Enabling Effective Visualization Creation in High School Teachers & Students

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Introduction

• 40% of students are visual learners [1]

• Available visualization tools are limited in accessibility, resulting in lost time for teachers or an absence of charts in classrooms entirely, which leads to a measurable underperformance in students who are visual learners

• Using feedback from high school teachers, we created a web-tool that allows users to simply create effective charts

Previous Research

• Visualizations containing data close to students in time, space, and interest are most effective [2]

• Reading data representing massive numbers can result in *number numbness*—a visualization showing the deaths of 100,000 lives doesn't communicate the importance of each one of those lives [2]

Based on this research, we are increasingly providing small datasets particularly relevant to Rhode Island students and students in the surrounding New England area. While not every visualization can be perfect it can still tell a clear story and be effective in one of the ways mentioned (in this case, proximity).
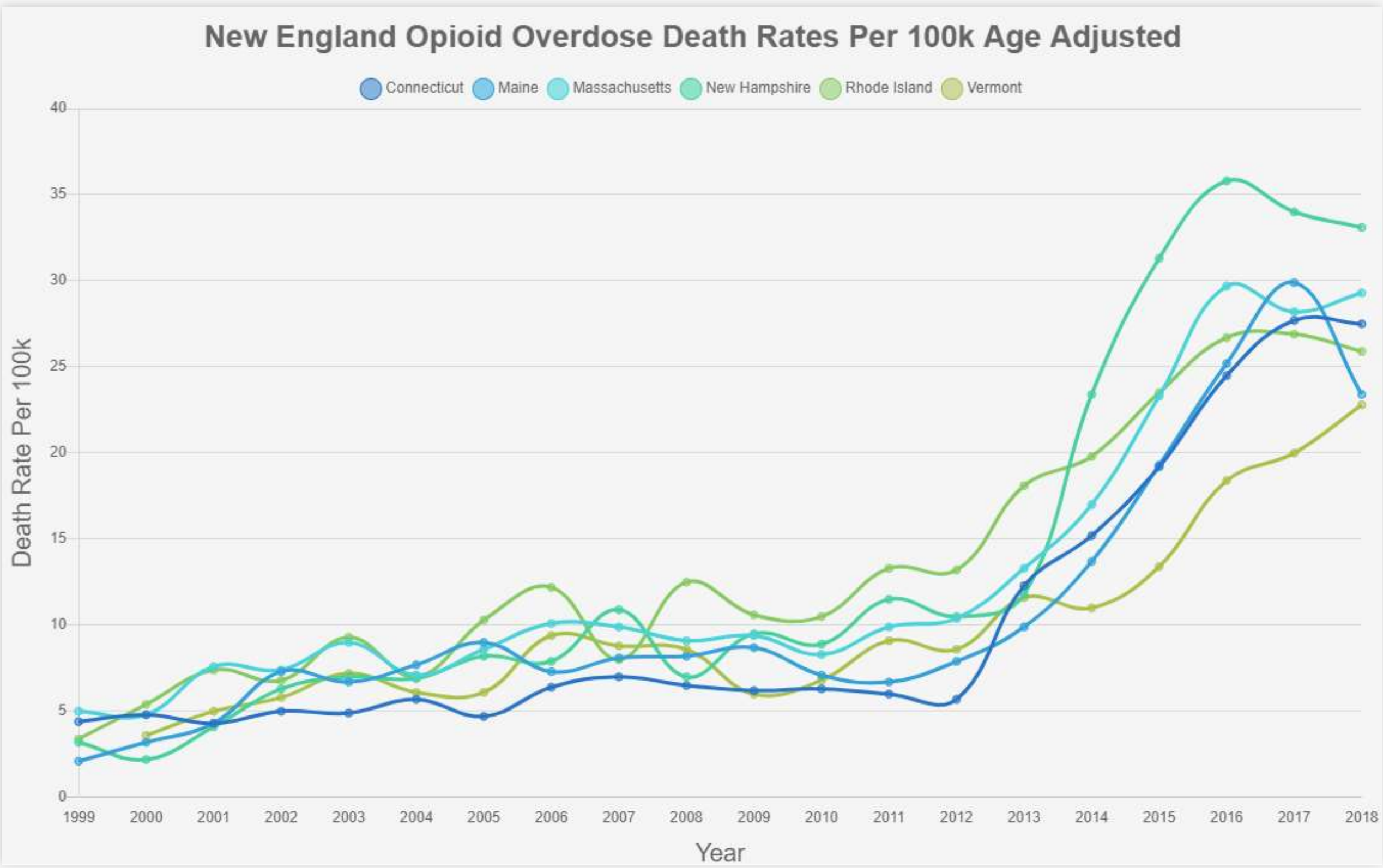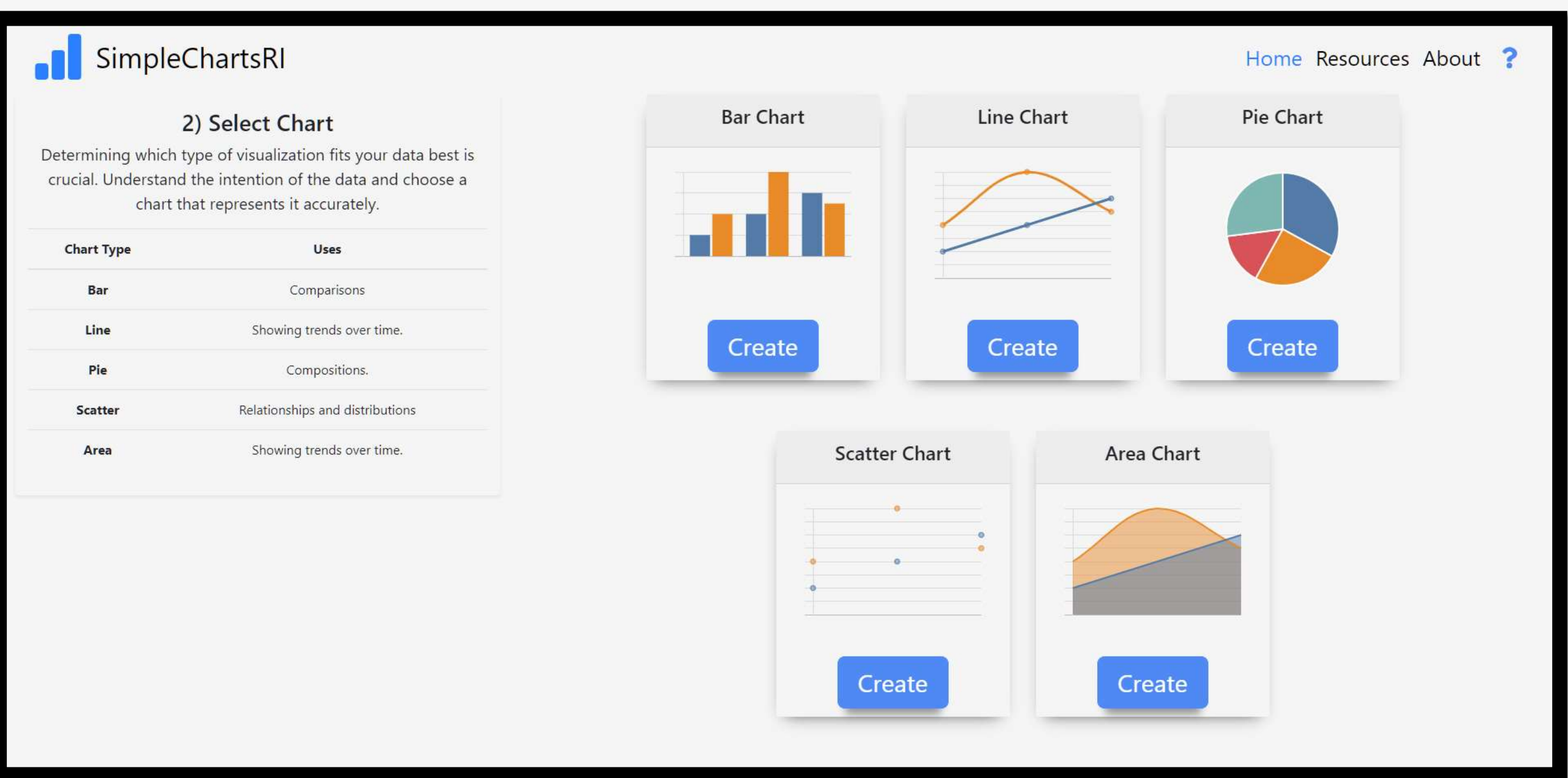

