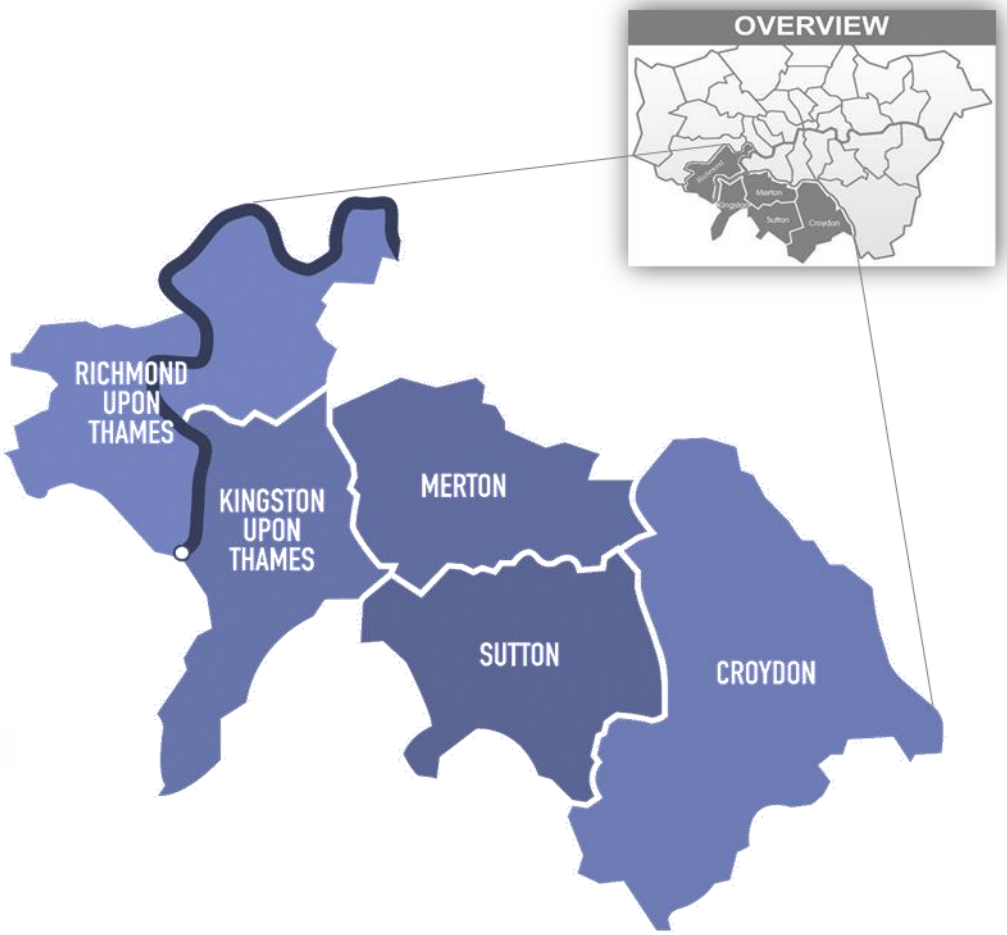


Source: TfL 2016, p.33, Attitudes towards Cycling



Internship: *Cycling rates, cycle-friendly infrastructure, and deprivation in the South London Partnership area*

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OBJECTIVES

1. Analyse the link between cycling rates, cycle-friendly infrastructure and deprivation.

2. Assess if the cycle-friendly infrastructure is equally distributed.

3. Identify areas in which future investment could increase cycling equity.

Internship: *Cycling rates, cycle-friendly infrastructure, and deprivation in the South London Partnership area*

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METHOD

Units of analysis: LSOAs.

Variables:

- Cycling rates: % cycling to work
- Cycle tracks: cycle tracks (km)/km^2
- Cycle lanes: cycle lanes (km)/km^2
- Quiet streets: quiet streets (km)/km^2
- Deprivation: Index of Multiple Deprivation score

Analysis: Correlograms, boxplots diagrams, and a bivariate map.

