

Summary

Rendezview is an **interactive** data visualization framework to show flock **patterns and relationships** in complex data, particularly data from social media platforms such as Twitter. "Flock" refers to the clustering of similar data. The multiple interactive visualizations allow users to assess many levels of relationships in their data and easily detect patterns that would not be evident in a database alone. It is built in HTML5, CSS, and JavaScript.

Motivation

To develop a web-based interface for visual data mining³ to extend functionality of previous Sophy⁴ framework :

- Implement multiple, interactive data visualizations: geo-spatial, time, and topic data.
- Improve user interaction coupled with data mining processes: data filtering, selection, aggregation, etc.

Data Visualizations

Spatiotemporal 3D Map

The spatiotemporal 3D map is the primary visualization in the Rendezview interface. It is implemented using Three.js⁵ and GeoJSON² data. Geospatial data is represented in the X-Y (red/blue) dimensions, while temporal data is represented in the Z (green) dimension. Each of the cubes that are mapped on top represent a matching row from the database. The shade of each box represents its value. Boxes turn red when selected and additional relevant information appears on the side.

Word Cloud

The word cloud shows the frequency of keywords and hashtags used in conjunction with the searched on keyword. It updates to include the aggregate of all word frequency information when multiple boxes are selected. This was implemented using D3.js¹.

Sankey Flow Diagram

This is a type of flow diagram that consists of nodes and links, where nodes are keywords and links are geospatial-temporal intersections between keywords. The width of the links shows the flow quantity, which is the measure of the intersection of the boxes in the 3D map. This is based on a D3 Sankey plugin.

