Road Accidents in France

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Sensitization, Prevention, Monitoring

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In this data visualization project, we will analyze the road traffic accidents from the French national database between 2005 and 2017. The dataset can be downloaded from the following link : https://www.data.gouv.fr/en/datasets/base-de-donnees-accidents-corporels-de-la-circulation/

The data are collected by the police each time a traffic accident occurs in France. The data are then aggregated by the "Observatoire national interministériel de la sécurité routière" (ONISR). The data takes the form of 56 CSV files describing, 4 for each of the 14 years of history :

- The vehicles implied
- The passengers/pedestrians
- A description of the location
- Characteristics of the accident

Our analysis could bring value to several road authorities in France :

- Communes, that are in charge of communal roads
- Departments, that are in charge of departmental roads
- The French Government, in charge of the national roads

We except our end users to use our tool to :

- **Sensitize** the youngsters and road criminals on the danger of the roads depending on the transportation mode they are using
- **Prevent** road dangers through a tool that would advise the best road characteristics for a road rehabilitation, and visually illustrate the outcome of the algorithm
- **Monitor** the dangers of the roads (at difference scales, including Communes, Departments and Nation) by allowing the user to select geographic zones and filters (weather conditions, hour of the day…) to gain additional insights

We believe that those 3 tasks correspond to the main objectives of all the road authorities in France, and DataViz could help bring additional value in these cases.

I. Sensitization

Why did you choose this representation?

We chose this representation to illustrate the dangers of the road, not only for car users, but also for pedestrians, bike riders or motorcyclists. The aim of this design is to convey a simple, easily understandable yet visually efficient message.

What kinds of interactions do you intend to support?

We intend to support a filter on the type of roads (communal, departmental, national), and to observe the difference of survival rate of the different categories of road users depending on the speed on the road. This would illustrate how the speed of a car impacts the survival rate of the other road users.

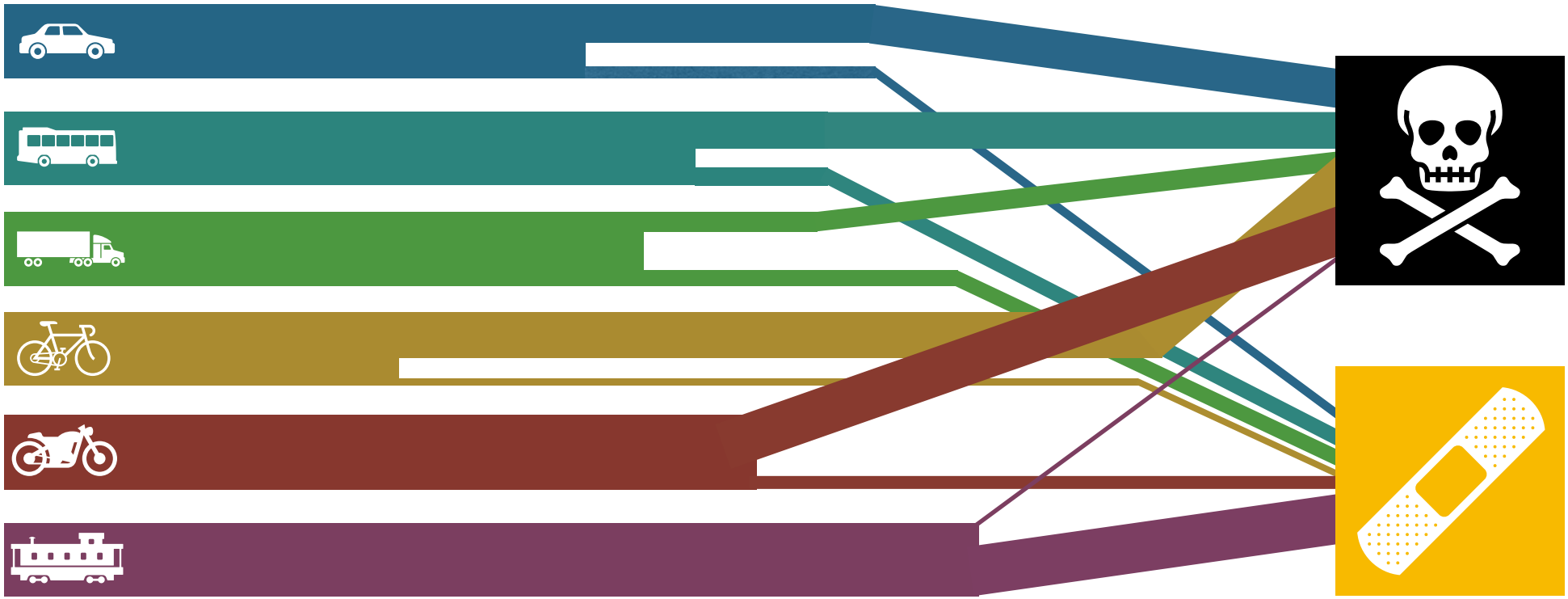
What kinds of things (tasks) does this design help the reader to understand?

