CS458 - Intro to Information Visualization
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Mapping the ADHD Treatment Landscape: Availability and Distribution of Facilities Across Regions

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Understanding the accessibility and distribution of ADHD treatment facilities in different regions is critical to assessing the care environment for individuals diagnosed with ADHD. It can highlight disparities in care delivery, identify areas where ADHD treatment is difficult to access, and help inform future resource allocation and policy interventions. Incorporating location information into the topic adds an important dimension to our understanding. It allows us to visualize geographic disparities and identify "treatment deserts"-areas where ADHD treatment facilities are scarce or lacking. It can have a profound impact on people living in these areas, who may find it difficult to access timely and appropriate care. For example, urban areas may have multiple ADHD treatment facilities, while rural or remote areas may have almost none. This geographic variation in service availability may result in unequal health status for people with ADHD depending on their location. In addition, mapping the distribution of these facilities may also indicate the geographic extent of different types of treatment. For example, areas with higher concentrations of facilities offering certain types of treatment (e.g., behavioral therapy or medication) may indicate a preference or bias for these treatment modalities in those areas. By visualizing the location of these facilities on a map, we can gain insight into the geographic distribution and density of these facilities. These data can reveal a wealth of information about access to care for people with ADHD. For example, densely populated areas with a high density of treatment facilities may indicate higher accessibility to care, while areas with fewer facilities may indicate a "treatment desert". Understanding these geographic differences is critical because people living in "treatment deserts" may face challenges such as long travel distances or lack of available services, which can lead to treatment delays and potentially poorer health outcomes. In addition, mapping the location of these facilities can help identify potential patterns or correlations with other geospatial data. For example, is there a correlation between the prevalence of ADHD in an area and the number of treatment facilities? Are there areas with high rates of ADHD diagnosis but low numbers of treatment facilities? Understanding these patterns can provide valuable insights for healthcare planning and resource allocation. In summary, incorporating geospatial information into our understanding of the ADHD treatment landscape can greatly enhance our understanding of the topic. It allows for more comprehensive and nuanced analyses that can inform policy decisions and improve resource allocatio, and ultimately promote health equity for people with ADHD.

There are 7 techniques for visualizing the data in the article, “7 Techniques to Visualize Geospatial Data”, and we picked 3 techniques among them for analysis: Choropleth Map, Heat Map, and Dot Map. Choropleth Map, Heat Map, and Dot Map are all widely used visualization techniques that play a crucial role in representing data spatially. While they share similarities in their spatial representation, each technique employs distinct strategies to portray and emphasize information. **A Choropleth Map** serves as a powerful tool for displaying data associated with specific geographic areas. By utilizing various colors or patterns, it represents different values or categories within predefined regions like countries, states, or counties. Choropleth maps effectively communicate variations in data across regions by employing color gradients or shading. Typically, darker or brighter colors indicate higher or lower values, respectively. This technique finds utility in illustrating demographic information, election results, or any data that can be aggregated into predefined regions. This technique is also used for representing our data set, “Percent of children (aged 3–17 years) with current ADHD who receive treatment” on the Centers for Disease Control and Prevention website. However, it is important to note that Choropleth Maps may not be suitable for accurately representing precise values due to the inherent limitations of color-based representation. **Heat Maps** offer a different approach, focusing on representing data density or concentration in a continuous spatial area. They excel in visualizing data that lacks distinct geographic boundaries, such as temperature distribution, population density, or web traffic patterns. Heat maps employ color intensity or gradients to depict variations in data density, utilizing warmer colors like red to indicate higher values and cooler colors like blue to represent lower values. The intensity of color at a given location signifies the magnitude or density of the data at that point. Heat maps provide a more detailed representation compared to Choropleth Maps, enabling the exploration of nuanced patterns within a continuous area. However, similar to Choropleth Maps, Heat Maps face challenges in precisely determining values due to their reliance on the color representation. Additionally, since heat maps rely on color schemes to represent data, the interpretation of colors could be subjective. The way people perceive colors and attribute meanings to specific color gradients can vary among individuals, which can sometimes result in possible misinterpretations or misunderstandings of the data. **Dot Maps** take a different approach altogether by representing individual data points or events on a map using distinct dots or markers. Each dot typically represents a fixed quantity or a predetermined count of occurrences. Dot maps find utility in displaying discrete data points, such as the locations of cities, crime incidents, or disease outbreaks. The density of dots in a specific area conveys information about the concentration or frequency of the events being represented. Dot maps excel in providing localized insights and highlighting spatial patterns within the dataset. However, they may face challenges when dealing with a large number of data points, as overplotting can occur. Overplotting makes it difficult to distinguish individual dots or

