**Assignment 2**

Firstly I downloaded the IMD 2015 map that is freely available from the CDRC website [1] and imported this dataset into CartoDB. Using SQL, I selected to display all of the LSOA's that have an IMD rank above 0 (See Appendix A). This is because I wanted to show the most and least deprived LSOA's and not just one or the other. The map was then produced and I chose to style each polygon (LSOA) on the map in colours that looked appealing and made the area's what I'm trying to look at, the most and least deprived, stand out.

The colours what I decided to choose to represent the most and least deprivated area's for the map was a polarisation colour palette. I decided to use my own colours so this was done using CartoCSS (See appendix B).I also used the Multi-Hue sequential colour scales as this is advantageous to represent numbers. One of the main reason I chose a polarize colour palette was because I wanted to make the most deprived and the least deprived areas stand out. For example, the most deprived areas are represented with a dark red colour. As the area's get less deprived, the colours get cooler. I also created a legend to help the user have a clear understanding of the map.

The base map what I chose to use was the Default Carto map with the Voyager style. The reason for this was that the map displayed the labels of areas of in Liverpool on top of the coloured areas and the colour scheme I used went with the colour of the map.

I downloaded the IMD 2015 map for the whole of England [2] as this IMD map had the IMD decile (% rank of deprived area's in the country) and the LSOA name. The original IMD map downloaded from the CDRC [1] did not have these columns.

I then added the columns mentioned in the last paragraph to the IMD map downloaded from the CDRC. This was done through using an analysis tool called "Add Columns from 2nd Dataset. This used an intersect Join on the column "LSOA code" that was present in both datasets. This was done to allow me to be able to display the IMD decile of each LSOA on the map.

I give the user the option to display only the LSOA's by the decile by creating a widget of the IMD Decile's to the side of the map. If user's just want to display the decile's that are in the least 10% of the country then they can click the 1 and it will only show that decile. I created another widget for the IMD Score of each LSOA. This widget is a histogram which allows the user to choose sections for which LSOA they would like to be displayed for a certain IMD score range.

I then decided to create a pop-up for the user for when they hover over each LSOA on the map. When hovered over, a pop-up will display the; LSOA code, the LSOA name, the IMD decile and the IMD Rank. A little note will also appear which will explain what the decile means and what the rank means. There was no option by CartoDB to allow me to add the note so this had to be done by editing the HTML of the pop-up that was automatically generated by CartoDB (See Appendix C).

I also created a pop-up for the user for when they click on an LSOA. Clicking an LSOA will display the LSOA name, the IMD score and the scores for all seven domains for what the IMD score is calculated

on. Like the previous pop-up, I also wrote a note that I had to manually add in via HTML (See Appendix D).

I decided to create a heat map of the crime data of Liverpool in the month of January 2019. The reason I created a heat map was because crimes are normally recorded as individual incidents that occur at one particular location. However, we tend to want to look at areas in terms of a high or low risk of crime. One way of aggravating this information into data that can be analysed is by using a heat map.

I downloaded the data from the Police.UK website [3] and inserted the dataset into CartoDB. One problem I had was that this dataset was for Merseyside, meaning that it displayed crimes from areas such as Birkenhead, Crosby and Knowsley. I had to create an SQL query so that it only displayed the crimes were the LSOA name had contained the word Liverpool (See Appendix E). I also gave user's a chance to break the heat map down into the different categories of crime's by creating a widget allowing them to select which category they would like to see.

One thing to take in to consideration is that because there was so much crime in the month of January, the heat map makes it slightly difficult to see the city centre areas. This can be sorted by zooming into the city centre area. An alternative way is to turn the crime section off in the legend which will make the heat map disappear.

# References

[1] C. D. R. Centre, "CDRC English Indices of Deprivation 2015 Geodata Pack: Liverpool (E08000012)," 2015. [Online]. Available: https://data.cdrc.ac.uk/dataset/cdrc-english-indices-of-deprivation-2015-geodata-pack-liverpool-e08000012.

[2] A. Rae, "Indicies of Deprivation 2015: Maps and Data," 2015. [Online]. Available: http://ajrae.staff.shef.ac.uk/imd15/england_IMD_2015_300915_v1.zip. [Accessed 11 04 2019].

[3] Police UK, "DATA.POLICE.UK," 01 2019. [Online]. Available: https://data.police.uk/data/fetch/e09b3354-2b94-44e8-9fe9-54b804a82eac/. [Accessed 11 04 2019].

# Appendix

The code that has the `Courier New font` is the code what has been added by myself.