The design helps the reader understand the distribution of the volume of road users accident, depending on the kind of road being used, as well as the effect of speed.

Why did you choose this design approach? What trade-offs did you make?

This graph is quite similar to the one of Napoleon's 1812 march. The design initially represented the number of soldiers alive through the different steps of the march. We wanted to build something similar, while displaying the outcome of the accident. Since we have a large number of features, we need to make a trade-off on the complexity of the information displayed, especially if the design is to be used for sensitization among youngsters.

Sensitization



II. Prevention

What kinds of things (tasks) does this design help the reader to understand?

When undertaking road rehabilitation works, there is not easy tool for communes or departments to target the exact features of the road (whether there should be a terre-plein, the width of the road, the speed limit…). For this reason, we'll develop a design to allow those users to get the prediction of the accident rate given a certain number of features they'll input, and also suggest some modifications within a pre-defined range of the features which can be modified on the road, in order to minimize the number of accidents expected yearly on the road.

What kinds of interactions do you intend to support?

The user will be able to modify the constraints to set manually, and define the variables to play around with. On the graph itself, a tooltip will allow the user to get the road characteristics of the other points.

Why did you choose this representation?

We chose a T-SNE representation on a 2D plane with interactive buttons on the side to set constraints and variables of the road characteristics. This dimension reduction tool will allow us to visualize high dimension problems on a 2D plane and use a color code to illustrate the optimal road characteristic. This visualization avoids the Black Box effect of some models.

Why did you choose this design approach? What trade-offs did you make?

T-SNE can be a great tool for dimension reduction, in both 2D and 3D. We were inspired by some great works in the field of Natural Language Processing for example, that allows a better explainability of the outcome of some models. 3D tools can sometimes be trick to understand, for users that are not familiar with it. For this reason, we'll stick to 2D planes.

