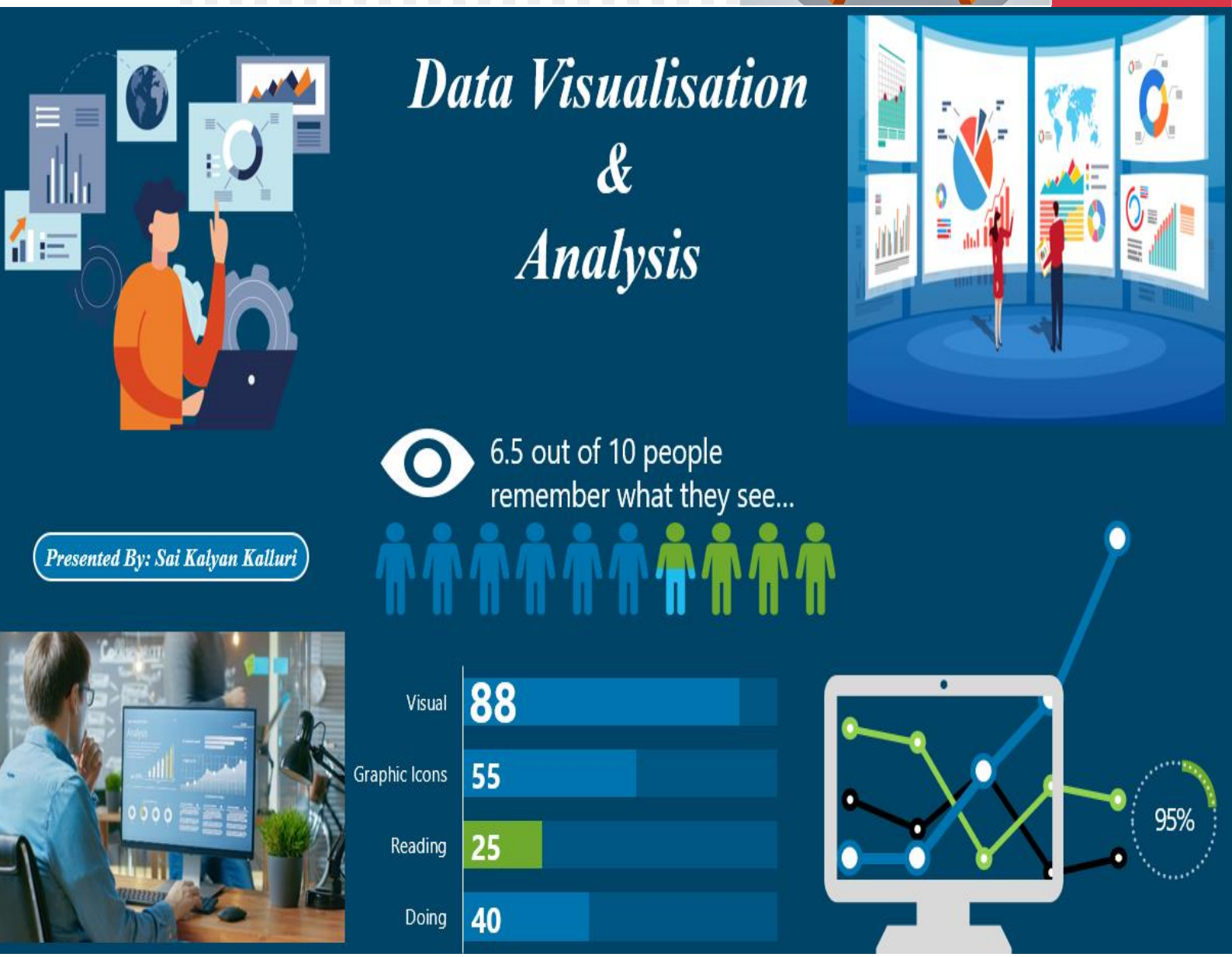

Cardiff School of Computer Science and Informatics

CMT218

Visualisation Analysis

<u>Report Presented by</u>

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ABSTRACT

In this coursework, we were given a task to discuss the visualization of data of our choice. It was important for us to select a good visualization that would provide the theory behind visualisation design and need to discuss improvements that can be made to the visualization for making it more effective. Additionally, it was also essential for us to consider the visualisation within the context of the principles which were discussed in the class and critically needs to analyse them. After doing a bit of research I finally decided to select the " UK Elections" topic as it is one of the most complex and complicated ones, which deals with a large amount of data, Categorial features, and numbers.