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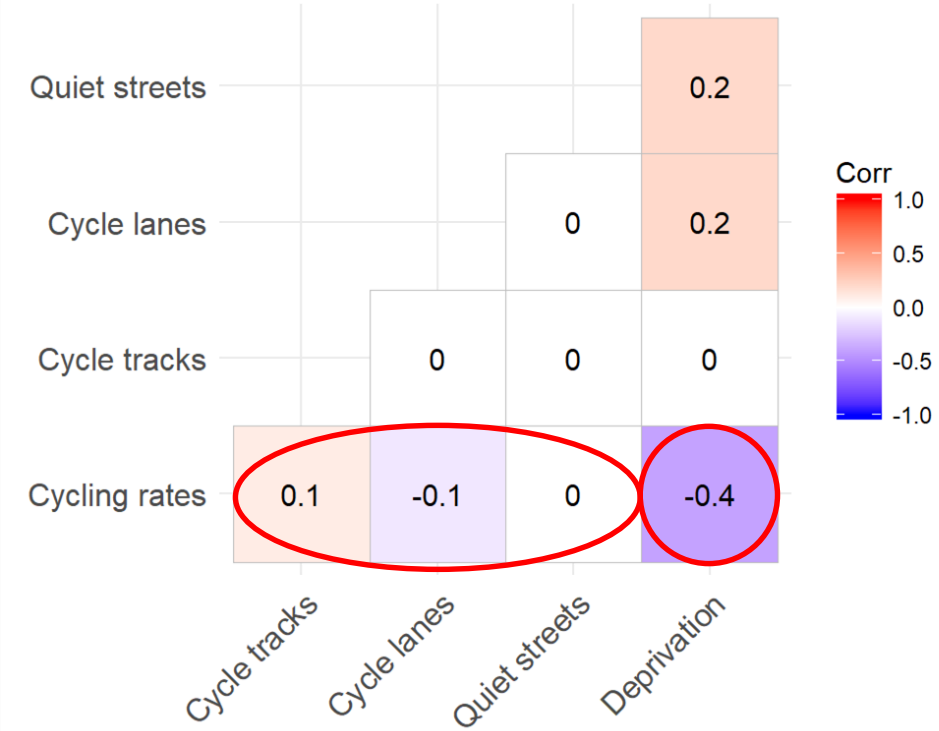
1. Cycling rates, cycle-friendly infrastructure and deprivation link