Prevention

Contraintes

Voie : Double Sens

Piste Cyclable

+

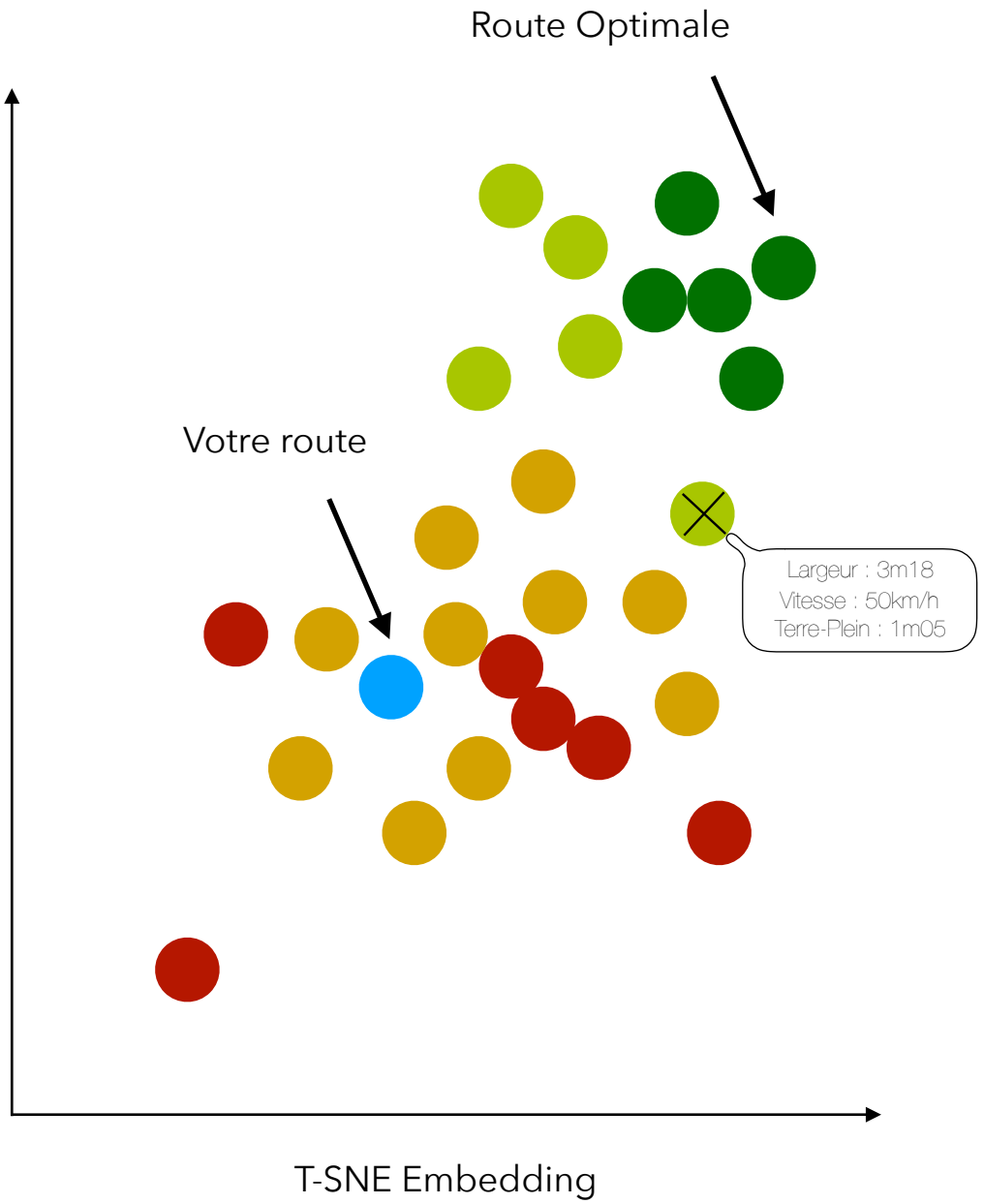
Variables

Largeur : 3m25

Vitesse : 70 km/h

Terre-Plein : 1m

+



Route Optimale

Largeur :
3m52

Vitesse :
50km/h

Terre-Plein :
1m12

III. Monitoring

What kinds of things (tasks) does this design help the reader to understand?

Communes and departments might be aware of roads in which there are empirically more accidents. However, it might become really hard to deal with the large amount of variables observed at each accident : weather conditions, hour of the day, number of passengers… We propose a clear map-based design in which the user can set filters and observe the interaction between them. The end user will be able to monitor the accidents that occurred during the night, implied male drivers, with snowy conditions, at the level of his commune or of the department for example.

What kinds of interactions do you intend to support?

The filters and the interactions between the filters will be the main interactions for the end user. Filters will be cumulative, to gain additional insights.

Why did you choose this representation?