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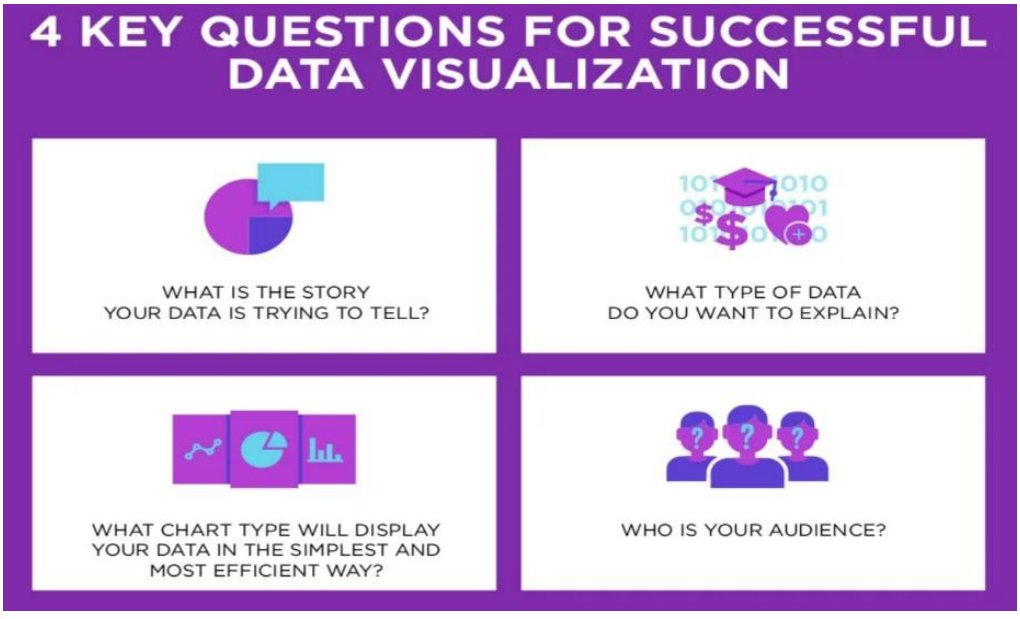
INTRODUCTION

Visualisations, like words, can be used to lie, mislead, or distort the truth. But when practiced honestly with care, the process of visualisation can help us to see the world in a new way, revealing unexpected patterns and trends in the otherwise hidden information around us. At its best, data visualisation is expert in storytelling. More literally, it is a process of mapping information to visuals. We craft rules that interpret data and express its values as visual properties. Some of the few points which tells us why Data Visualization is Important

- *Data visualization makes data easy to digest.*
- *It helps Identify patterns within a given set.*
- *It helps narrate a wider story*
- *It makes data more memorable*

"On doing Initial analysis, I came to know altogether, we have more than 44 different types of charts are available and from which we can make effective visualisations according to the scenario".

Also, a good visualization design requires the understanding of data, audience, and appropriate choice of chart or graph that we use to communicate the data meaningfully according to the nature of data. Also, below are a few key initial questionaries that we need to consider while starting a visualisation.