Rendezview Interface

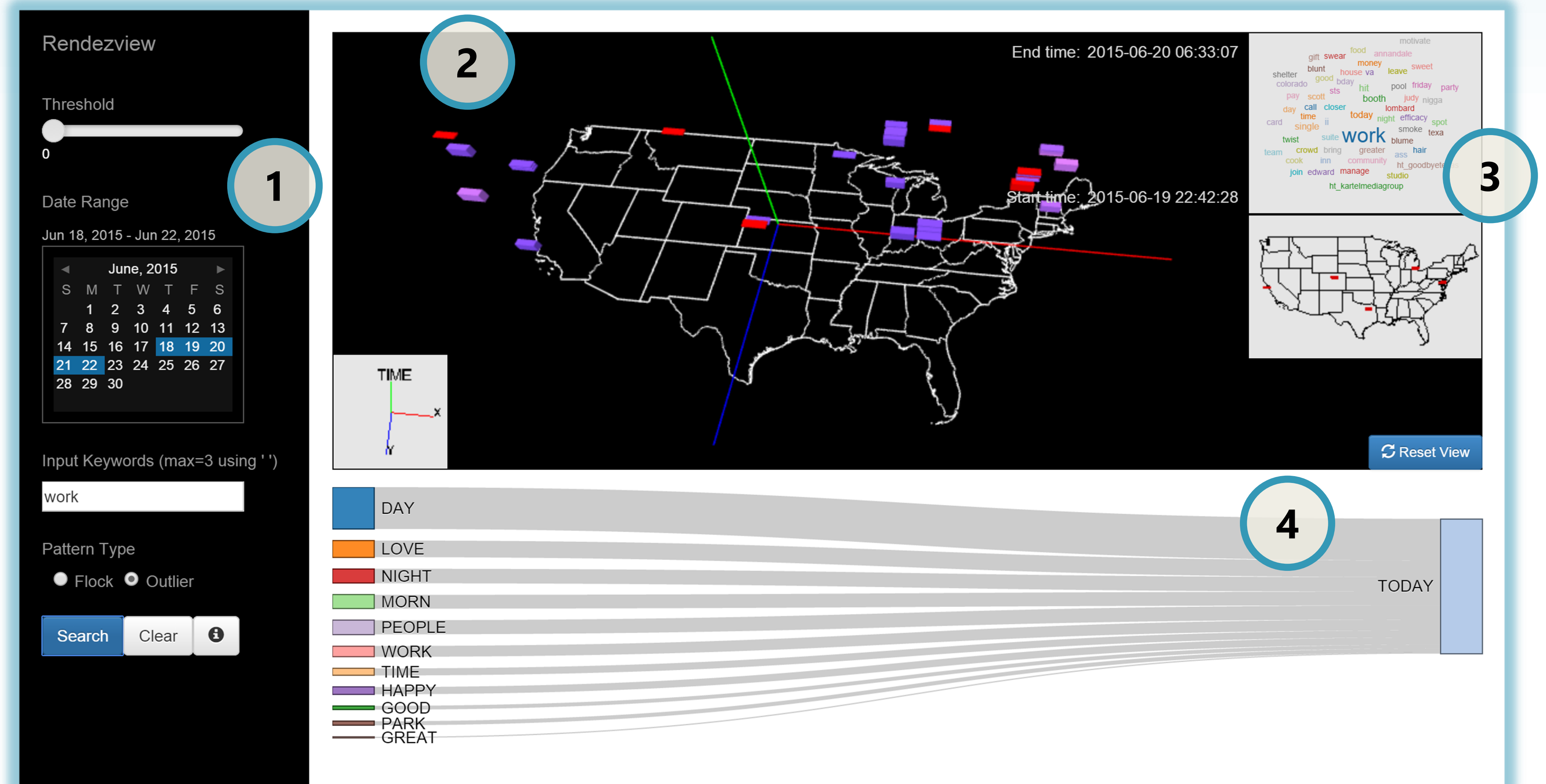


Figure 1. The above screenshot shows the UI layout, design, and functionalities of the Rendezview framework. **(1)** The user inputs their options for **filtering** the data to display. **(2)** Database entries that match the selected options are represented on the 3D map as **cubes**. Each cube's position, dimensions, and color correspond to geospatial, temporal, and/or topic metadata. **(3)** Additional visualizations appear when boxes are clicked on. These include a **word cloud**, a 2D map to more clearly show geospatial dimensions, and labels displaying the time range of the selected data. **(4)** A Sankey diagram shows **flock relationships** between keywords. The user can click on links between keywords to display geospatial temporal intersections of those keywords on the 3D map.

Interactive Visual Data Mining

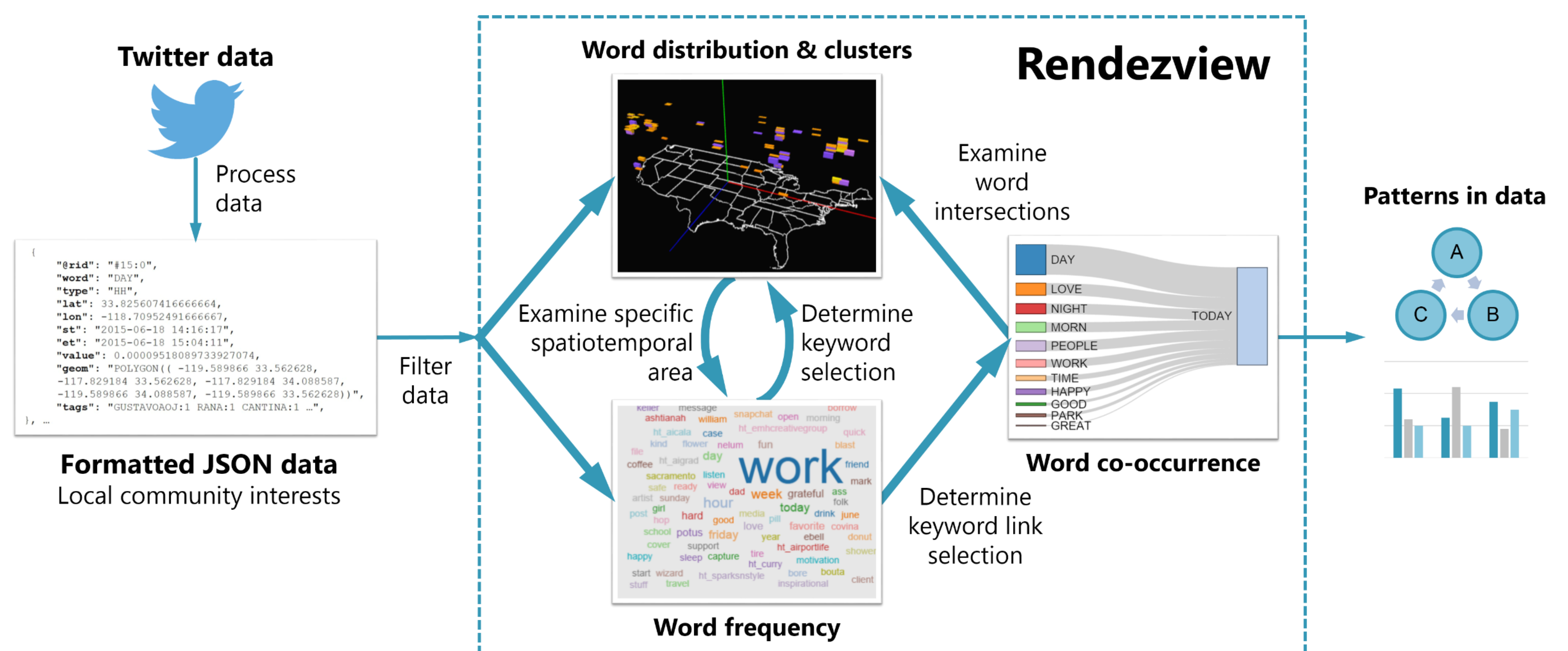


Figure 2. Rendezview is a tool for *visual data mining*: the process of detecting patterns within big data using visualizations. This diagram shows how data is represented and the interactions between the visualizations.

Future Improvements

- Connection to live database.
- Sankey diagram functionality and interaction with 3D map, including option to view link widths according to various aggregation types.
- Front-end performance improvements.

References

1. D3: <http://d3js.org/>
2. GeoJSON: <http://geojson.org/>
3. Keim D. Information Visualization and Visual Data Mining. 2002.
4. KS Kim, H Ogawa, A Nakamura, I Kojima. Sophy: a Morphological Framework for Structuring Geo-referenced Social Media. 2014.
5. ThreeJS: <http://threejs.org/>

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