Our Tool

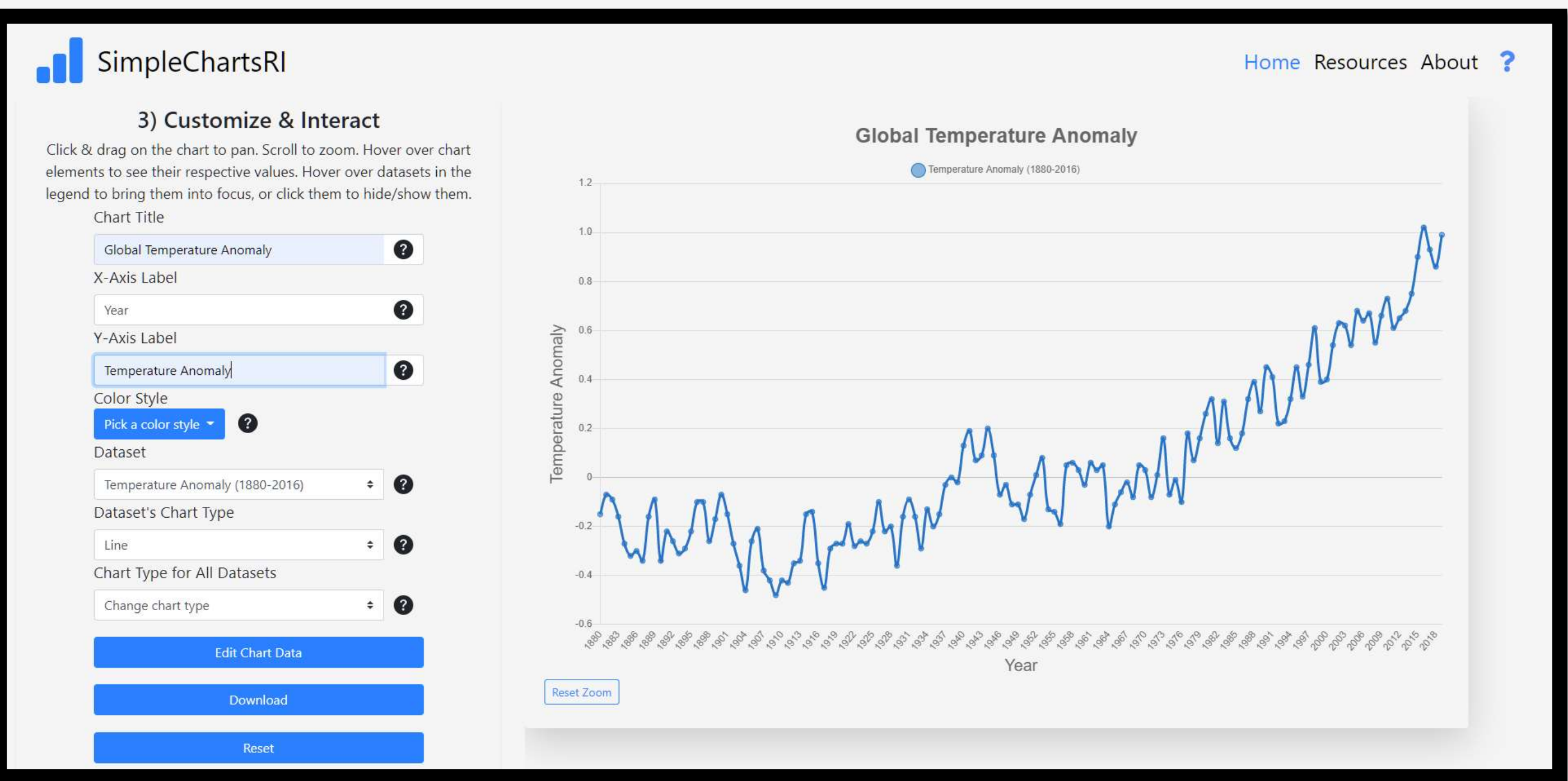Our free web-tool allows users to create a chart in 3 steps:
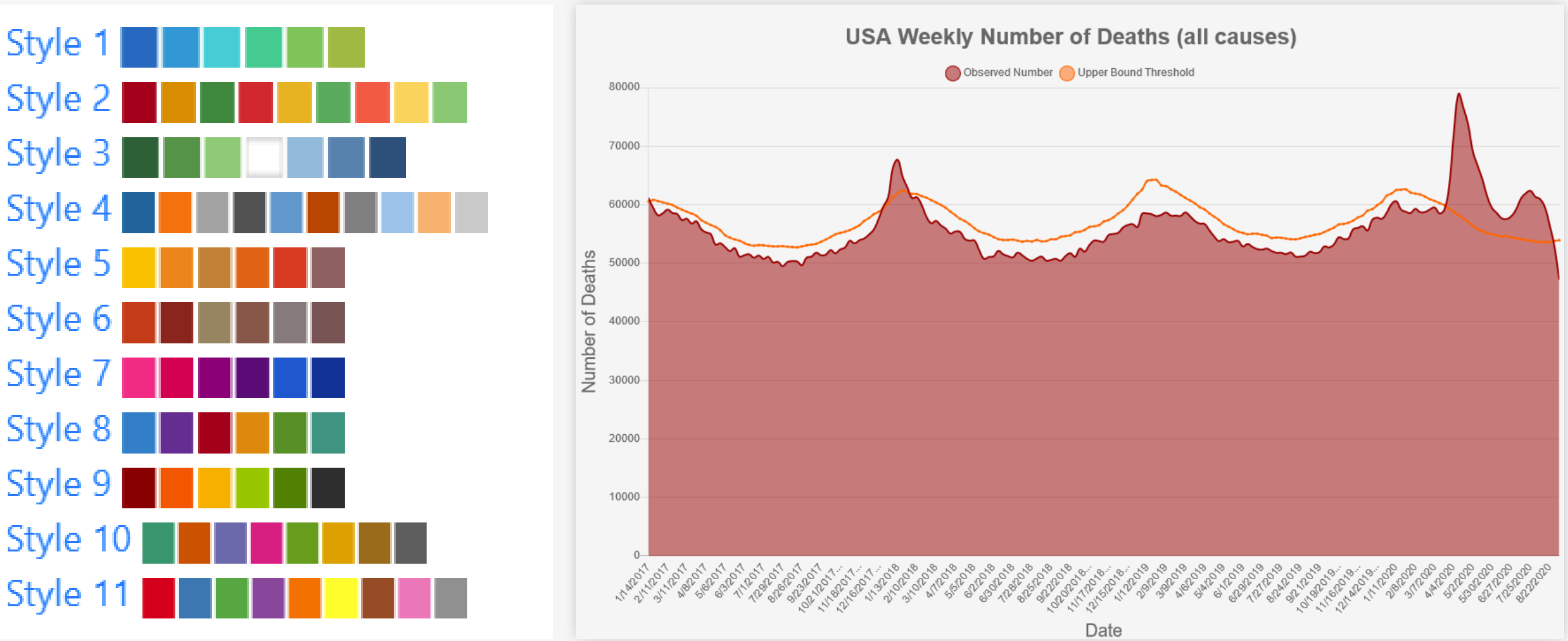
1) Choose Data
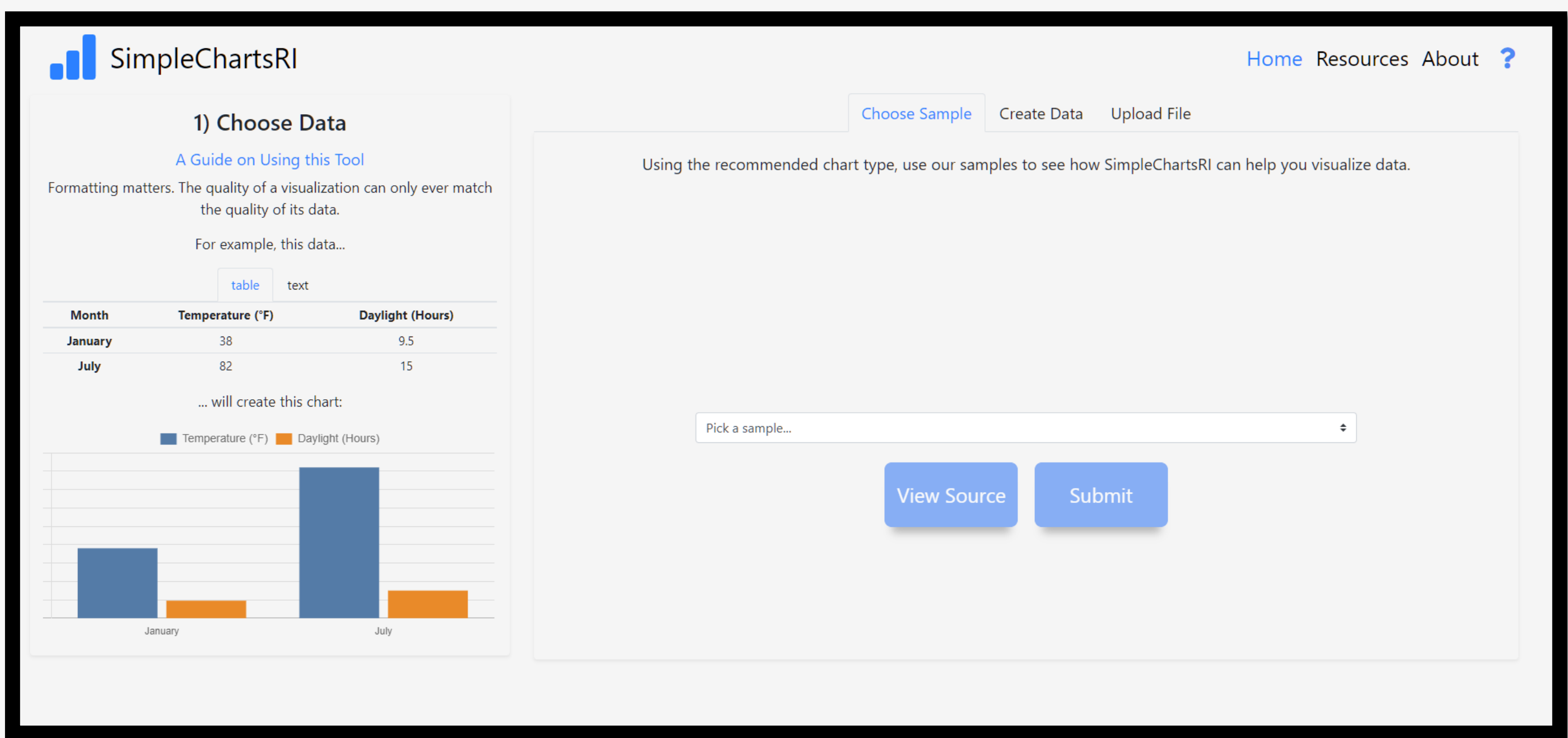
2) Select Chart