## Appendix A
```
SELECT *, ST_AREA(the_geom::geography) FROM "anthony-envs456-19".e08000012_3 WHERE imd_rank >0
```

## Appendix B
```
(#d5001a, #ff6a00, #ffb507, #ffffbf, #b2ddcc, #42b3d5, #182276),
quantiles)
```

## Appendix C

```html
<div class="CDB-Tooltip CDB-Tooltip--isDark">
  <ul class="CDB-Tooltip-list">
    <li class="CDB-Tooltip-listItem">
        <h3 class="CDB-Tooltip-listTitle">LSOA Code</h3>
      <h4 class="CDB-Tooltip-listText">{{lsoa11cd}}</h4>
    </li>
    <li class="CDB-Tooltip-listItem">
        <h3 class="CDB-Tooltip-listTitle">LSOA Name</h3>
      <h4 class="CDB-Tooltip-listText">{{right_lsoa11nm}}</h4>
    </li>
    <li class="CDB-Tooltip-listItem">
        <h3 class="CDB-Tooltip-listTitle">IMD Decile</h3>
      <h4 class="CDB-Tooltip-listText">{{right_imdd15}}</h4>
    </li>
<li class="CDB-Tooltip-listItem">
        <h3 class="CDB-Tooltip-listTitle">Note:</h3>
      <h4 class="CDB-Tooltip-listText">A decile of 1 means the area is in the
10% most deprived areas in the country<br>A decile of 10 means the area is
in the 10% least deprived areas in the country</h4>
    </li>
    <li class="CDB-Tooltip-listItem">
        <h3 class="CDB-Tooltip-listTitle">IMD Rank</h3>
      <h4 class="CDB-Tooltip-listText">{{imd_rank}}</h4>
    </li>
</li>
        <li class="CDB-Tooltip-listItem">
        <h3 class="CDB-Tooltip-listTitle">Note:</h3>
      <h4 class="CDB-Tooltip-listText">A rank of 1 is most deprived <br>A rank
of 32,844 is least deprived</h4>
    </li>
  </ul>
</div>
```

## Appendix D

```html
<div class="CDB-infowindow CDB-infowindow--light js-infowindow">
  <div class="CDB-infowindow-close js-close"></div>
  <div class="CDB-infowindow-container">
    <div class="CDB-infowindow-header CDB-infowindow-headerBg CDB-infowindow-headerBg--light js-header"
style="background: #35AAE5;">

    <ul class="CDB-infowindow-list">
      <li class="CDB-infowindow-listItem">
       <h5 class="CDB-infowindow-subtitle">LSOA Name</h5>
       <h4 class="CDB-infowindow-title ">
         {{lsoa11cd}}
       </h4>
      </li>
     </ul>
   </div>
   <div class="CDB-infowindow-inner js-inner">
    <ul class="CDB-infowindow-list js-content">
      <li class="CDB-infowindow-listItem">
       <h5 class="CDB-infowindow-subtitle">IMD Score</h5>
```

```html
      <h4 class="CDB-infowindow-title">{{imd_score}}</h4>
    </li>
          <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Note:</h5>
      <h4 class="CDB-infowindow-title">A score less than 8.50 is least
deprived<br>A score of more than 34.18 is most deprived<br><br>The IMD
Score is calculated by combining the information from the following seven
domains using various weights for each domain</h4>
    </li>
    <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Income Deprivation</h5>
      <h4 class="CDB-infowindow-title">{{income}}</h4>
    </li>
    <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Employment Deprivation</h5>
      <h4 class="CDB-infowindow-title">{{employment}}</h4>
    </li>
    <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Education, Skills and Training Deprivation</h5>
      <h4 class="CDB-infowindow-title">{{education}}</h4>
    </li>
    <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Barriers to Housing and Services</h5>
      <h4 class="CDB-infowindow-title">{{housing}}</h4>
    </li>
    <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Living Environment Deprivation</h5>
      <h4 class="CDB-infowindow-title">{{living_env}}</h4>
    </li>
    <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Health Deprivation and Disability</h5>
      <h4 class="CDB-infowindow-title">{{health}}</h4>
    </li>
    <li class="CDB-infowindow-listItem">
      <h5 class="CDB-infowindow-subtitle">Crime</h5>
      <h4 class="CDB-infowindow-title">{{crime}}</h4>
    </li>
   </ul>
  </div>
  <div class="CDB-hook">
   <div class="CDB-hook-inner"></div>
  </div>
 </div>
</div>
```

## Appendix E

```sql
SELECT * FROM "anthony-envs456-19".table_2019_01_merseyside_street
WHERE LSOA_name Like '%Liverpool%'
```