Information Visualization Project: Ultimate Travel Guide

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1 Introduction

There is immense growth in travellers around the world. The statistics shows that the number of tourist worldwide increased from 1996 to 2017. In 2017, the estimated number of international tourist worldwide was approximately 1.32 billion. Travel and tourism made 8.27 trillion U.S. dollars to the global economy in 2017.
By observing that how tourism is becoming one of the important economic factor of the world providing benefits to both departure and arrival countries, we aimed at improving the Way people plan travel. We served visualizations by observing data throughout ten years and scrutinizing them with interactive options user can plan their travel in no hassle.

2 Data Source

We collected data from two sources for our project. Two sources are : Bureau of transportation statistics and data.world. After collecting the data we used SQL queries to use the part of subset of data as required in our project. The data we collected from Bureau of transportation statistics was air traffic data giving information about source country, source city, destination country, destination city, number of passengers, time of the year. Data we collected from data.world was about international airline rankings which had a airline score for following factors : Punctuality, Handling of Passenger Rights and Service Quality and Airline Score.

3 Approach

3.1 Design

The layout of the website is based on a navigation menu for moving through website functions page. In each page, there is a visualization and also explana-

tion of how to use the visualization.
Following are the detail explanations of component of navigation menu :

- Home – This page gives details on the problem statement and solution of our project through slider images.
- Overview – This section gives all destination countries to be travelled from United States through bubble chart. The size of Country bubble also indicates the number of tourists. The Country bubble also includes the city bubble inside it. Hovering over the bubble will give us more detail about city, country and passenger count.
- Find Best Destination – This section helps user in deciding the country of travel. User can select their source city and accordingly map will change highlighting top 10 countries to be visited from that source. Also, by hovering on a particular country a pop up will appear which shows the cities to be visited in that country presented in pie chart.
- Find Best Time – This section helps in deciding the best time to visit a particular destination. By default line chart shows the number of passengers to top 10 destination countries from United States over January to December in 2017. User can select a particular destination to find out what is the best time to visit it. User is also given option to select multiple destinations.
- Find Best Airline – This section helps user to find best airline to travel with. By default, we present user with stacked bar graph based on factors like Punctuality, Handling of Passenger Rights, AirHelp Score, Service Quality. We have also provided user options like viewing only Top 10 Airlines and Viewing alphabetically.

3.2 Technical considerations

1. We used D3.js as our data visualization language. We choose D3 as it uses a functional style mechanism which can help in reusing code and append elements to our heart's content. Also, D3 helps us choose styling, choose among variety of visual charts, manipulate and add interactivity to our charts. We have learnt to use D3's graphic capabilities.
2. We used Angular as our structural framework. We build different components serving to be as our functionality in Angular. Angular provided modularization, robustness and data encapsulation to our project.
3. We leveraged bootstrap 4 in our angular app to form basic elements of our User Interface. Using bootstrap helped us bring design consistency in our project.
4. Git was used to collaborate work of team members.

3.3 Development

1. Different users have different needs. To cater to those needs we have provided user with interactive options, transitions, detailed information over hovering, multiselect option.

2. We took care of coloring scheme not be sensitive and do not involve any sort of inattentional blindness. A wide range of color palates are used with saturation and hues. Color combinations are added to understand visualization distinctly.

3. Scales have been chosen by keeping accuracy and precision in mind. For instance, with Line Chart we help user to select the best time to travel. So, we have displayed months against passenger count. This will help user to compare different months easily and effectively.

4. We have used legends and detailed interactive information to help user better understand Visualization. For instance, we have mentioned the factors in stacked bar chart.

3.4 Evaluation

1. Consistency: We have used consistent coloring schemes. We have also made sure to use consistent interactive element i.e dropdown.

2. Hierarchical Format : We have carefully displayed hierarchical information without causing any confusion. We ensured that the parent child data is displayed in user understandable format and is self-explanatory.

3. Data Labeling : Data is labelled to bring clear understanding of visualization.

4. Compatibility : We have made the website to be compatible across multiple browser platforms.

5. Responsive : Our website is responsive to all devices like laptops, tablets and cellphones.

6. Effective Navigation : We have provided an easy and efficient way to navigate to different parts of our website. Self-explanatory navigation options are added to the top of website

7. Story : Our website have a user specific story. We have added information on every part of this story

8. Cairo's Visualization Wheel : We have considered following factors of Cairo's visualization wheel like multidimensionality, functionality, novelty. We have organized our inner layers based on story. Structures are focused towards logical ordering

4 System Description

- We have added a Circle-Packed Bubble Chart to provide overview of our focus. We have used Bubble Chart as it helps in spotting categories easily and compare them to the rest of the data by looking at the size of the bubble. By having just a look at our data we can see that Mexico is largest bubble i.e. Mexico is destination for most of the travelers from United States in 2017.
- The first section of our story is helping user find the destination country for their travel. We selected choropleth map for this section as maps are organized and helps users in giving bird eyes view. Visualizing data spatially help us to make insights about the data quickly. By default the map shows all the countries that are visited by travelers from United States in year 2017. User is provided with dropdown interaction to select their source country and the map will change displaying the top countries to be visited from that source. This result is based on count of passengers in past from a particular source to destination. On hovering a particular destination country we also present users with pie-chart which helps them in deciding which city to travel in those countries. Again the cities are displayed based on the past travelers count.
- The next step is helping user decide when to travel after deciding where to travel. By default we show users the best time to visit top 10 countries from United States. We have provided legend to help understand the data better. Line Chart helps us in determining the relationship between two destinations. User is provided with dropdown menu to select destination. This will help in selecting multiple destinations as well. Line Chart will then change accordingly and we can then predict the best month based on peaks in Line Chart.
- The last step is helping user to find the airlines they can travel with. We have provided user with stacked bar graph. The factors considered in determining best airline are Punctuality, Handling of Passenger Rights, AirHelp Score, Service Quality. Sum of these factors is important in determining the Airline ranking so we have used stacked bar graph. User is given option to view just Top 10 airline or alphabetically.

5 Related Work

Trip Advisor has related field of focus. But it is generic, and we have catered to consider various user specific features like from where they want to travel and help them progress step by step towards their itinerary.Everyone is interested in analysing air traffic for investigating best flight routes, reducing air traffic congestion. Air traffic is never analysed in suggesting the most visited destination and the best time to visit it. We analyse these trends in our project unlike others.

6 Conclusion

We have added all required factors in our website like story, responsiveness, visuals, interactivity. We have served the purpose of being ultimate travel guide.

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