



Anthroface

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Abstract

Under the guidance of Dr. Fred Harris and Cortney Hulse, our team created a rib fracture data collection and analysis application, Anthroface. Currently researchers at UNR are manually collecting data using CSV files and don't have it in a centralized place. The purpose of this software is to provide researchers an efficient way to collect and record relevant data and make meaningful interpretations from the dataset. The main features of Anthroface can broadly be placed into three categories, a quality user interface system to efficiently collect and record relevant data, a database to store collected information, and tools to help the user make meaningful interpretations from the dataset.

Goals

Our main goals for this project were to create an interface that could be used to record all relevant rib data, create a database to house all this data, provide a tool for statistical analysis of the data, and to create graphs and heatmaps to visualize the data. We want to satisfy our client to allow for an efficient way to collect and analyze the data which will help researchers understand rib fracture patterns and the variables that influence their occurrence and severity

Architecture

Our application is built using a react front-end to handle the user interface as well as getting and setting data via requests to the back-end. Our back-end uses Django which is a Python web framework. We are using a SQLite database to house the data. We have our project containerized and deployed on the UNR server.

Features

Anthroface allows users to login and enter new rib fracture manually. **Figure 1** shows the top of the new patient page where you can manually input a patient and their demographics. **Figure 2** shows the bottom of the page where you can manually input rib data and can fill the rib location by clicking the image. Our application also allows users to upload properly formatted data from a .csv file. Anthroface stores the data in an online database that can be exported as a .csv file. The database is filterable to allow users to find either specific cases or cases that are like other cases in rib fracture locations or through demographics. **Figure 3** shows the patient database page where the filter bar is filtering all the patients that are white males.

Figure 1

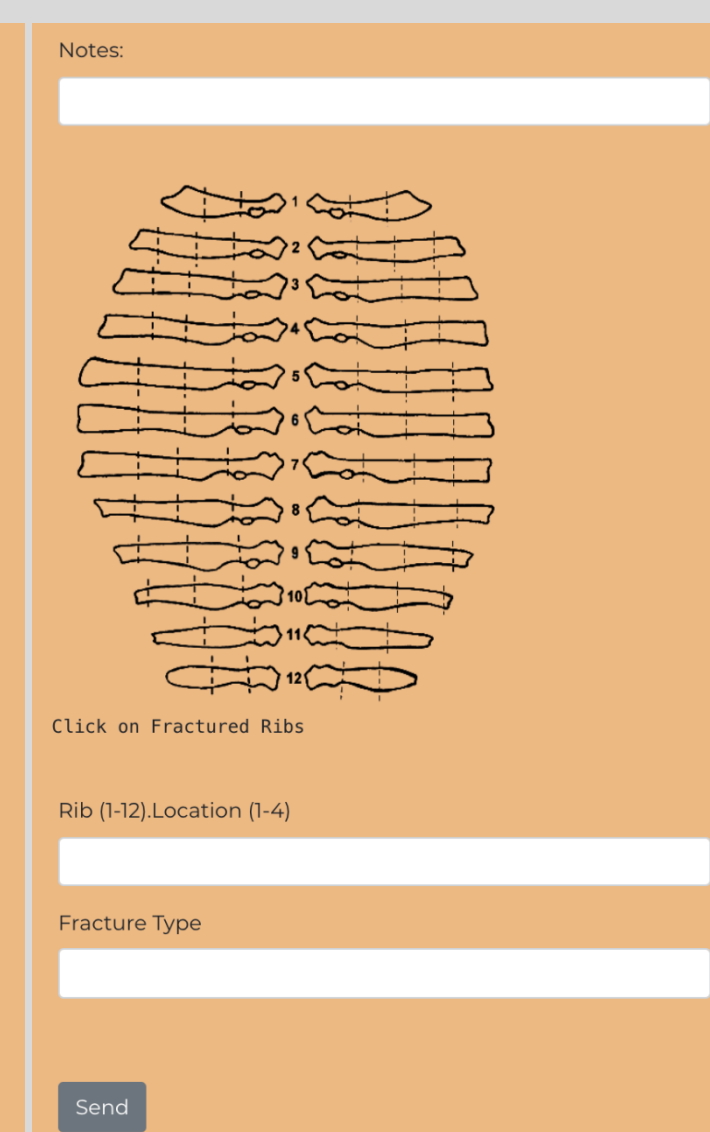


Figure 2

Case ID	Age	Sex	Weight	Height	Ancestry	MOD	COD	COD Type	Rib Type	Rib Count	Belated	Country
2019-0008	33	F	165	47	white	accident	MVC	PNA, trauma	Y	16		
2019-0017	38	M	139	37	white	accident	MVC	PNA	Y	16		
2019-0022	24	M	170	68	white	accident	MVC	intermediate	Y	Y		
2019-0030	33	F	152	58	Hispanic	accident	MVC	PNA	Y	16		
2019-0040	75	M	160	65	white	accident	MVC	intermediate	Y	16		Y
2019-0044	38	M	239	72	white	accident	MVC	intermediate	Y	16	Y	Y
2019-0048	38	M	211	68	white	accident	MVC	intermediate	Y	16	Y	Y
2019-0050	21	F	110	55	Hispanic	accident	MVC	intermediate	Y	16		
2019-0051	38	F	162	65	white	accident	MVC	intermediate	Y	16	Y	Y
2019-0052	25	F	162	65	white	accident	MVC	intermediate	Y	16	Y	Y