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Considering all these parameters, I choose Election data, as it is one of the most complicated ones, no matter the scale of the election that needs to be covered. At the same time, readers expect clear data visualizations from the different sources of media to fully understand the data and numbers. First, let's take a look at what election data comprises. There are two kinds of data that come in to picture while dealing with election data. The first one is generated in the run-up to the elections. It majorly involves candidate histories, assets, and opinion polls data (Who are the richest candidates from each party?, Which party has held on to a particular constituency for how long?, and What are the opinion and exit poll results?). These are some potential questions that can be answered and visualized with data. The second kind of election data is generated in real-time as the election results are being announced. These are more dynamic and some of the questions which can be answered are: (How did each region vote? Who won with the highest and narrowest victory margins? There was a particular party the dominant one?). The objective was to offer good real-time visual election reporting and present meaningful insights as stories. Stories about elections, which are already a massive affair, start trending quickly, offering valuable insights to the audience and huge primetime viewership to news channels. When I started my Initial analysis I understood that we can choose different charts for representing election data to make it a good visualization. Some of the commonly used charts for representing elections data are Line charts, Bar Charts and Pie Charts. I am not going to discuss them in this blog, for reference I gave respective knowledge-sharing links which can help in understanding the election data easily by reading those blogs.

"From my research, I found few charts which are good and interesting for representing elections data. Some of them are Parliament charts, Maps, and Sankey charts.

A PICTURE TELLS A STORY BETTER
THAN A THOUSAND WORDS COULD

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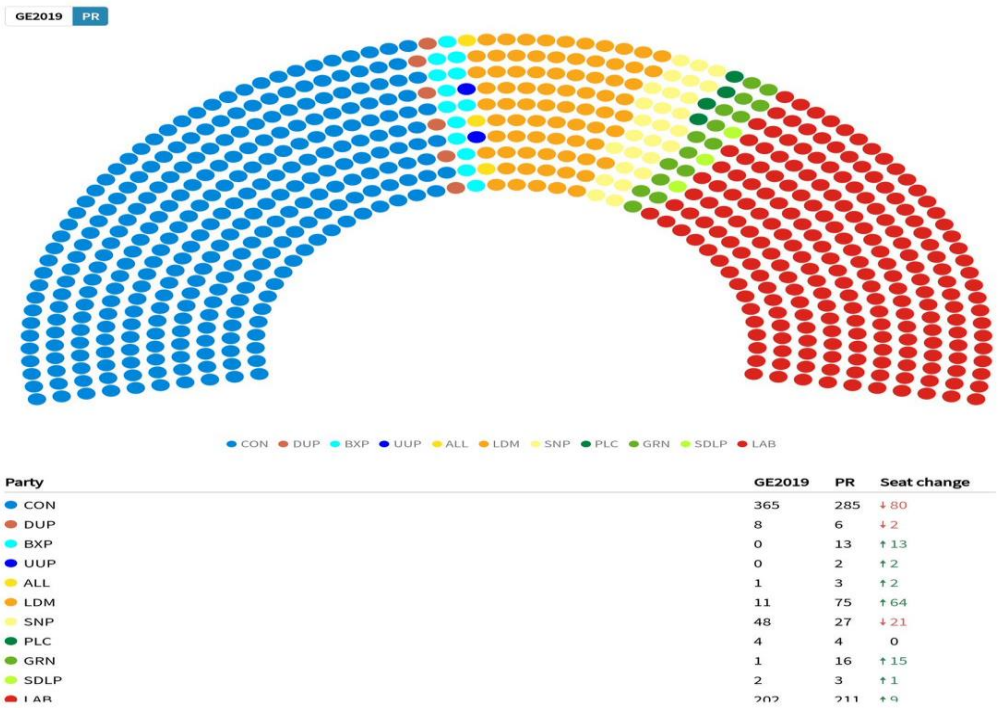
"Good charts effectively convey information. But, Great charts enable, inform & improve decision making."
-Dante Vitagliano

1. Parliament Chat:-



Party	GE2019	PR	Seat change
CON	365	285	↓80
DUP	8	6	↓2
BXP	0	13	↑13
UUP	0	2	↑2
ALL	1	3	↑2
LDM	11	75	↑64
SNP	48	27	↓21
PLC	4	4	0
GRN	1	16	↑15
SDLP	2	3	↑1
LAB	202	211	↑9

