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Senior Capstone 480

Work Reflection Essay

The University of St Thomas is driven by its mission to create morally responsible leaders who think critically, act wisely, and work skillfully to advance the common good. Throughout my time at St Thomas, I have taken classes where this mission and the common good have been very present in the work we do.

One project where this was very prevalent was in the capstone project for the web development class. Throughout this class we had built our skills on creating servers and websites. At the end of the class, we had to put everything together and create a dynamic client side rendered website to display crime data in St Paul. The data was a SQL database of various crimes that had been committed in St Paul from 2018-2021. This data included everything from petty theft, to carjackings, to homicides. We had to use an interactive map to display all of the different neighborhoods in St Paul and then create a selector that when clicked would display the number of crimes in that neighborhood. On top of that, we had a table that would display all of the crimes visible on the map. The table was also color coded so violent crimes were red, car crimes were yellow, etc. Then, when you selected a crime from the table, the map would zoom into where that crime was committed and display more information about what had taken place.

Looking back on this project, it connected with a couple of St Thomas' goals. The first one is the goal to think critically. During the software creation process we ran into multiple issues where we did not know what was wrong with the code. We were forced to dig into the code and think critically about what was going wrong and where it was going wrong. One

example was when we were receiving the wrong information from the database. We were hitting the correct endpoint and could not figure out why the data we were receiving wasn't correct. I thought critically about the function as a whole and followed it through step by step and realized our SQL query was not correct. I had written it and I was used to using PostgreSQL instead of MySQL and I had written the query wrong. Without this critical thinking, we may have had incorrect data the entire project. The second of St Thomas' goals we accomplished with this project was working skillfully. We had never worked on a full stack project before. At this point we had just worked on either front end or back end. It took skill for us to be able to put a front end, and back end together and get them to work in harmony. We ran into a lot of problems throughout the process of building a website and without the skills we had learned in class. Lastly, we created something that could be used for the common good. The website we created could be used to know more about the crime that is happening in our community and help stop it. We displayed how many crimes happened in each neighborhood and classified the type of crimes in the table. You can take this data and show it to lawmakers or people in power and make suggestions on how to stop these crimes from happening. It can also show you places you may want to avoid.

Another project I did that was outside of the computer science department was creating a linear model to assess the value of a car. This was for a stats 360 class, and it was our capstone project for the class. We were tasked with finding a data set and creating a linear model that encompassed everything we had learned in the class. My group found a dataset of cars and their value. In this dataset there were also a bunch of variables like brand of the car, number of miles on the car, condition of the interior and exterior, etc. to determine the car's value. There were about 100,000 different cars we had in the dataset. We had to then clean the data. This included

taking out any car with null values, removing outliers, and removing any variables that were too highly correlated with each other. We then created multiple models with different parameters. We then got metrics on our different models and selected the best one. We then tested our model in the real world. We took a 2007 Porsche 911 Carrera (also known as Sally from the movie Cars). We found an exact model of Sally online, put the metrics of the car into our model and got the result. Our model predicted the price of the Carrera to be about $2000 less than the car was listed for online. There were some limitations to this model because our data was only from used cars, not new cars. So, we could only predict the price of used cars. We also did not have every car brand in the dataset, so we were limited there as well. We also created this model with data that was from before the chip shortage that has driven the price of used cars through the roof, and it does not take the current inflated prices into account.

This project, like the last one, required a lot of skill to be able to manipulate the data to get it to be useful for our needs. We had to code in R and learn a new language most of the group hadn't worked with before to create the model and refactor the data. As someone who had worked with R before, I had to do a lot of teaching to the other members in the group to get them up to speed with R. This project also has a use for the common good that St Thomas strives to improve. If we were to release this model to the public and allow people to input specs of a car they are looking to buy, we would be able to give people an accurate idea of what they should offer for the car. Also, with the process we used to come to the model we used, we could change the dataset to something like houses and find the best model for that data. We could then use that model to predict the price of a house based on its features and give buyers and sellers an accurate price point to go off of when selling or putting in offers. If we have the dataset, we could

basically make a model to predict the price of just about anything and make the public better informed on how much they should pay.

The last project I did was for a web development class. We had to create a server using RESTful methodology. This means that you use four functions. Get, post, put, and delete. The get function will return data from the database. The post function will create a new entry in the database table. The put function edits an existing entry in the database, and the delete function will remove an entry from the database. With these four functions you are able to manipulate all of the data in the database that you need to.

For our project, we had to create a restful server that allowed us to manipulate and get information from a database table of crimes that had been committed in St Paul. We would then provide either error messages if something went wrong, the data if it was a get request, or success messages if the request was to manipulate data. While creating the server, we had to think critically about what information we were providing from the table and how we were formatting it. We ended up returning everything except the id of the row in the table and using the industry standard of JSON format. Creating this server gave people access to crime data that allowed them to be more well informed about the city they are living in. We could also take any data and create a server for it and provide it to the public for the benefit of the common good.

Overall, I thought the projects that St Thomas had us work on encouraged collaboration, and problem solving along with the values that St Thomas prides itself on. Working on these projects made me a more well-rounded student and person who is able to analyze problems and create solutions not just for the benefit of myself but for the benefit of everybody.