accurately assess their density, potentially obscuring patterns or leading to misinterpretation. Additionally, Dot Maps may be less effective when representing continuous data or when the precise geographic context is essential. In summary, Choropleth Maps, Heat Maps, and Dot Maps are powerful tools for visualizing spatial data. Each technique has its strengths and limitations, and the choice of which technique to employ depends on the specific characteristics of the dataset and the insights sought. By understanding the unique features and considerations associated with each technique, data analysts and researchers can effectively leverage these visualization tools to gain deeper insights into the spatial patterns and relationships within their data.

Google Charts is one of the data visualization tools. It is overwhelmingly convenient as it can be integrated with various other Google tools such as Google Spreadsheets or Google Forms. Specifically, one thing that was really interesting was that we could make a chart with a table on Google Docs, not with Google Spreadsheets. Moreover, Google Charts offers real-time data updates, so the user is always able to check the latest visualized data. For example, when conducting a survey for specific data collection, if you use Google Forms to conduct the survey, Google Charts automatically visualizes the data according to the user's requirements. To verify this point, we submitted a new response to the sample survey form we created ourselves. Then, we observed that the pie chart was being updated almost in real-time. Unlike other programs, Google Charts is easy to use, making it widely accessible to beginners in data visualization. In addition, it is already popular with people so the user can find a lot of related resources within a community.

Multi-view Visualization

Motivation:

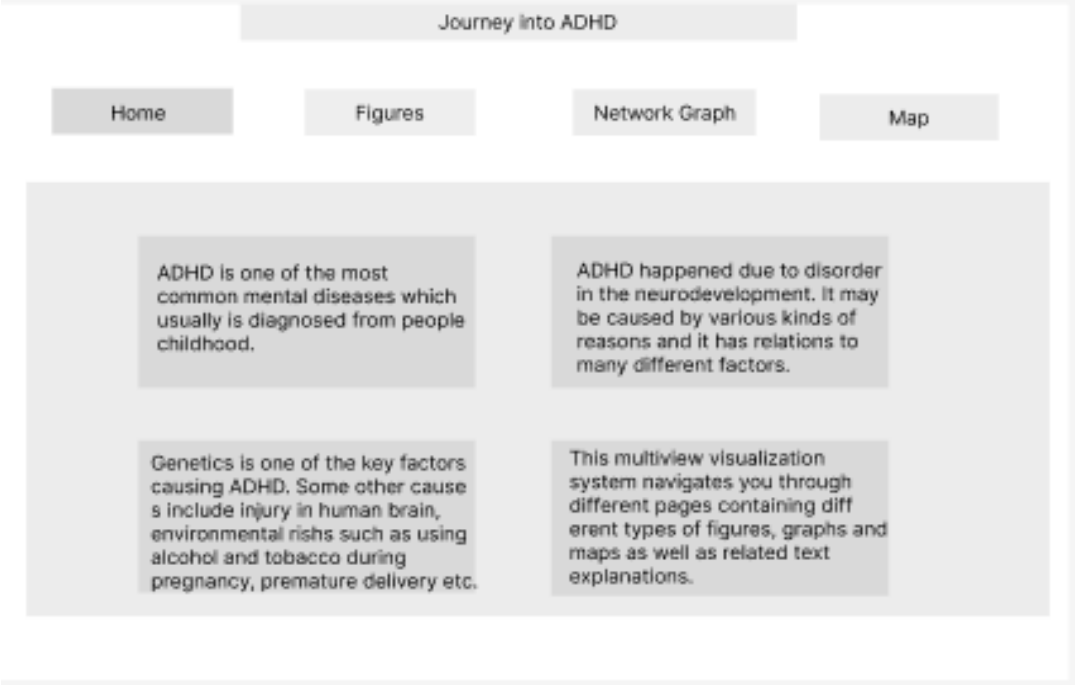
The motivation for designing the multiview visualization system for our ADHD topic is to recognize or discover the multifacted and complicated nature of ADHD from multi persepctives and integrated all facets into the one visual system; thus, we could have a more comprehensive understanding of ADHD through knowing its facts, background information, prevalence, causing factors, treatments, co-occurring symptoms, and networking associations with one another. By integrating various different figures, graphs, maps and datasets related to ADHD into the one system, the visualization becomes more cohesive and coherent. Another motivation is to also provide users a easy-accessible platform to explore various different aspects of ADHD, get internal associations between these factors/aspects, discover hidden relations and gain new insights which might be hidden inside original data sources. Multi-view Visualization also provides users a straightforward way to engage in and interact with the visualization system through the navigation/exploration on the UI.