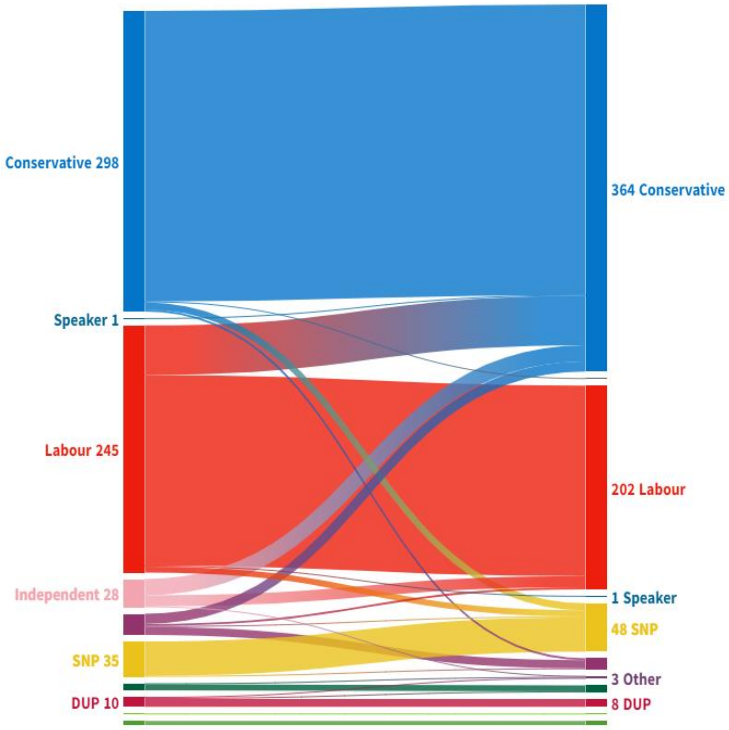
- *Parliament charts show each seat of parties' details in a semi-circle, similarly to the way seats are arranged in a parliamentary chamber.*
- *These Charts are ideal for showing the number* ***of seats held by each political party****. These charts are common for showing the results of* ***election data.***
- *These are* ***Dynamic, Responsive,*** *and are* ***very straightforward*** *to make, all you have to do is to* ***structure the data and to create the shape****.*
- *The chart comes with* ***interactivity out of the box so the reader can hover over the different parties to see the total number of seats****. Also* ***notice that when you hover over a value the other series will dim out. This is happening for accessibility reasons as it is easier to differentiate the selected party from the others.***

Learn data & you can tell stories that more people don't even know about yet but are eager to hear

- Nathan Yau

Sankey Charts:

These are particular types of flow diagrams in which the thickness of each edge (link) is proportional to the flow quantity that passes through it. They have ***many applications in science, particularly in physics and thermodynamics,*** *where they show* ***how energy, water, electricity, material, etc. flows*** *within a network, but also in fields* ***like finance where a flow of money has to be visualized. It's ideal for displaying energy flows or the changes in seats between parties from before to after an election.***



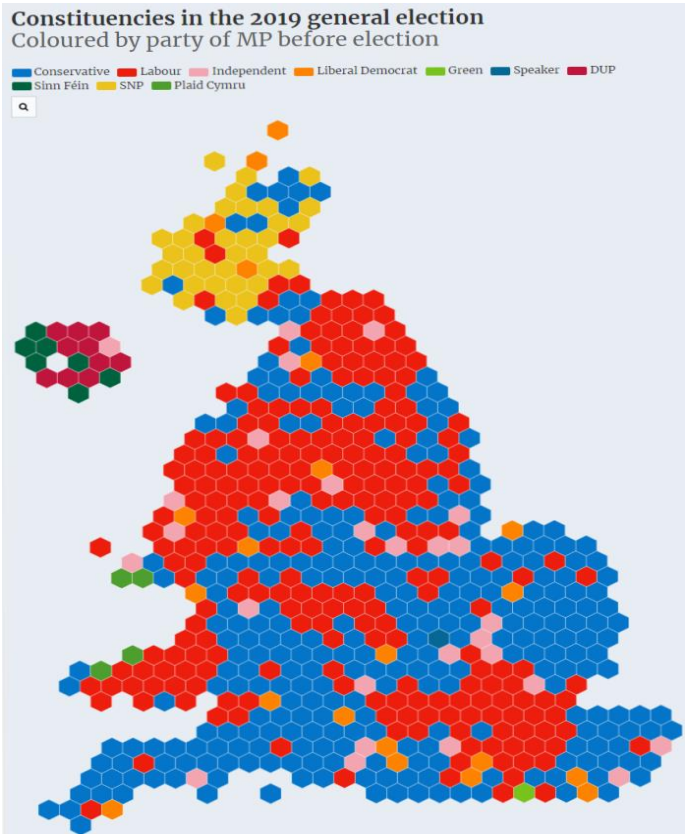
- *However, there are many use case scenarios where users have* ***advanced requirements that these standard tools cannot meet, e.g., specific constraints on node arrangements, non-trivial node or edge styles, etc. There are also cases where users already have an application in which they want to integrate a Sankey diagram. Users have to implement their own Sankey diagram tailored to their use cases and needs for these cases. Using a software library that provides ready-to-use components for this task helps developers save a lot of money, time, and workforce.***

