VISUALIZATIONS ON UFO SIGHTINGS

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Abstract - The Universe is a vast expanse of space and with that comes a rather profound existential question that we have been trying to answer for eons. Are we alone in this Universe? This curiosity has led to a plethora of UFO sightings and other unexplained phenomena that people have claimed to have experienced or seen for centuries. This project analyses over 80,000 reports over the last century, amassed from the National UFO Reporting Center (NUFORC). We aim to analyze patterns and relationships between UFO sightings and specific countries, population density, seasonality, and common descriptions provided by people and predict future sightings based on these parameters. The data collected is geolocated and time standardized.

Keywords- UFO, UFO sightings, population density, visualising, NUFORC

I. INTRODUCTION

Have you ever looked into the night sky and seen something unusual? Perhaps it was a star or an airplane, but what if it was actually something from another planet? The National UFO Reporting Center (NUFORC) was founded in 1974 and since then its primary function has been to receive, record, corroborate, and document reports from individuals who have witnessed unusual, possibly UFO-related events.NUFORC has had a 24-hour hotline available since 1974 and in the past 20 years has expanded to receiving reports via fax, email,and the organization's webform. These reports are stored in a publicly available database and are indexed by date of sighting,shape, state, and date posted. The reports range from serious reports to obvious hoaxes and while mostly reported from within the United States, there are reports of sightings throughout the world.

These strange occurrences might be concentrated in specific regions but they have been observed worldwide for over a century. With the amount of data at hand, there is a necessity for a systematic study and analysis to be conducted on it for us to better understand this phenomena and to conclude whether this is a product of mass hysteria or an indication that we are not alone in the Universe after all. This analysis will help us in finding patterns and correlate

several factors and in turn could aid in predicting future sightings.What we propose in this work is the goal to give the user a higher level view of where different types of sightings occur,to investigate whether sightings are increasing or decreasing over time, to discover the connections between different events which might happen at different geographic areas, and to quickly identify typical incidents at a given period of time without reading the whole sightings through topic modelling.We use filters to reduce the number of items on the map based on shape, date range, time of day, and duration and any other parameters that will make the result efficient. For example, When there are multiple points in a small area in the map, they are clustered together and encoded by hue to indicate the density of the points within an area.

In June of 1947, an amateur pilot named Kenneth Arnold was flying a small plane near Mount Rainier in Washington State when something strange and unexplainable caught his attention. About 20-25 miles north of him, were a chain of nine objects that shot across the sky, their surface glimmering under the sun. Upon closer inspection these objects looked to be around 45 to 50 feet wide and were faster than any manned aircraft of that era. This was one of the first known reported UFO sightings that garnered a lot of public and media attention.

UFO's, aliens and other paranormal phenomena is something that is deeply integrated in American culture and folklore. From several passages in the Bible which have stories of "angels that come down from the sky", sightings of cylindrical shaped clouds in the sky span over 40 feet in length, which appears as a "pillar of cloud by day and pillar of fire by night" to american media saturated with films and documentaries surrounding this phenomena. This goes to explain why a good majority of the sightings reported worldwide are from the United States. There are committees and institutions dedicated entirely to search for extraterrestrial life. Their sheer curiosity and urge to find an answer to this profound existential question is what drives them to actively look for such phenomena.
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II. RELATED WORKS

Visualising UFO Sightings

There have been various available tools for visualizing the occurrences of UFOs sightings over the last decades.

(A) Darrent et al use Python programming language to create a visualization report of UFO sightings distribution in the US to understand the correlation between demographic parameters

and the quality of UFO sightings. The input data is also obtained from the NUFORC. Each sighting is represented by one dot and is colored according to the shape. Darrent uses statistical methods to explain some trends and patterns of the sighting data. His reporting results is based on the hypothesis of the increasing number of internet connections,working hours of the day, seasons and location of the events.However, too many colors for sightings makes it difficult to distinguish between each events, especially where there many sightings reported in the same or very close locations because of overlapping. this interesting report shows only some general patterns and lack the level of details in each event.Despite this prior work on UFO sightings, none of these available tools are able to synthesize information and allow users to get insight into data upon users' request.Unlike other applications,in this paper, we provide an interactive data analytics tool for visualizing and analyzing a large number of UFOs sightings which are distributed on certain geographic areas and integrate parallel coordinate along with topic modelling for detecting highlighted sightings based on users' report.

(B) The other more comprehensive approach which we will be incorporating is created by Francisco, he collects data from different sources from all over the world with more than 176,000 records. Aggregate data map allows users to see the statistical results by continent or by country, users are also able to search the events based on time scale and desired locations. A heat map is overlaid on top of the Google map, letting users spot the number of sighting occurrences in the specific areas. Although this site both collects and combines real time data, its visualization tool is limited to some of th**e** very basic functions such as viewing and searching. Drilling and brushing are the two other functions for users that need to be implemented in this application.