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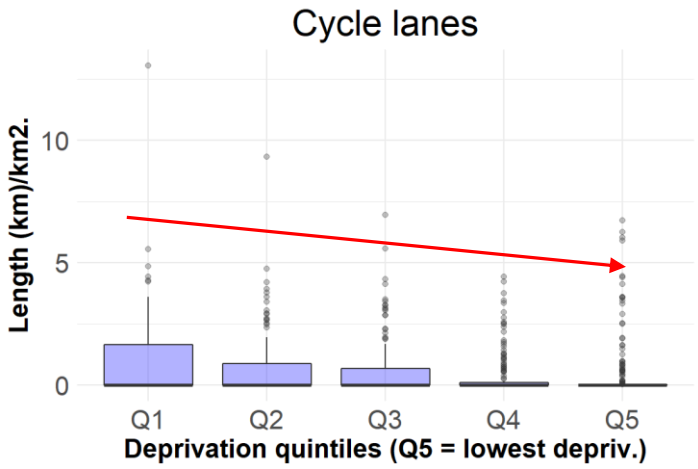
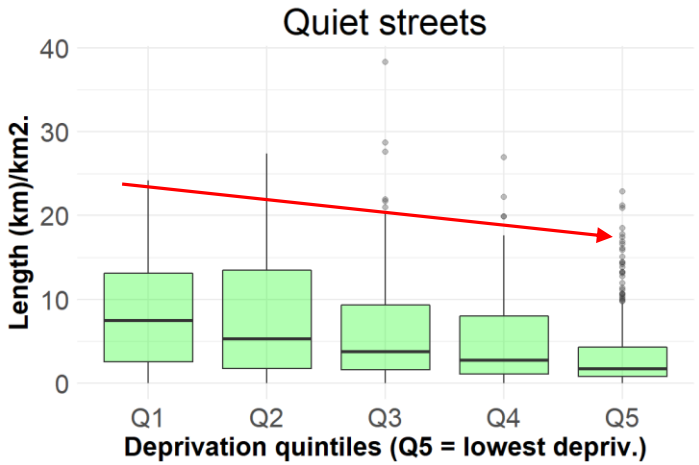
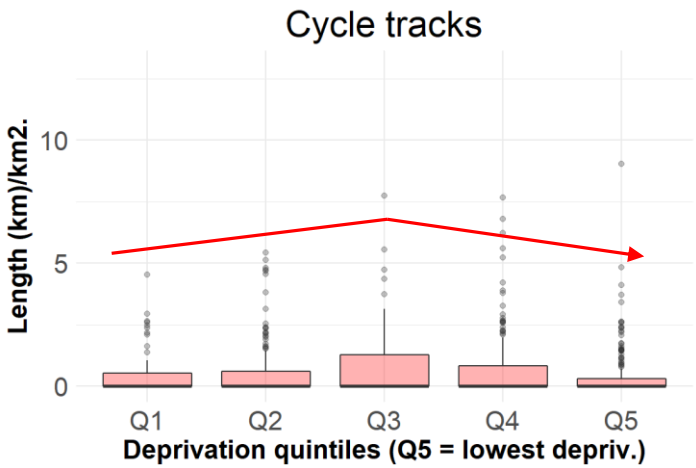
2. Cycle-friendly infrastructure distribution assessment