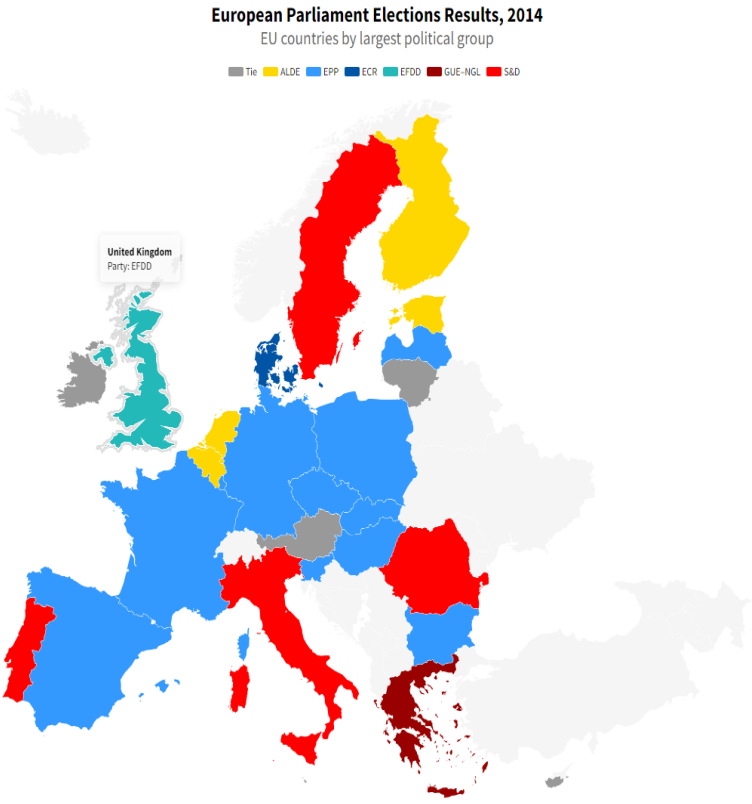
By visualizing information, we turn it into a landscape that we can explore with our eyes, a sort of information map. And when we are lost in information, an information map is kind of useful.

-David McCandless

Maps:-

We are having different kinds of maps available for visualization (Projection (Choropleth), heat, Hexogram, Geographical, etc). Among them, I prefer projection, and hexagram maps are the best for visualizing election data. ***Visualizing election data across geography allows readers easily to understand the connection between political opinion and location****. The current map shows results from the 2014 and 2019 general elections.*





- *The Equal-Area map projection shows the correct sizes of landmasses and continents.*
- *The Equal area map causes the shapes of landmasses to be altered and forced into curves*