Figure 3

Anthroface also provides users heat maps and charts to visualize data and make it easier to discover meaningful trends in data. These heatmaps can be filtered similarly to the database. **Figure 4** shows a heat map grid and charts that shows the number of breaks per location and the side bars represent the breaks added up. **Figure 5** shows the heat map where the circle size correlates to the number of breaks and you can hover over these to see the exact number.

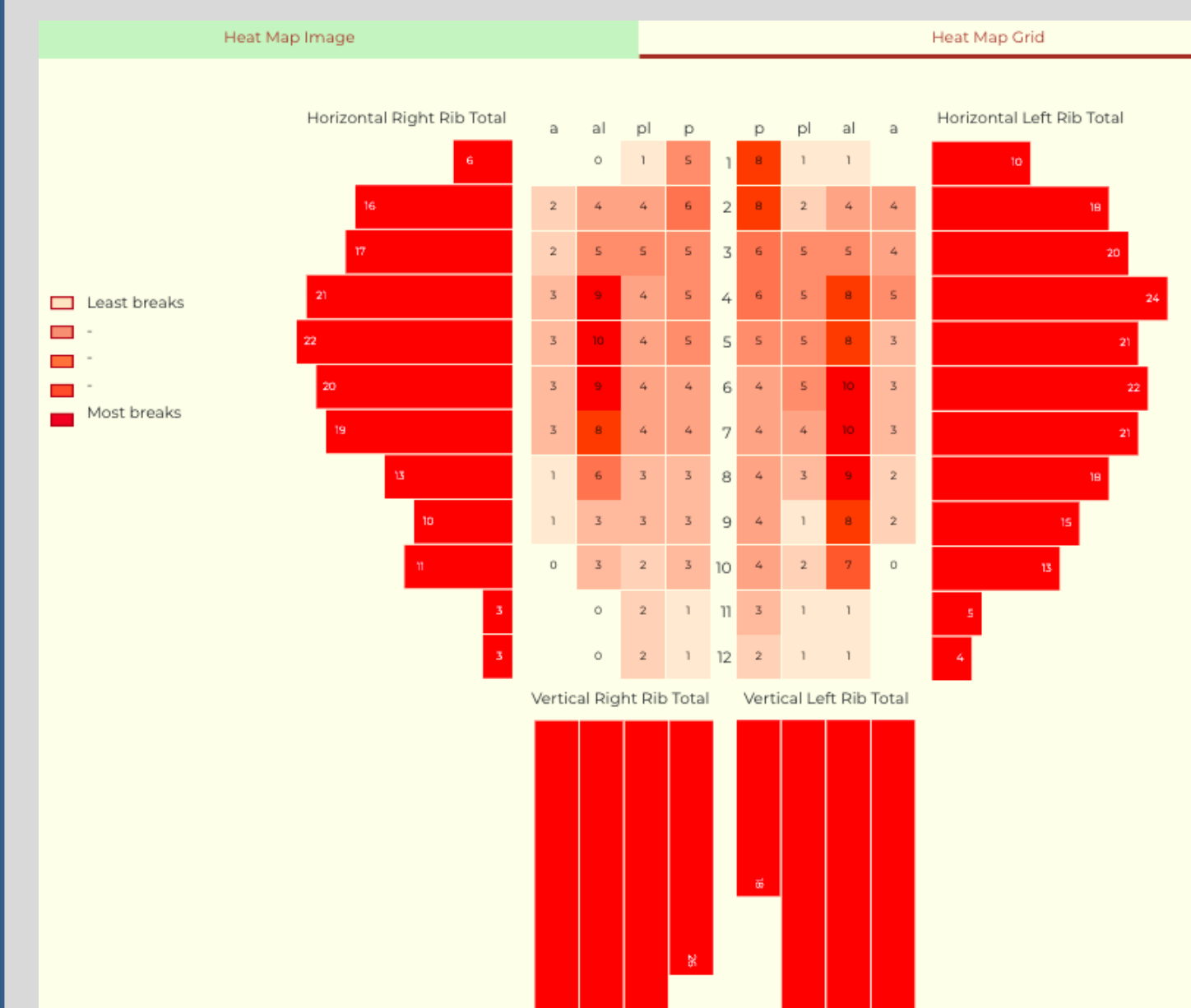


Figure 4

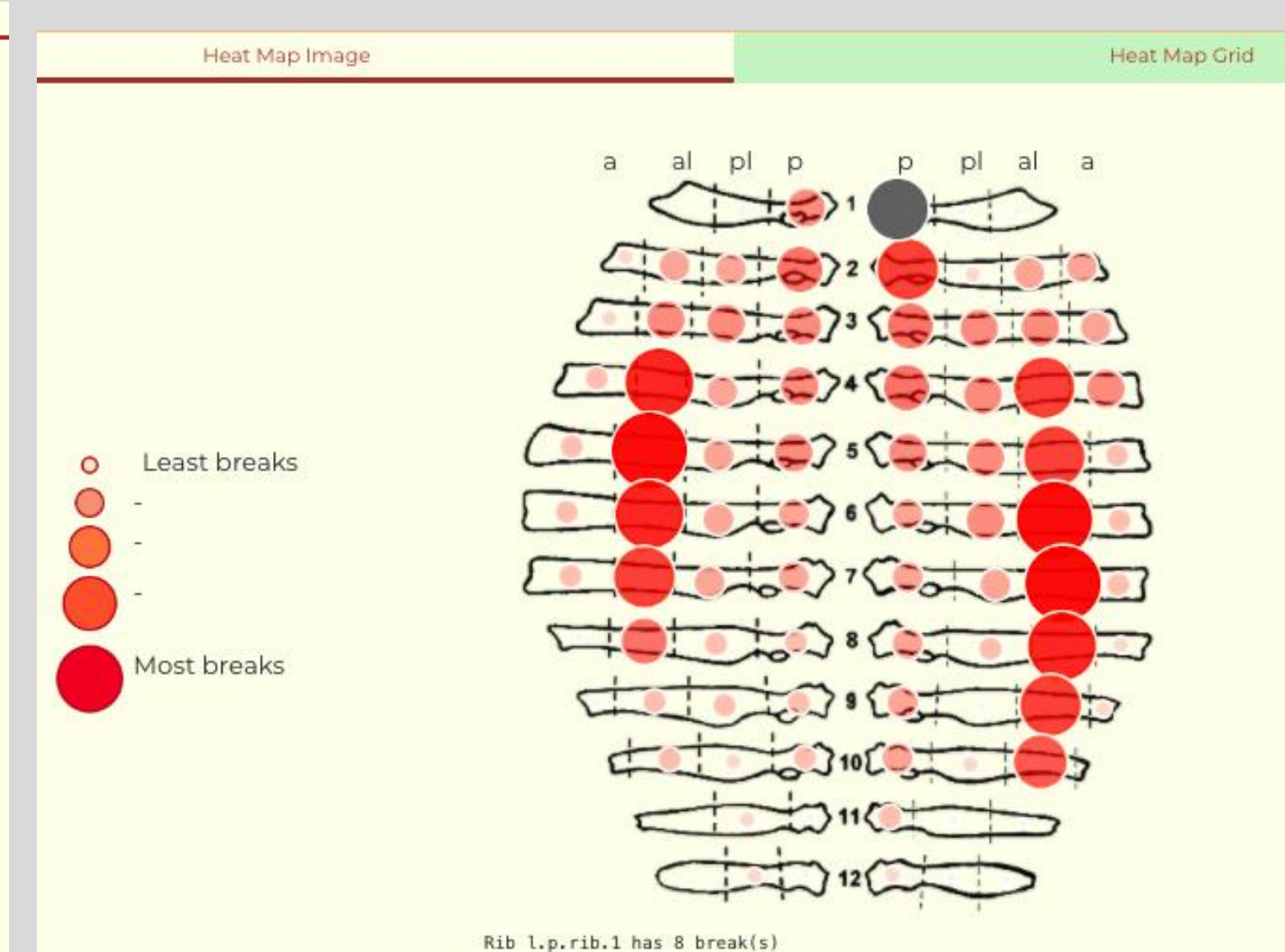


Figure 5

Conclusion

This project provides a rib fracture data collection and analysis application. This will help researchers efficiently collect and store data and transform the trauma analysis data from untestable and subjective interpretations towards empirically founded interpretations. Our application has: 1) an interface that could be used to record data, 2) a database to house all the data, 3) filtering options to filter the data, 4) heat maps to visualize the data, 5) import of the data from a .csv file, 6) exporting of the data to a .csv file, and 7) user login capabilities. We hope to expand upon our application in the near future.

Future Work

An extension of this project is to create a recommender system where the user will be able to pick a patient and get the 10 patients most like the one picked which will help further with analysis. Another extension is to make this into a mobile application, so it would be easier for researchers to put the data into their phone rather than having to take out their laptop. We are planning to continually improve this project and have a student work on this next year as well. We would like to expand this where users can easily share files and be able to work together like in Google Drive.

Acknowledgements

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