

# Study of Accidentology in Paris, risk factors and evolution of the traffic accident

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## 1 INTRODUCTION

Nowadays, traffic security is one of the most important issue in our cities. A lot of data are collected every day in order to identify the most risked sections, improve the road network or prevent future accidents. The goal of our study is to offer a simple visualization tool to the citizen of Paris who may want to know which route is more risky or have an idea of the number of accident in its agglomeration. We also intend to help the security service to find correlation between the number of accident and the weather, time period, special event or any other factor which could be related.

Our data [1] recense all the accident in Paris, between 2012 and 2013. Hence, the user will have the possibility to see the evolution through this period and identify the most risked moment of the year. The visualization will be display on the map of Paris with the possibility to focus on some point of interest to get more details about the situation.

In this article we will first discuss about the ways to display data at the scale of a city, then how we intend to create our visualization and eventually which technologies we will use during the creation process.

## 2 RELATED WORK

From what we have seen, it appear that a lot of data visualization about cities in general have some general commun point that we will discuss. Our goal is to use most of them as a base for our own project and adapt them if needed. We also found a visualization of the traffic accident in Houston which is very similar to what we want to do with Paris. We will start by examples about the city focused visualization and then go on the one which are about the traffic accident.

### 2.1 Visualization of a City

In general, the visualizations [5] which focus on a city display a various type of informations about its population (income, age, sexe), the price of the estate sector or political opinion. In this kind of visualisation it is often possible to select/deselect some part of the city and choose an interval of time in order to simplify the lecture. Futhermore, all of the type of information aren't display at the same time, it is let to the choice of the user to see what he wants. Additional informations can also be accessible when hovering a point of interest and sometimes allow to have a more precise view of the area.

Considering the visual aspect of the data on the map, a circular form seems to be the most commun way to mark an area with a type of information. This form are generally completed by a legend which play with the size and the color, to mesure the number, or the impact of the data in the zone. This can also lead to a more advanced tool [6] allowing to

compare an information between areas, periods of time or type of informations.

### 2.2 Visualization of Traffic Accident

We found an interesting example [7] of what we would like to achieve, it is a visualization of the traffic accident of Houston (USA). It show circular areas using a coding color about the number of accident which happened it the zone. It is then possible to click on them and zoom on the region to see appear smaller areas which was composing the original one and so one. A filter is also available, allowing to choose by which cause of accident (vehicle failure, failed to stop, speed ...), the gravity level or the type of weather by which we want to filter the areas. This visualization is pretty close to what we want to do except that we will not be able to manage a filter with our data, but we can provide other type of informations concerning an accident (type of vehicle, number of victims, time ...).

## 3 DESIGN SUGGESTIONS

As our main target are the regular citizen of Paris, our interface will be as simple as possible to help them highlight their main interests and inform them about the traffic security int their city.

The visualisation will be build on two main views. The main view whose goal will be to give the general situation of Paris with its major locations of interest. The second view will be generated by the user if he want to get more details on one of the point of interest.

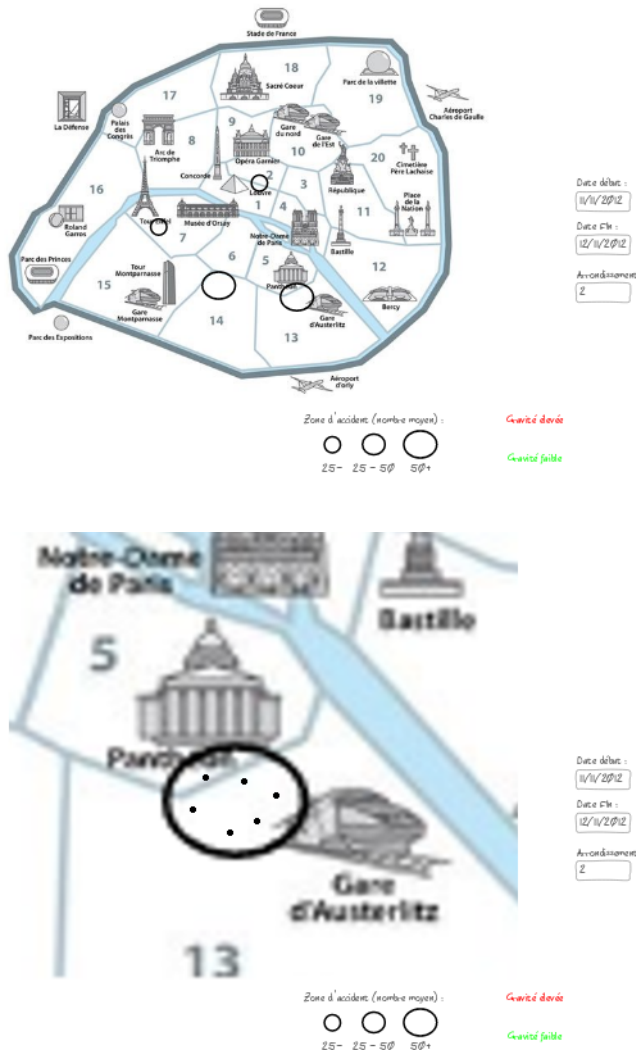
### 3.1 Dataset

We choose to use a dataset produce by the city of Paris that we found on the open data of Paris website. The data are available in different kind of format whose a GeoJSON file which will be useful to display data acording to their coordinate on the Paris map. This sample of data offer us a lot of precises informations that are discuss on the next views explanations.

### 3.2 Main View

This will be the home visualization, representing the map of Paris with what we call the points of interest. These points represent regions where accident occurred during a selected period of time. By default, all the arrondissements will be selected as well as the full period of time between 2012 to 2013. Indeed, the user will have the possibility to set the period of time thanks to two fields (begin and end) and choose the arrondissements of its choice, when the other will be "turned off" to allow a better visibility.

The points of interest will be display depending the number of accident they represent and their gravity (in average). The more a point regroup accident the bigger it will be display. A gradient of color will also be applied to these points from green to red depending the number of victims. A dynamic legend will give indications of the values behind the size or the color.



### 3.3 Focused View

This view will be dynamically generated by the user thanks to a left click on the targeted location. It will produce a new view zoomed on the targeted region to display each of the accident as a point. Each point will be colored as in the precedent view. The user will also have the possibility to obtain more informations about an accident in particular by hovering the point. This will show details information we got about the accident like the address, the date, the hour, the type of vehicle implied, the gravity of the injuries of the different victims and the type of driver licence they have.

### 3.4 Technologies and Techniques

To achieve this visualization we will use the D3.js framework which fit very well to an interactive maps with a dynamic generation of informations. We found a tutorial made by Thierry Templier [8] which could help us to manipulate our data. Thus we will surely use our dataset under the form of a GeoJSON file which seem to be the best format for our purpose. As the GeoJSON format seems to be an heavy one we will use the

tool topojson which will allow us to convert our dataset into a TopoJSON file which is a very lighter format than GeoJSON.

## 4 CONCLUSION

To conclude, we want to help the citizen of Paris understand the traffic circulation in their city and highlight its dangers. We also think our visualization could be used to connect external factors to the rate of accident like the weather, the type of the road or specific period of the year.

To achieve this goal we want to have a main visualization simple to understand and intuitive to use. Hence, the user will be able to generate a view in which he will have all the necessary informations he need to analyse a targeted area.

## REFERENCES

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