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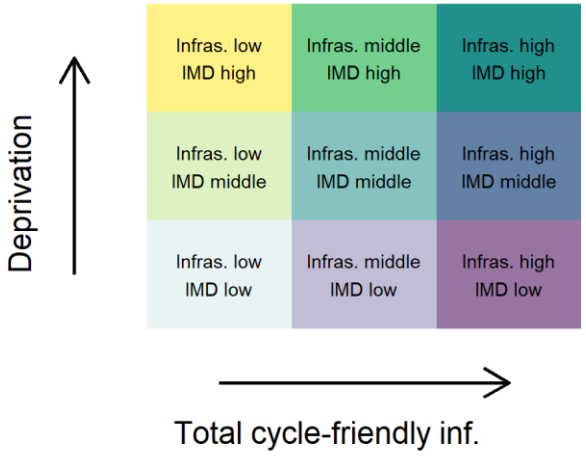
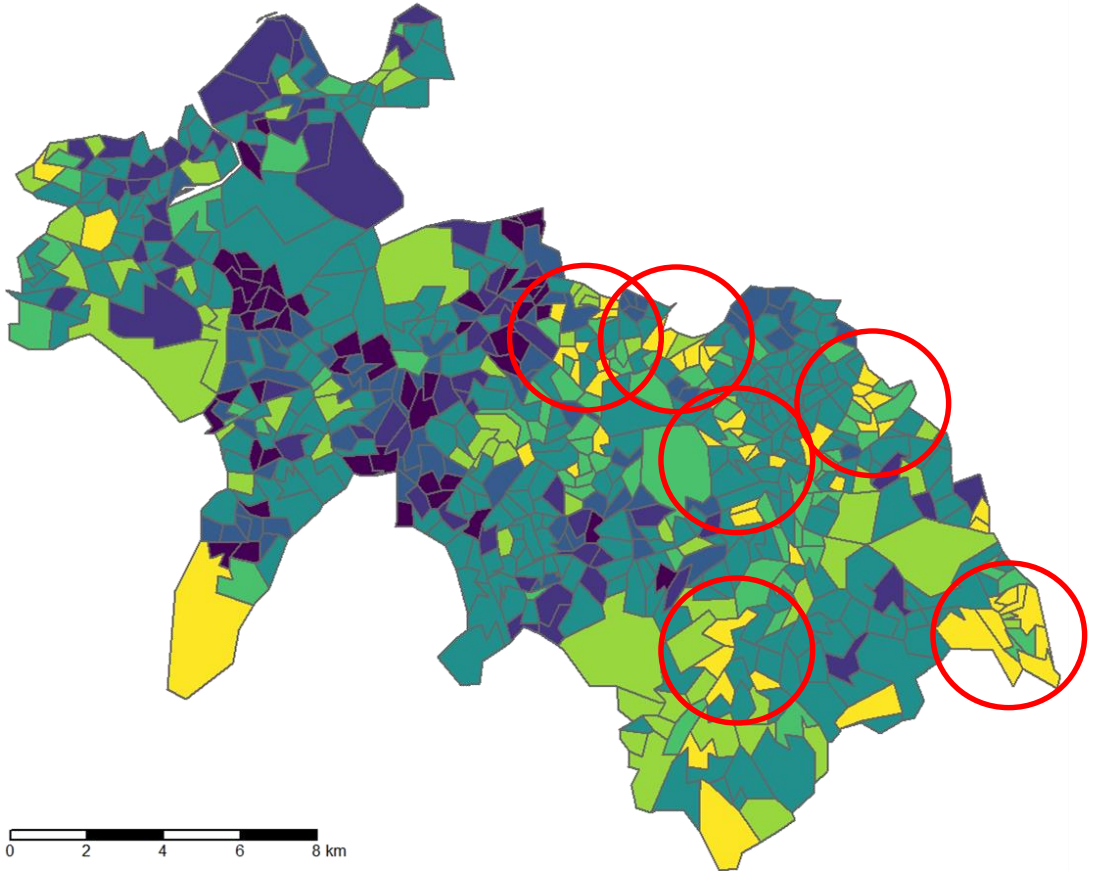
3. Identification of areas to increase cycling equity





PhD work: *Demographic and Geographic determinants of physical activity*

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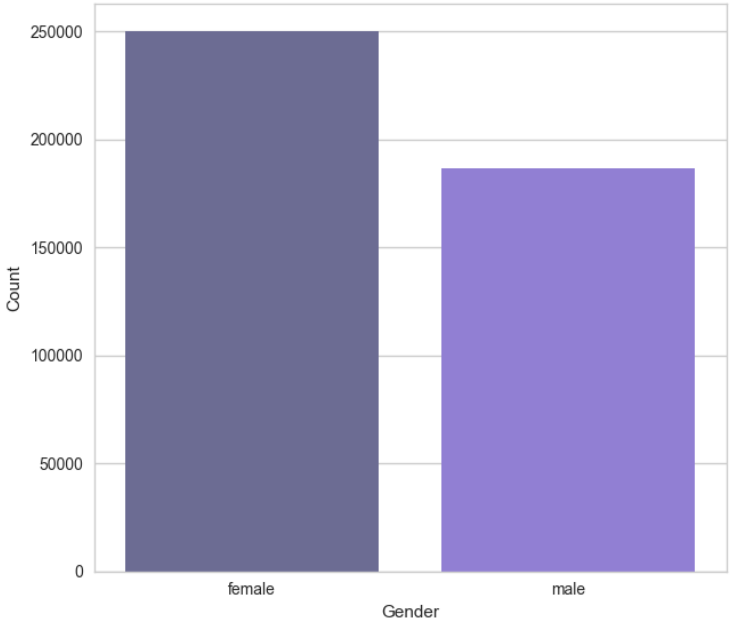
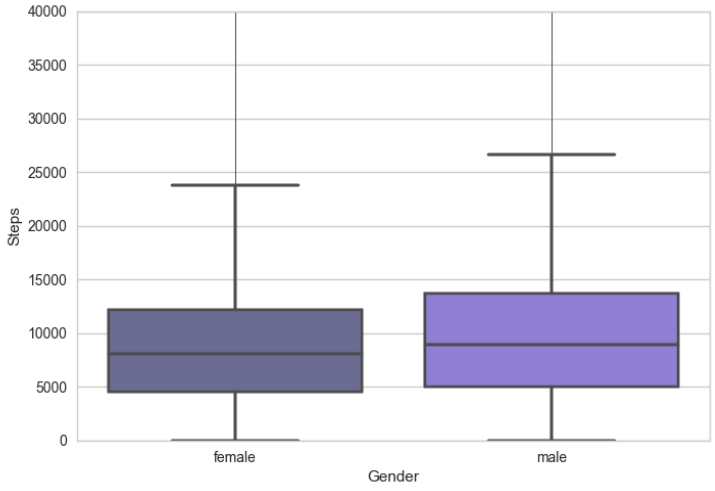


