Augmented-Reality Storylines Visualizations
Master 2 Internship
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Internship period: starting in March/April 2022, 5 or 6 months duration.
Supervisors: Anastasia Bezerianos and Vanessa Peña-Araya.
Location: ILDA, Université Paris-Saclay, building 660.

In our past contact with data journalists we’ve seen that they are interested in analyzing the relationships among politicians, whether they visit particular locations or if they are linked to certain organizations (e.g. political parties, enterprises, etc). These relationships help them understand recent news events, like why a politician won an election or why they quit their political party.

Visualizing these datasets is an emerging research field [3]. Our HyperStorylines [5] tool is one of the most recently published visualization techniques to explore them. It is based on Storylines visualizations where people are represented by lines that evolve over the horizontal axis that represents time. HyperStorylines generalizes Storylines visualizations by allowing users to create custom views and see the relationships of any two types of entities, instead of just people over time. Additionally, a third type of entity can be visible by using interaction. Figure 1 shows some examples of custom views of HyperStorylines and GeoStorylines, a design that includes geospatial context.

![Figure 1](image1.png)

**Figure 1**: (A-C) HyperStorylines visualization with three views of a dataset. (A) Shows a view of people (represented by lines) that evolve along the horizontal axis, that here represents time (aggregated by months). Small vertical bars are relationships, positioned in the intersection of both axes of the entities that compose them. Relationships can have zero or more internal nested entities (a third type of entity), which can be seen by interactively expanding them (B). (C) Shows the stories of people related by locations instead of time (time is the nested entity). The red circles across images indicate where the entities that contribute to the highlighted relationship in (A) appear in the other views. (D) Shows an example of GeoStorylines, a visualization that shows the geographical context of these relationships.

Internship goal:

The volume of real-world datasets makes the resulting views complex and hard to analyze. In order to make the analysis of them easier, we aim to take advantage of the 3D space and data manipulation provided by Augmented Reality (often referred to as Immersive Analytics in the visualization community [11]). Therefore, the goal of this internship is to design and implement a new version of HyperStorylines in Unity that allow users to explore these datasets in an immersive environment. As inspiration, Figure 2 shows two immersive analytic systems that show different ways to link data across views.

Work plan:

The work of the internship will be divided in four main tasks:
Figure 2: Two augmented reality systems to analyze data. On the left, the work of Reipschlager et al. [6] that show a set of techniques for extending visualizations on large displays with AR for better data exploration. On the right, STREAM [4] a technique that allows users to use tablet input to interact with linked visualizations.

1. Review the available visualization libraries for Unity (e.g. IATK [2]) and evaluate the feasibility to use them for the project.

2. Implement a first version of Storylines visualizations in Augmented Reality as the base of the system.

3. Design and implement the visualization for expanded relationships in the third dimension, in addition to the connection among the entities within them.

4. Evaluate prototypes of the new designs in a user study.

**Requirements for Applicants:** Knowledge of programming using Unity is a big plus, having ta user evaluation and prototyping methods.

**References**