(C) John Nelson provides a per-capita approach for UFO sightings. This tool shows the overview of the ratio of the sightings by population, a bi-variate mapping of sightings in the color dimension, and population density in the opacity dimension. The most interesting part of this paper is the trending area where different shapes of the sightings are compared to each other in terms of time. Another interesting feature of this application is that non-geographic data is plotted into a cell chart (horizontal axis is the time of day and night while the vertical axis splits up the months of the year) and other bar charts embedded into it. This allows users to see data from multiple perspectives.

(D) Max Galka also uses Google Map for UFO sighting distribution, sightings that occur on the same night within about 50 miles of each other will be grouped together into a circle, the size of each circle indicates the number of the events that it contains. Sighting reports are shown from different perspectives such as by population, near airports or military bases. However, lack of necessary interactions and and get insight into data make this application hard for detail analytics

III.PROBLEM STATEMENT

There is no concrete reason as to why these sightings are so prevalent worldwide and with our project, we aim to come to an understanding of said occurrences. For this, we are coming up with a unique problem statement that talks about predicting the next occurrence of UFO sightings.This thrills us just as much as it does to you. Through observing recurring patterns from the data collected, we want to find out what factors majorly influence such sightings and subsequently predict future sightings. This not only helps us answer a burning question but also

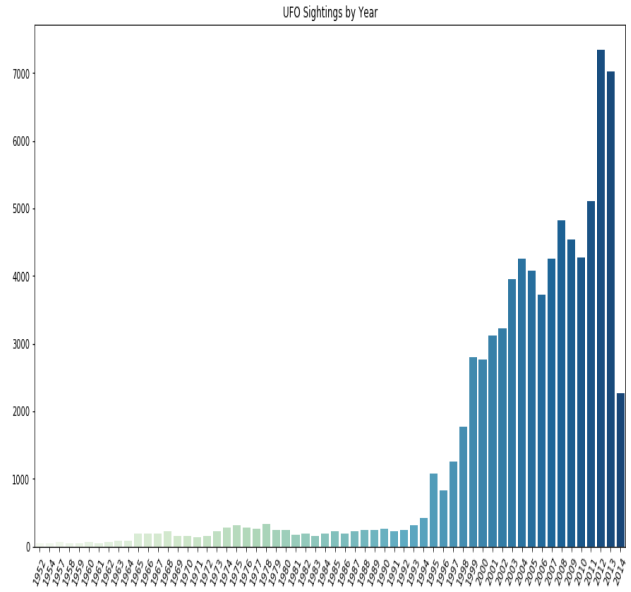
helps us look at this from a rational standpoint, through proper observation and analysis.Prediction makes it easy to experiment as the occurrence has been predicted beforehand.

IV. OUR APPROACH - THEORETICAL FRAMEWORK.

Our problem statement is the cumulative result of all the analysis done on the dataset. In our approach, the occurrences of UFO sightings are predicted based on the visualizations made on the different parameters and by analysing the patterns in the plots. With the help of Exploratory Data Analytics, we are able to achieve the main goal of our project.
Our approach is to analyze the patterns in the sitings and predict the possibility and location of next Ufo_siting.We will try to explore hidden correlations as no direct correlations were shown in the visualization stage and we we are aiming to demonstrate correlations with population density by region and the frequency of these sightings. After taking into account all the necessary inputs , we shall build a model to predict the location of next possible sightings. Here is the basic information and observation that is extracted from the EDA process on data.In the advanced model, we promise to provide the detailed dependencies of the indirectly correlated patterns on the dataset.

UFO Sighting Frequency (1949 - 2013):

This visualisation clearly depicts that there has been an increase in the UFO sightings over the years and seen its peak in years 2010,2011,2012,2013.

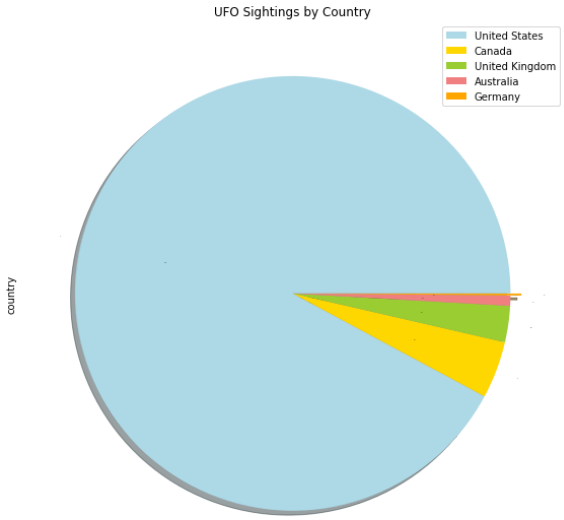


The peak of UFO sightings can be observed in the year 2012, which can be attributed to the fact that the year 2012 was deemed as the “End of the World " as per the Mayan Calendars belonging to the Maya Civilisation of MesoAmerica i.e Mexico and Central America, which raised suspicions amongst people worldwide if this is the product of something otherworldly or perhaps something.

