Data Science Capstone
IBM Coursera Course

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I. INTRODUCTION/BUSINESS PROBLEM

Bristol City Council are proposing a new initiative for Low-Traffic Neighbourhoods (LTNs). LTNs are an area in a city in which all through-traffic is banned, meaning that the area becomes highly pedestrianised. As traffic and pollution levels have reached exorbitant levels in recent years, LTNs are designed to promote the use of greener alternative means of transport such as cycling or electric scooters. While business owners are often hostile to the notion of an LTN, research has shown time-and-time again that businesses actually benefit from the increased foot traffic.

The paper outlines an approach to identify a candidate area for a new LTN in Bristol. It is postulated that neighbourhoods which contain a larger number of hospitality businesses, as opposed to industrial or office spaces, will benefit most from the introduction of an LTN, because these types of businesses will benefit from the increased footfall.

II. DATA

Bristol is divided into 116 informal neighbourhoods, names of which are found in the following Wikipedia article: https://en.wikipedia.org/wiki/Subdivisions_of_Bristol. The names of these neighbourhoods will be used to form part of a Foursquare API request that will return a JSON file of local businesses.

The Foursquare API can return venues close to a specified latitude and longitude. Since it is unlikely that Foursquare will recognise the names of each Bristol neighbourhood in a general search call, the latitude and longitude of each neighbourhood is found using the ArcGIS REST API. Listing 1 shows a snipped of the response from the ArcGIS REST API for the search term 'Bedminster, Bristol'. The actual response returns a number of potential candidates, but for the purposes of this study only the first (or top) candidate is considered. The data is wrangled into a Pandas DataFrame so that each neighbourhood is allocated a set of coordinates.

Listing 1. ArcGIS REST API response for 'Bedminster, Bristol'

```
1  {'spatialReference': {'wkid': 4326, '
       latestWkid': 4326},
2    'candidates': [{'address': 'Bedminster,
       Bristol, Avon, England',
3      'location': {'x': -2.6091299999999364,
          'y': 51.44023000000004},
4      'score': 100,
5      'attributes': {},
6      'extent': {'xmin': -2.6191299999999362
          ',
7       'ymin': 51.430230000000044,
8       'xmax': -2.5991299999999367,
9       'ymax': 51.45023000000004}}]}
```

The Foursquare API is then used to collect details of venues for each of the neighbourhoods, by sending the coordinates as arguments to a REST API call. The returned JSON response contains a list of nearby venues for a given call, along with a category for each venue. The category is used for the study going forward, as it allows the grouping of venues together to get a picture of which types of business are present in a given area. Sometimes, there are multiple categories for a given venue, but for our purposes here it is fine to use the first item as this will reflect the most accurate category.