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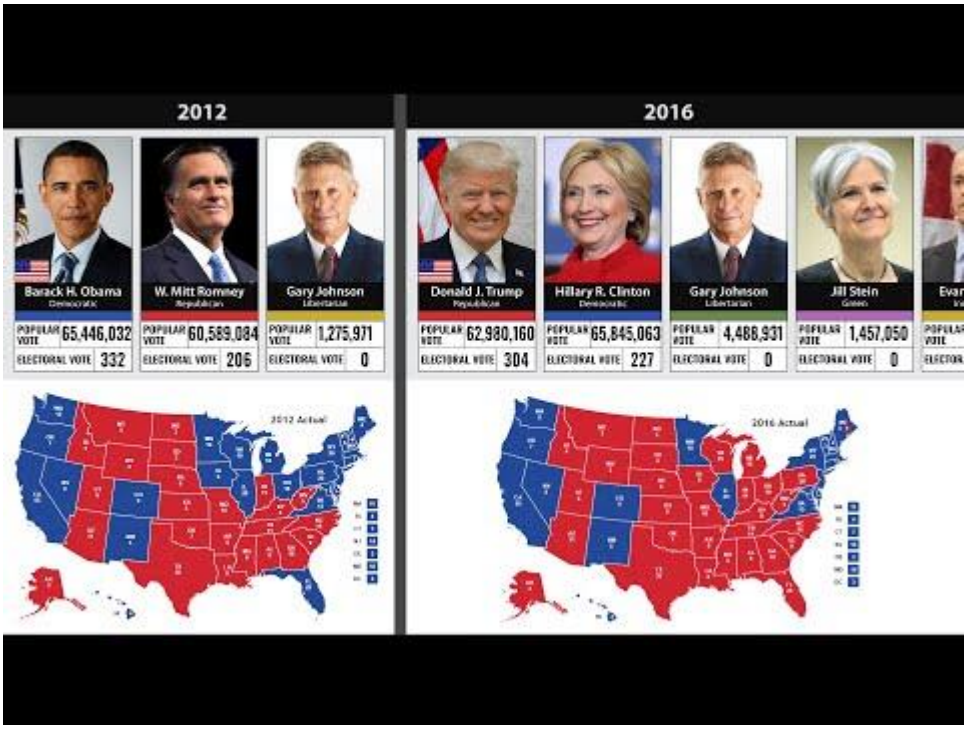
Below is one of the best examples of election data that was visualised using Maps.



- *Among all the above-mentioned maps, it is easy to get accurate real-time data from the UK elections website so making a parliament chart is* ***easy and it is best for representing*** *the difference between parties. Also, it is quite a* ***simple & straightforward chart****. The colors which are used for preparing the chart are* ***eye-catching****, by seeing the chart one can* ***easily understand the data****. But the main drawback in using a parliament chart is its shape and also it is not suited for large data visualisations.*

- *Sankey chart allows us to visually* ***show complex processes, focusing on a single aspect or resource that we want to highlight****. As Sankey diagrams are ready-to-use tools, the main disadvantage is that they only support the standard features of a Sankey diagram, e.g., thickness adjustment, colour adjustment for nodes and edges, and limited node arrangements and cannot be further extended.* ***These are not much interactive and are also a bit complex for understanding data.***

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- *By using Projection(Choropleth) or Hex or Geographical map are used Visually to inform our readers about the results* ***of the election to display them geographically and it can make the user think about the data****. Instead* ***of just who won, It also serves a clear purpose by telling our readers where they won, adding another level of complexity to their understanding.*** *These are the tried and tested methods for election mapping hence sometimes it may cause Distortion hence we should be careful while dealing with real-time data. Whilst useful for visualising the elected party in each constituency, one drawback in this chart is tricky to understand the resulting representation of each party in the House of Commons due to the UK being divided into its 650 constituencies using population rather than geographic area. In the case of the 2014 election, this is demonstrated by a much greater portion of the map (below) being blue than red despite the Conservatives winning seats more than Labour. In my opinion, to make these charts more effective, we have to stick with the below points.*

  - ✓ *We have to make sure that the data is compelling and strong enough to support visualisation and is the right fit for the story.*
  - ✓ *We should not overcomplicate the design and need to use colour effectively within limitations.*
  - ✓ *Focus on the objective point or statement it's making – we should don't confuse a user by trying to overload them.*
  - ✓ *Have to use a visual hierarchy on the page to highlight the key elements.*

Therefore, I strongly believe the Projection/hexagram maps are the foremost motivation for the visualisation to improve public access and understanding of electoral data, how much of the population we reached, and how effective is our message communicated to them.