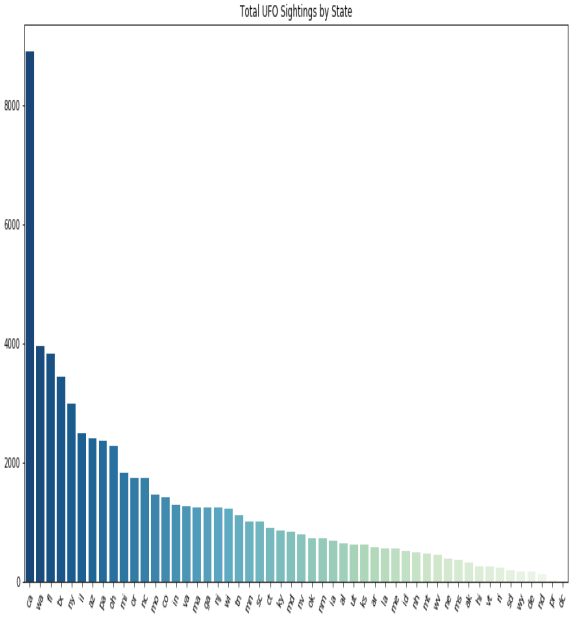
Geography - Where do most UFO sightings occur?

As observed by the plot, the United States constitutes the majority of the UFO sighting reports worldwide. Primarily because the National UFO Reporting Center (NUFORC) is a US-based organization and therefore it is more accessible to people in and around America and another reason being, UFO’s and the extraterrestrial is inherent to American folklore and media and therefore the good majority of people in that region are actively looking for such occurrences. Subsequently, Canada being

the next country which is neighboring the states and shares cultural and geographical similarities with that of America also influence this finding.



Where do UFO Sightings occur most within the United States?

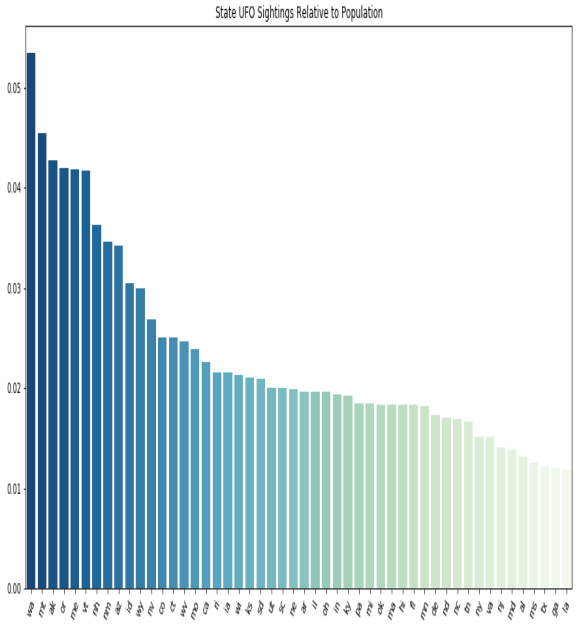


Better Measure for UFO Sighting Patterns

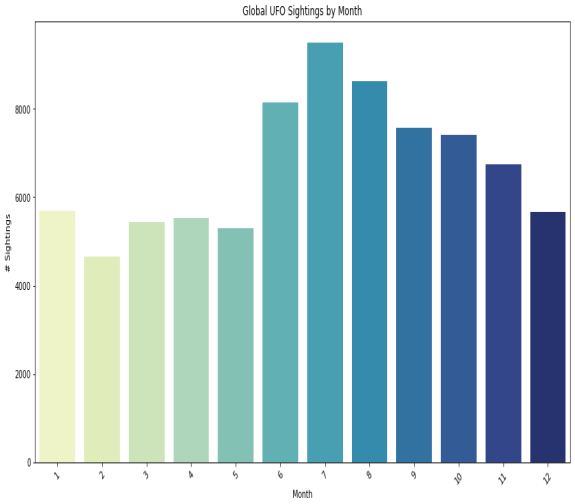
This may not be a very useful measure for knowing the likelihood of seeing a UFO, because California, Florida, Texas, and New York all have relatively large populations and are thus expected to have more reports of UFO sightings. Washington is unique in that it is not in the top 10 most populated states, yet experiences the second-most sightings of UFOs.

While this may not have a remarkable effect on the data, let's just go a little deeper for good measure:

What are the top states for UFO sightings relative to state population?



Seasonality - Is there a popular time during the year that UFO sightings happen?



Typically, people see UFOs in the summer. This may be because people are outside more often in the summer, or it could be because UFO activity is heightened during the summer. We can group UFO sightings by location in order to see if this makes a difference.

Results and Conclusion:

From all the data amassed and analysed so far, we have concluded that the United States is a hub for the majority of the UFO sightings and mostly regions in the east and west of the United States have had a surge in reports over the years. People in these regions are more rational and progressive in their thinking compared to people in the south who are less likely to believe in the natural evolution and therefore less likely to believe in the existence of extraterrestrials.

We will also include analysis and visualisations on indirectly correlated data in our subsequent findings.

V. ACKNOWLEDGEMENT

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