Explanation of the UI and the planned coordination of different views:

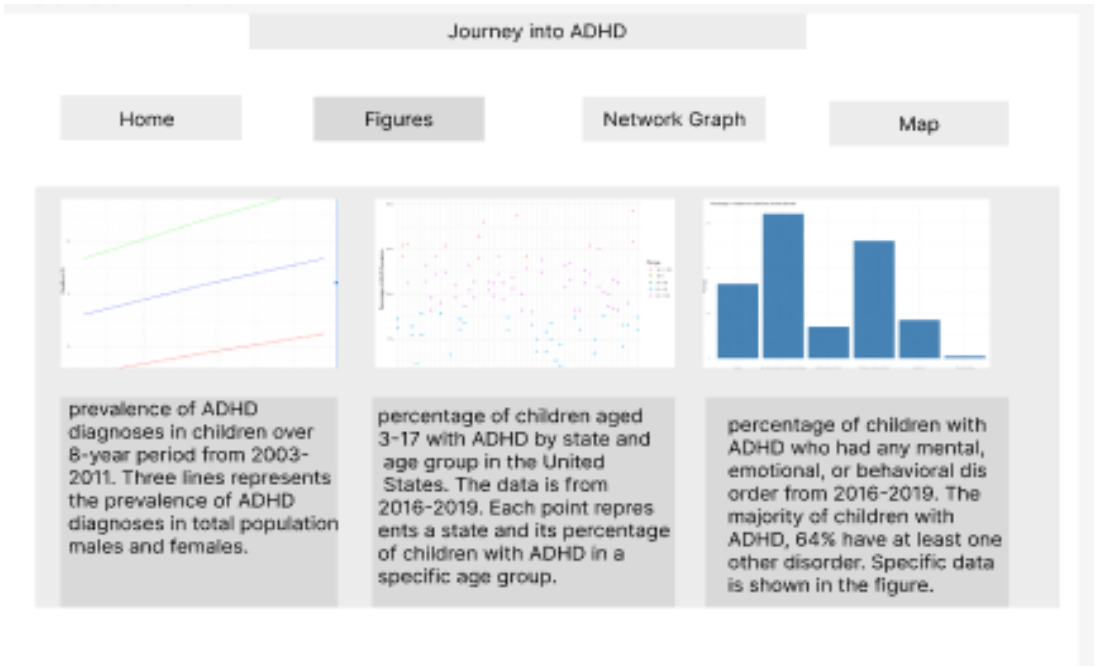
The color chosen for the UI is white, light gray and dark gray. Most of the elements are rectangles and squares. At the top center of UI, there is the name title of our topic. Below it there are four tabs aligned well with each other to serve as a navigation bar. Each of them represents corresponding separate section of related information. The `home` section is like the main menu (Homepage) of the system. If the user clicks on the `home` tab, this section would show and it is the default view of the whole system for the user. There are some ADHD facts, background information, as well as a simple guide or explanation of this system shown on this section. For the `figures` section, there are three different figures as well as their text explanations shown. For the `network graph` section, there are four graphs and their text explananions shown. For the `map` section, there are three heatmaps and a geolocation map related to ADHD data as well as their text explanantion shown. Under the figures/graphs/maps, there are also hyperlinks to related data sources attached in the rectangle boxes. To explore this system, users can just click the tab to visit the section they're interested in. Once clicked the tab, its background color would turn to dark gray, which implies this section is currently showing to the user, otherwise all the tabs color are light gray. By clicking on the tabs, the navigation through the multi different views or sections is implemented.