340,000 unique users

9.6 million activities



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PhD work: *Demographic and Geographic determinants of physical activity*

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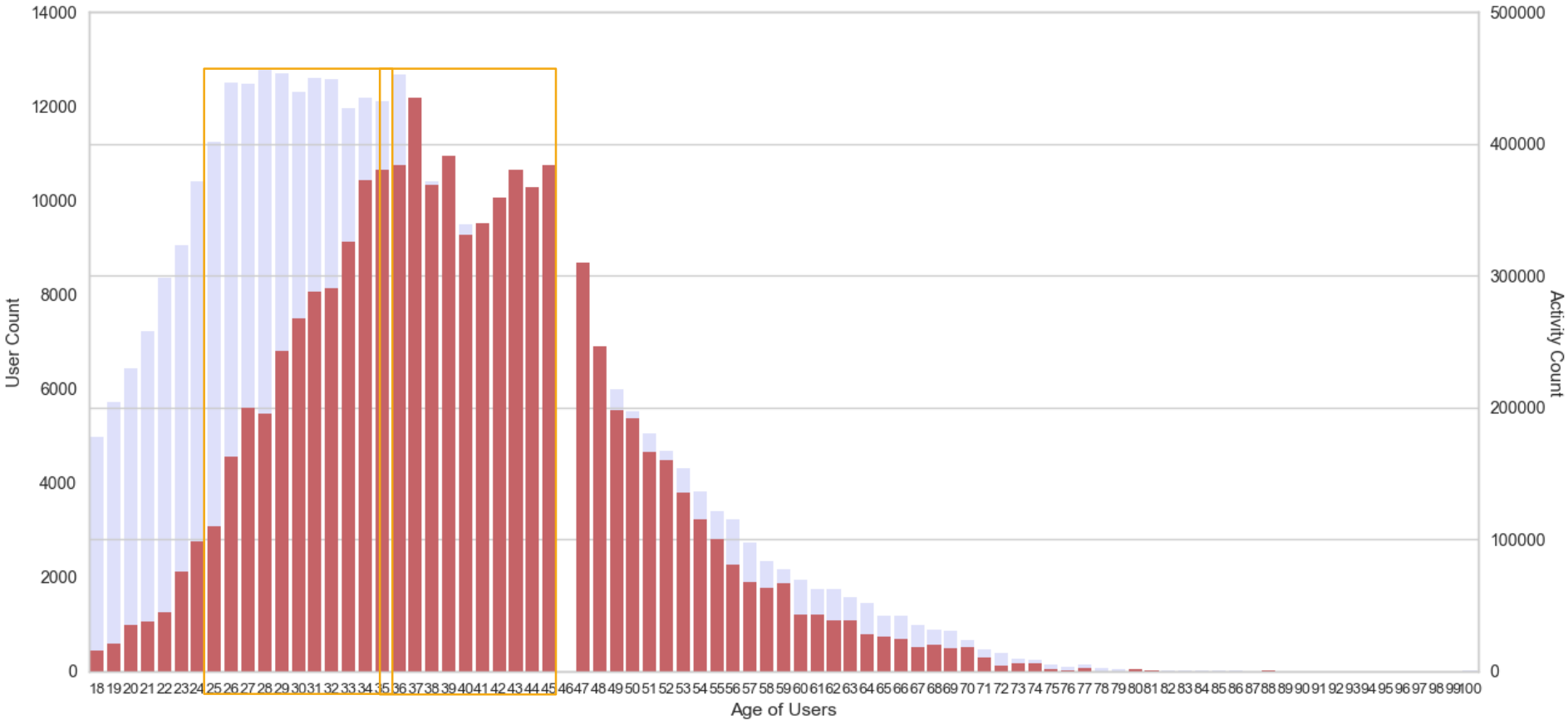