3) Customize & Interact

Workshop Survey

During a data visualization workshop, we surveyed high school teachers to see what would be most useful. We added features to our tool based on their responses. Two larger features we added were color styles and the ability to overlay datasets with different chart types.

Another feature mentioned in survey responses was the ability for chart interaction. Since the goal of a chart is to tell a single clear story—we utilized the standard features of ChartJS and added onto it to allow users to simplify their data dynamically in the following ways:

1) Click on datasets in the legend to hide/show them
2) Hover over datasets in the legend to turn all other datasets transparent
3) Use the mouse wheel to zoom and click & drag to pan
4) Hover over chart elements to see their specific values

Conclusions

For teachers, finding datasets and formatting those datasets in a timely manner is difficult. Future additions to our tool will further aid users with this process. Ideally, an additional integrated tool with a low learning-curve would be created to help users search for smaller datasets that can then be easily reformatted.

References

[1] Hannah K. Ricketts, Alexa M. Salsbury, David R. Bevan, and Anne M. Brown. 2018. Using Immersive Visualization Environments to Engage Students in Hands-On Learning. In Proceedings of the Practice and Experience on Advanced Research Computing (PEARC '18). Association for Computing Machinery, New York, NY, USA, Article 74, 1–5. DOI:https://doi.org/10.1145/3219104.3229274
[2] Campbell S, Offenhuber D. Feeling numbers - The emotional impact of proximity techniques in visualization. Information Design Journal, Volume 25, Issue 1, 2019, p. 71-86

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