Snapshots:

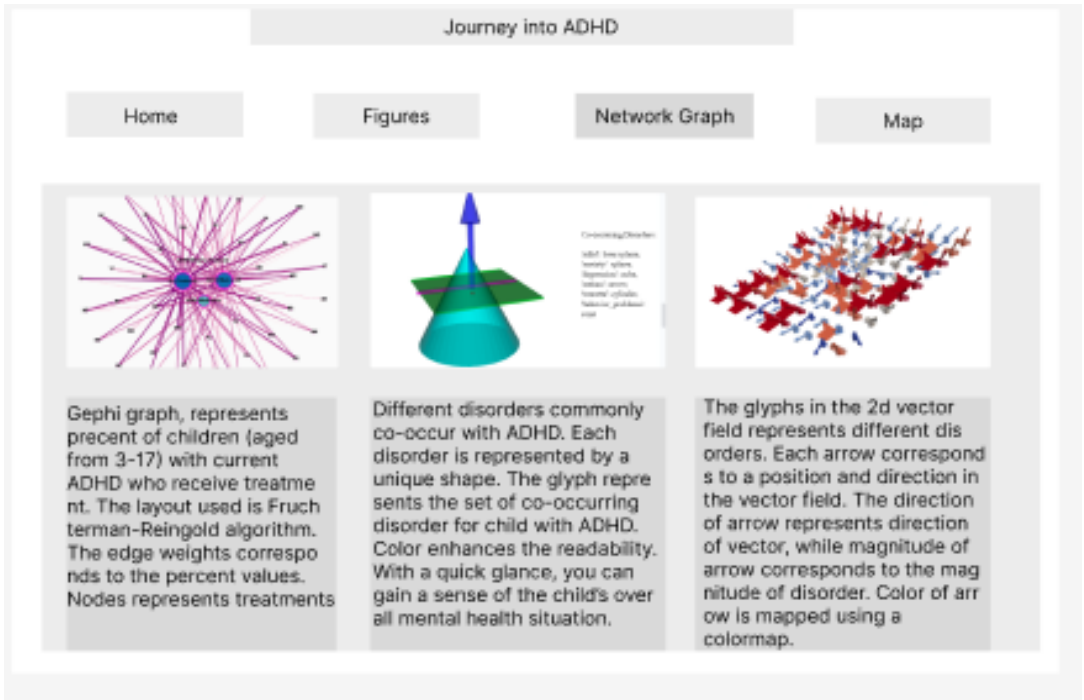
Main Section:



Figures Section:

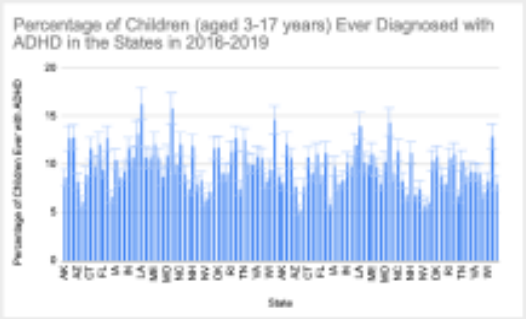


Network Graph Section:



Journey into ADHD

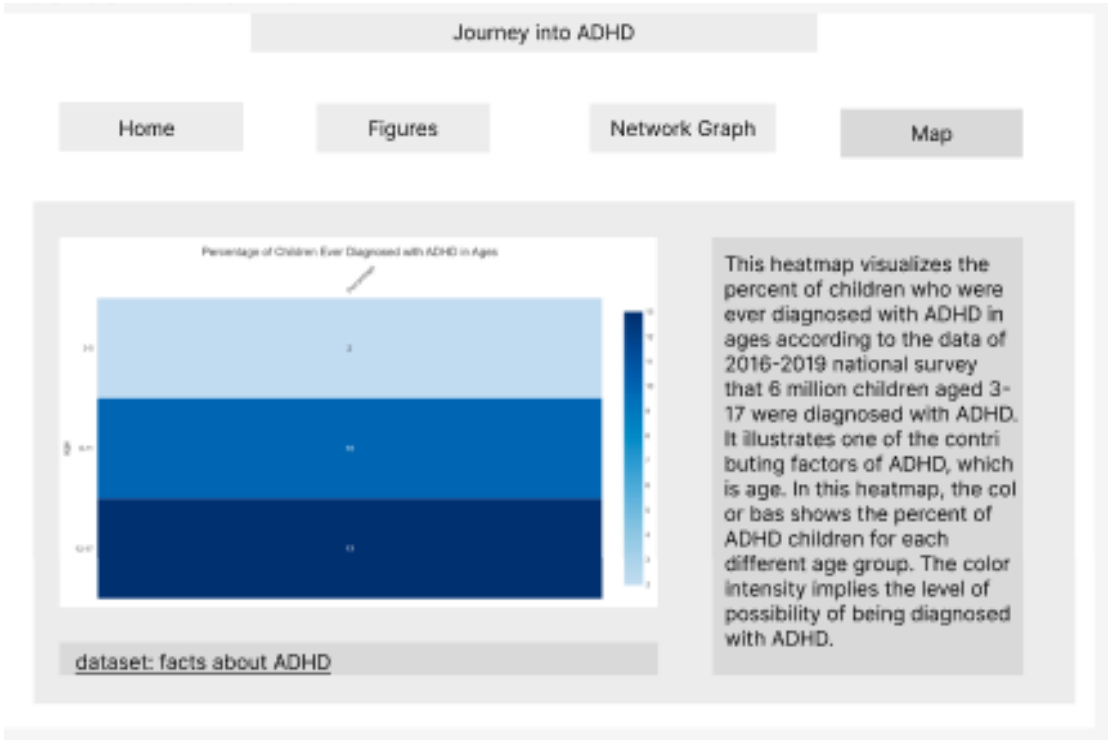
Home | Figures | Network Graph | Map



dataset: the state-based prevalence of ADHD diagnosis in 2016-2019

The graph shows the uncertainty visualization in the format of the error bars. It shows the percentages of children aged 3-17 years old ever diagnosed with ADHD in the states of U.S. in 2016-2019. The x-axis represents the states, and y-axis represents percent of children ever diagnosed with ADHD. The source of uncertainty comes from the possible variation of per cent values cause these values are in variable ranges and they may fluctuate up and down. The graph shows the upper and lower range of the stated value in the type of percent and the percent value is defined to 10%.

Map Section:


Journey into ADHD
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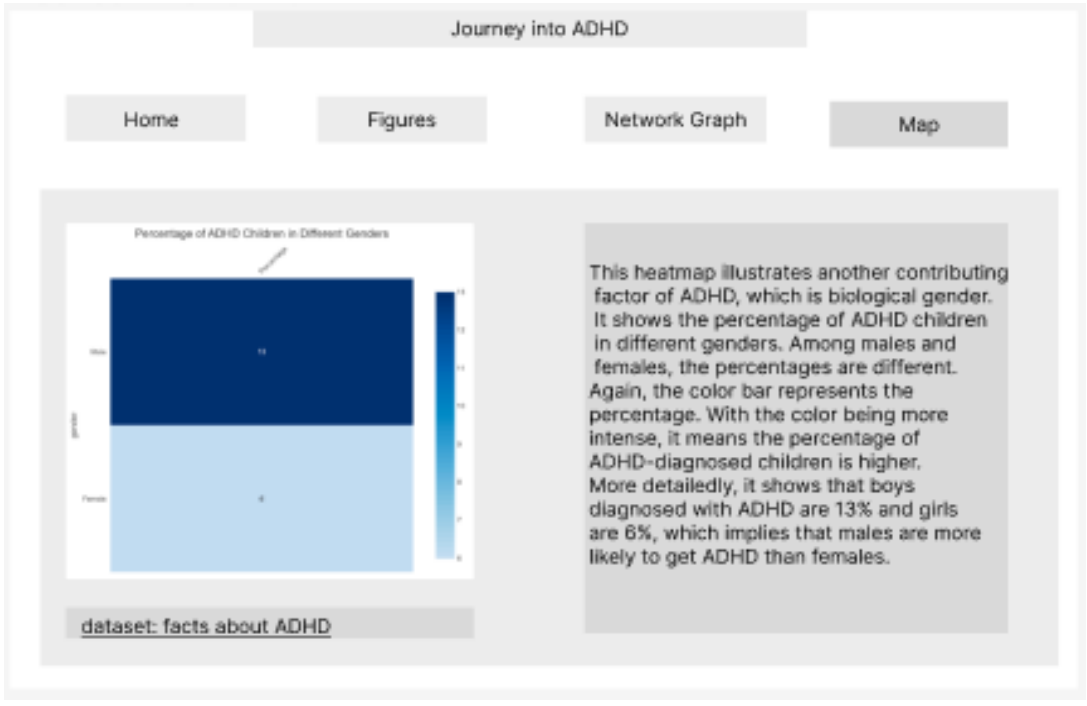
Figures
Network Graph
Map
Percentage of Children Ever Diagnosed with ADHD in Ages
This heatmap visualizes the percent of children who were ever diagnosed with ADHD in ages according to the data of 2016-2019 national survey that 6 million children aged 3-17 were diagnosed with ADHD. It illustrates one of the contri buting factors of ADHD, which is age. In this heatmap, the col or bas shows the percent of ADHD children for each different age group. The color intensity implies the level of possibility of being diagnosed with ADHD.
dataset: facts about ADHD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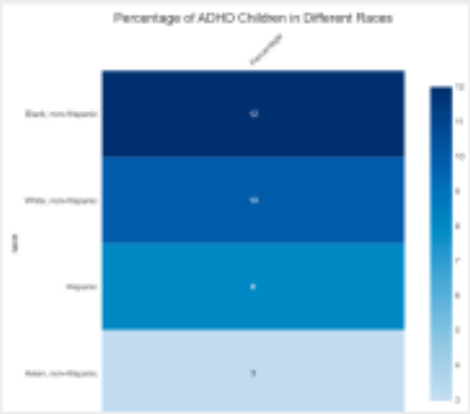
Map
Percentage of ADHD Children in Different Genders
This heatmap illustrates another contributing factor of ADHD, which is biological gender. It shows the percentage of ADHD children in different genders. Among males and females, the percentages are different. Again, the color bar represents the percentage. With the color being more intense, it means the percentage of ADHD-diagnosed children is higher. More detailedly, it shows that boys diagnosed with ADHD are 13% and girls are 6%, which implies that males are more likely to get ADHD than females.
dataset: facts about ADHD

Journey into ADHD

Home | Figures | Network Graph | Map



dataset: facts about ADHD

This heatmap shows another contributing factor of ADHD, which is race. It shows four different races including black non-Hispanic, Hispanic, and Asian non-Hispanic, as well as their corresponding percentage of ADHD children. The color bar represents the percentage level, and the percentage is higher with the color more intense. The heatmap shows the percentage of ADHD children differs in races. Black non-Hispanic children occupy 12% white non-Hispanic occupy 10%, Hispanics occupy 8% and the Asian non-Hispanic proportion is 3%. It imp lies that black non-Hispanic children might be more likely to get ADHD and Asian non-Hispanic children are less likely to get ADH D among the different races.