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PhD work: *Demographic and Geographic determinants of physical activity*

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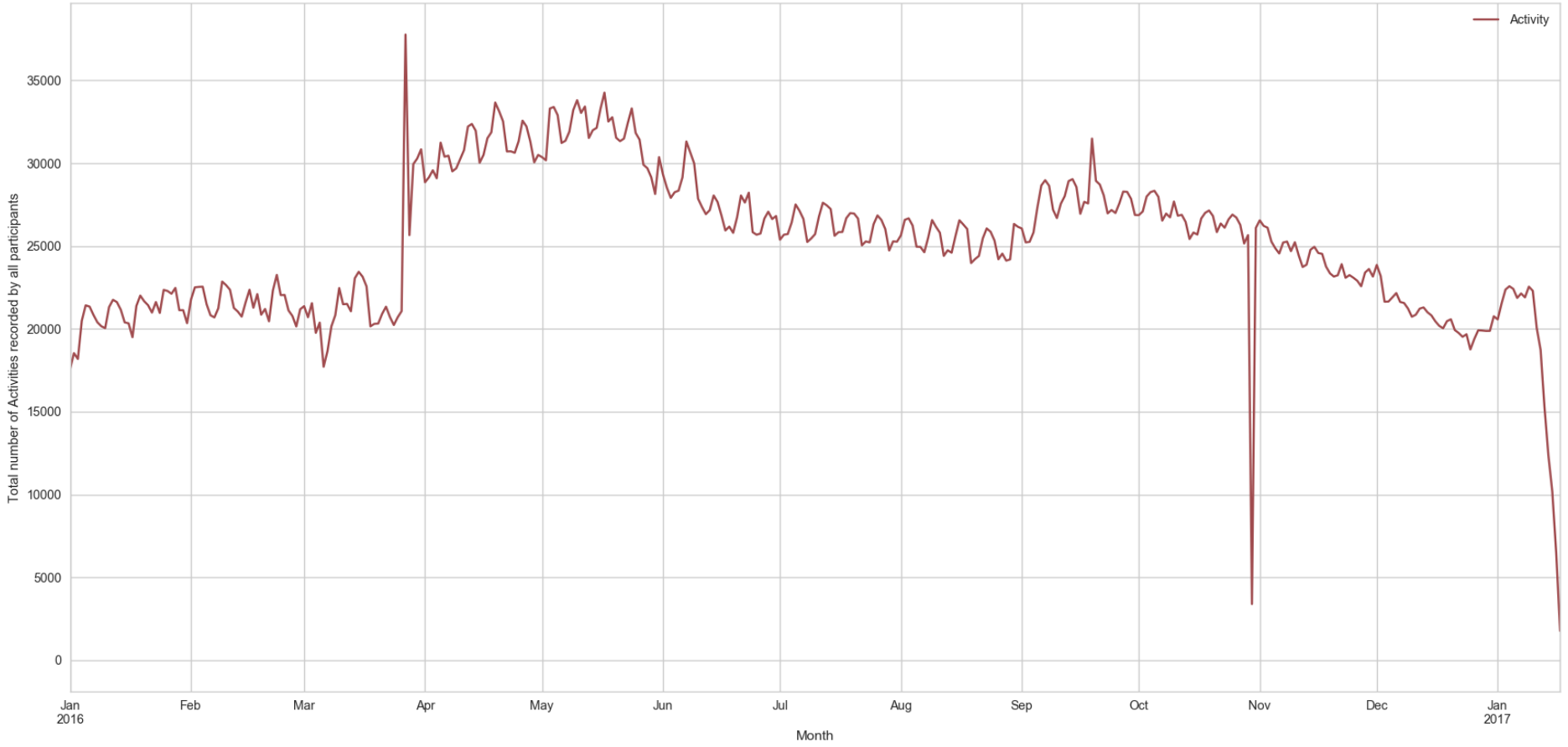

