An Online Corpus of Isochrone Maps

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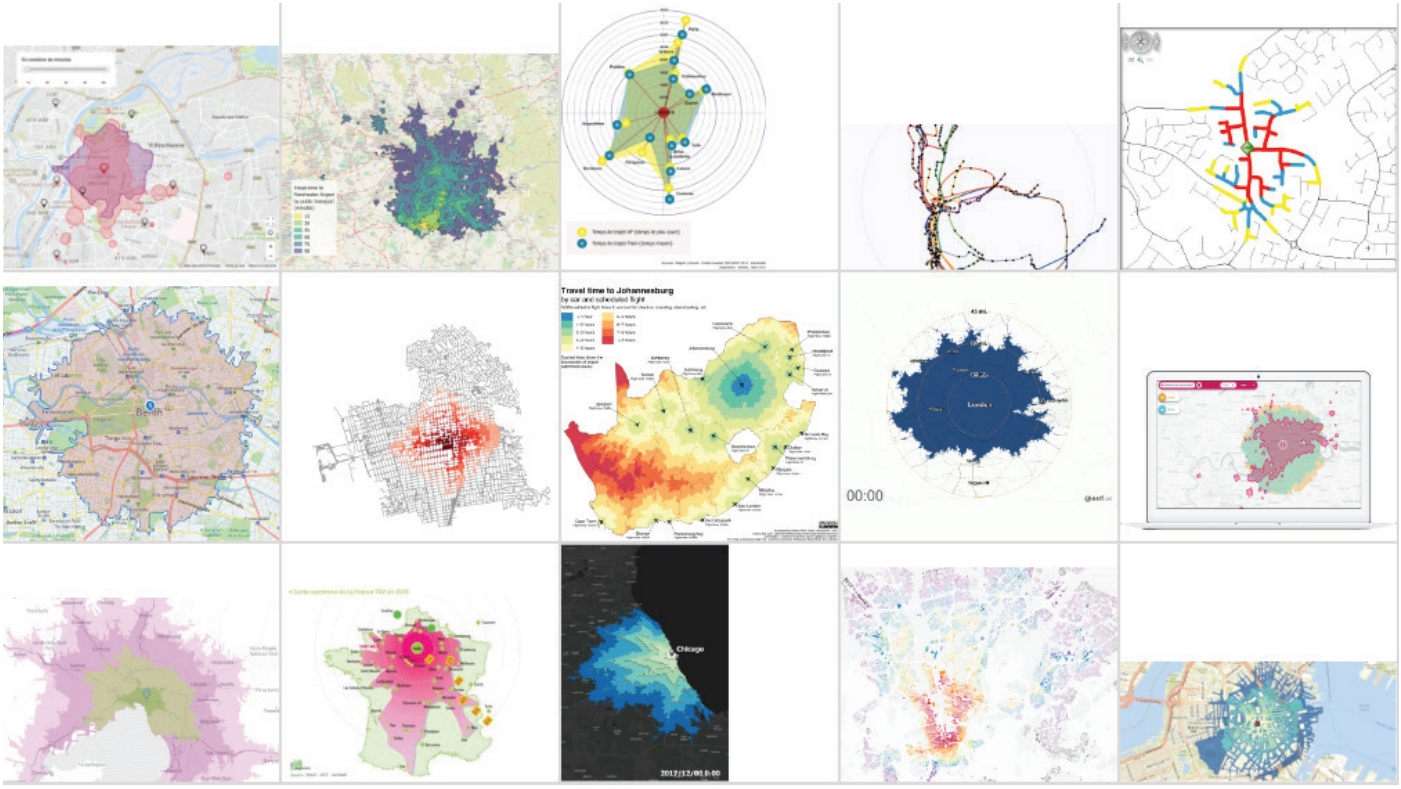

Figure 1: Sample of isochrone maps we collected and organized in our corpus.

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1. CONTEXT AND CONTRIBUTION

Isochrone maps depict destinations that can be reached within a time range (e.g. 5min). Such maps are popular in GIS tools and on mobility websites as they are intuitive for non-technical people. Using isochrones, urban decision-makers can visually capture the coverage of transit systems, and spot difficult to reach areas. City inhabitants can use them to find living areas that are close to work, daycares, or other personal preferences.

We present a web-based corpus of isochrones maps we collected, to identify their design space. While isochrones are constantly improved to support new tasks (e.g. to display time-varying mobility data [1], or support multi-modal networks characteristics [2]) the breadth of their design space (e.g. color scales, color gradients, steps, data types) still needs to be better understood. We built this corpus from diverse sources including Google Image, GIS websites, isochrones toolkits galleries, digital libraries, and personal collections. We gathered 52 isochrone maps (and counting). We then sanitized the dataset by removing redundant representations and un-related ones, to keep 37 representative isochrone maps.

The corpus is available online as a faceted search website[1]. The website allows filtering by properties such as color scale, color interpolation or any other metadata we identified (e.g. year, data source). In order to improve the

breadth of the corpus, we turned it public, the community can submit structured examples using a Google Form[2]. And the corpus is available as an open spreadsheet[3], that can be exported and further analyzed, or simply commented to improve quality.
As we already started to perform quantitative analysis on the corpus, we also provide all the code that allow to extract statistics (e.g. parameters frequency) from the spreadsheet using a Python Notebook[4] to further update our analysis.

We plan to continuously update the corpus to reflect both past and present advances in isochrones designs and applications. Such corpus subscribes to other community-based geo-related collections such as the Visualizing Cities Open Platform website[5]. It will also be used in the frame of the M2I project[6] that partially funds this research, and which aims at providing new visual tools to to build and follow combined itineraries in urban areas.

2. PRELIMINARY REPORT

We now report on a very preliminary analysis of our corpus. Figure 1 shows a sample of visuals from our collection. Regarding the isochrones creation period, they range from 1881 to 2018, where the earliest are paper-based representations. Recent isochrones are computer-generated images resulting from the assembly of multiple building blocks (e.g. base map, data source, layers, shapes generator). We haven't (yet) identified any particularly frequent combination of those blocks. This was surprising as, from our experience, isochrones are difficult to generate due to the complex data queries they rely on, so we expected less isochrone generators to exist. However, a common denominator was the data source used: often Navitia or OpenTripPlanner — both are very popular, free itinerary APIs.

Color is a key element of isochrone maps design, as each region usually has a filling encoding the time steps. Yet we found very diverse color palettes and we could not identify any unique strategy from our corpus analysis. Color interpolation was linear for roughly a half of our examples (the Viridis one being very popular), the other half used thresholds or categories. Most of the color scales could arguably be improved (by not using rainbow colors, by being color-safe, etc.).

We expect to continue this analysis and discussion during the CityVis'18 workshop and report on more advanced and statistics-supported findings from our isochrone corpus.

FOOTNOTES

[1] https://romsson.github.io/isochrones/web/isochrones.html
[2] https://goo.gl/forms/fkt7RiVzdsVB81vK2
[3] https://goo.gl/TX1gcp
[4] https://romsson.github.io/isochrones/processing.ipynb
[5] http://cityvis.io/collection.php
[6] https://projet.liris.cnrs.fr/mi2/

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