Journey into ADHD

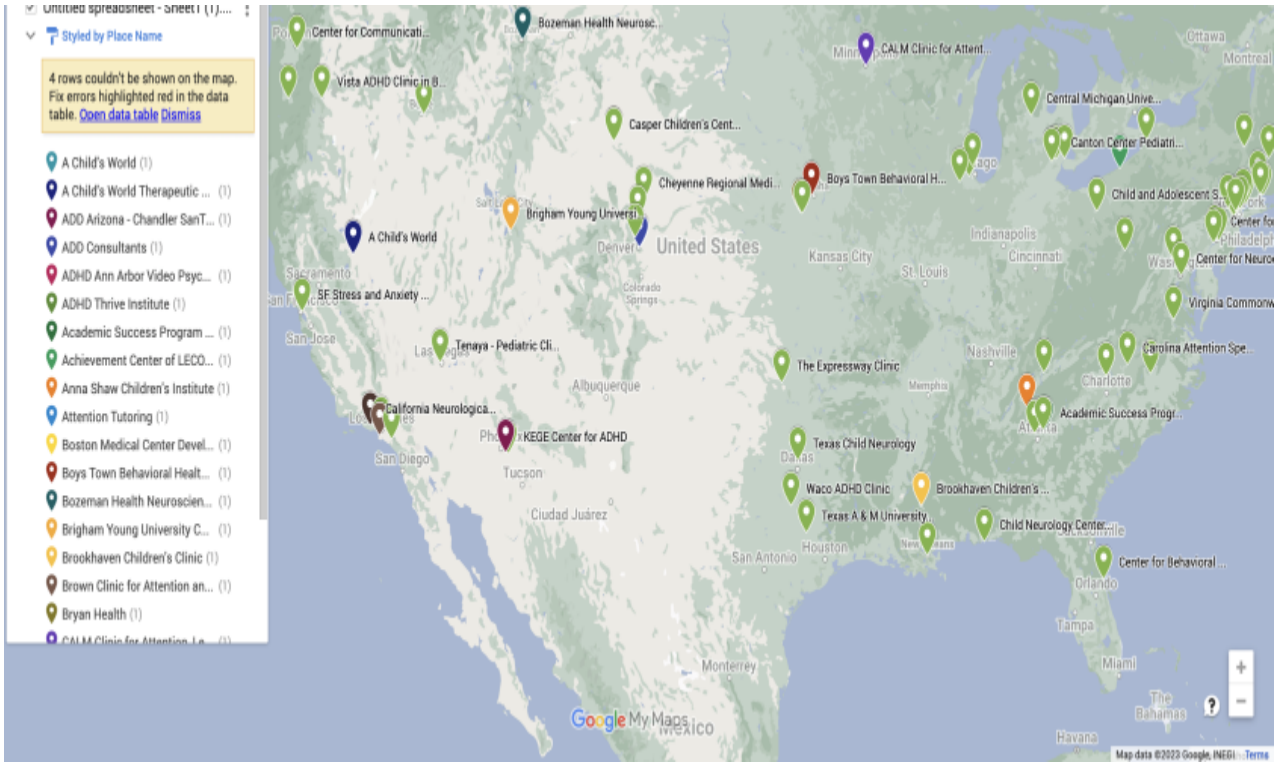
Home | Figures | Network Graph | Map

datasource: https://directory.additudemag.com/listing/guide/adhd-centers-clinics

This geographical map shows the overall situation of the distribution of ADHD treat ment facilities in different regions of the United States. It's a map visualization inte rgrating location information and other in formation (in this case it's the names of ADHD treatment facilities). It identifies areas where ADHD treatmet is difficult or easy to access, delivers helpful informatio n about how ADHD treatment facilities are distributed in the United States so that us ers could have a quick view of the overall situation to get more information and mak e their own decisions about where to go for treatment. In this map, the location m arks represents the names of ADHD clinics/ facilities, and each one is with a different color to distinguish. All of the facilities are placed on the corresponding and correct geographical locations on the map.

Note:

Original Geographic Map:



References:

https://www.cdc.gov/ncbddd/adhd/data.html

https://directory.additudemag.com/listing/guide/adhd-centers-clinics