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PhD work: *Incorporating E-commerce into Grocery Sector Retail Location modelling*

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- UK Grocery E-commerce industry is amongst the most developed Grocery E-commerce markets in the world.
- UK Grocery E-commerce valued at £10.4Billion in 2017 – predicted to be the fastest growing market in the wider grocery industry over the next 5 years – forecasted value of £16 Billion by 2022 (IGD, 2017).
- Online grocery sales contributed 7.3% of total grocery sector spend in 2016 (Rigby, 2017) – A figure expected to grow.
- Fundamental change in the nature of interactions between supply and demand.

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- Incorporating E-commerce interactions (Home Delivery and Click and Collect) into a spatial interaction modelling framework to support location based decision making.
- Omni-channel focus
- Research and understanding of both Consumer demand in the UK and how this driven and the Supply side dynamics of offering these services.
- The real novelty and the real challenge of the project comes in understanding and capturing the consumer interactions in a spatial interaction framework that can be used to support decision making.

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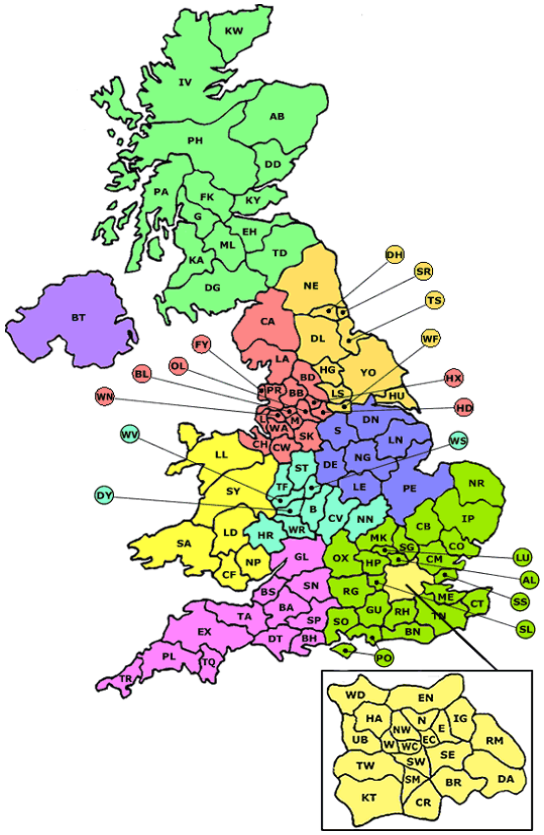
Appraisal Areas



- Breaking down the wider estate in smaller areas containing a number of stores
- A method to monitor performance
- Each store has a service area they deliver to. The area which they deliver to is determined by the predicted demand in the area, the capacity of the store and a tradeoff between market share and profitability.
- Designing appraisal areas is very a much an art rather than a science at the moment.

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Next Steps?

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