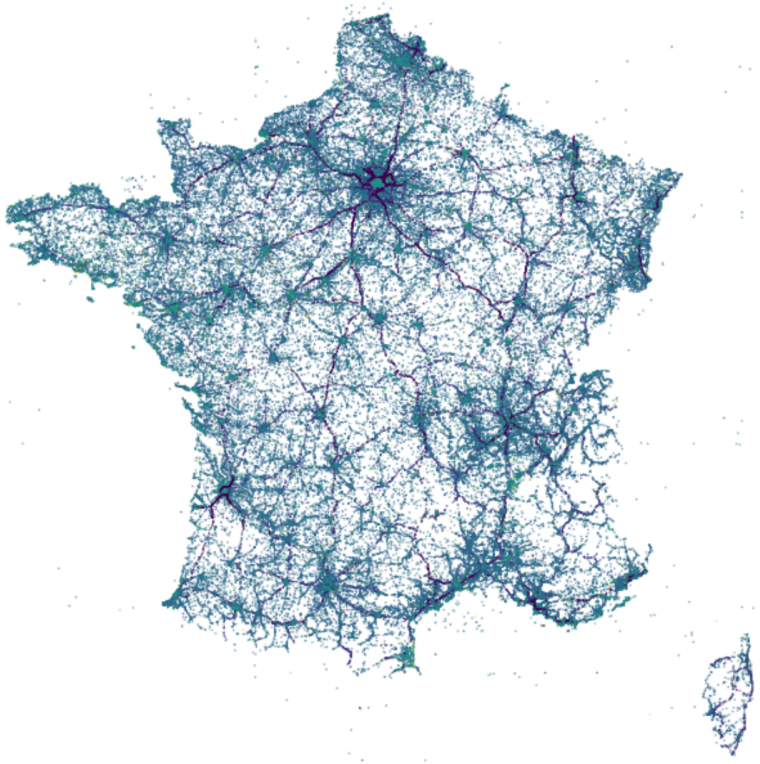
The work we have been doing so far on maps of France in the IGR204 course is obviously an inspiration for us to deliver value while using maps. Maps bring concrete elements for monitoring purposes, and could potentially help detect clusters for example (in red on the example below).

Why did you choose this design approach? What trade-offs did you make?

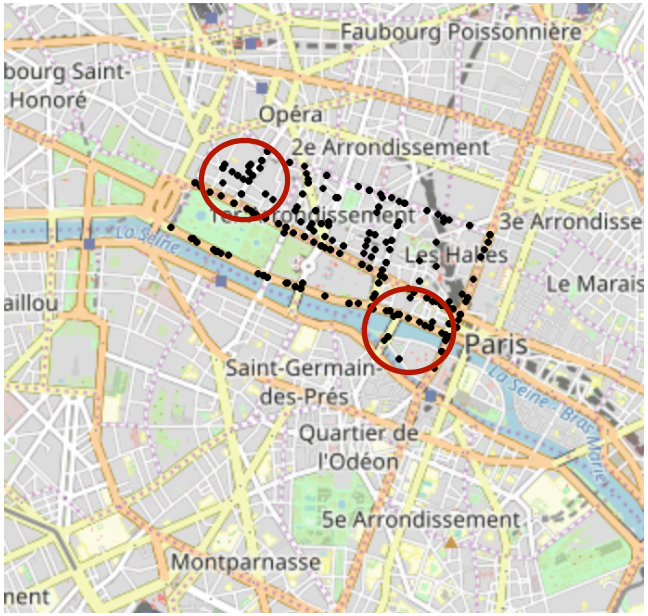
Since we have a lot of features, it was tempting to display them in additional dimensions instead of filters. We could play on the size of dots, on their color, on the marker, on the angle of the marker… In the end, the user would have surely been lost, which is the reason why we chose filters.

Monitoring

France



Votre commune : 75001



Filtres

Nuit

Gravité : Blessé

Conditions :

Sexe :