Datacasting, an Opportunity in Educational Equity

New Mexico

Supercomputing Challenge

Final report

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Team 10

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Executive Summary

Our project attempted to demonstrate the connection between the COVID-19 pandemic and levels of educational success within the state of New Mexico; while simultaneously showing a possible benefit to the implementation of Datacasting. Datacasting is a form of one-way communication transmitted through television stations. Receivers give access to a periodically updated educational library without the need for a broadband internet connection. Our connections would be determined using Python w/ TensorFlow by creating a linear regression model. Data for this model was supposed to come from localized sources (broadband availability, educational success metrics, etc.) but data collected by localized sources was inconsistently produced and not available for the model. Instead, our model used hypothetical data derived from known NMPED data.

Project Statement

Due to economic and residential inequities, many students cannot access broadband internet. Students have an unfair disadvantage compared to others with unlimited access to broadband**.**

Description

The solution to the problem is drawn from collected data, training models, and testing against a variety of scenarios. Examples of scenarios for testing include; economic status, access to broadband internet, and access to Datacasting. With these scenarios and educational success metrics (SAT/ACT scores, state testing proficiency, and graduation rate) we can feed the data into a linear regression model. The mode can later be upgraded to a non-linear model for greater accuracy. In simple terms, the model will allow students without access to internet to download and edit documents for school or work.

Results

The expected results should be the same regardless of data, and should equal a model capable of presenting the educational success of New Mexican students over time and with differing scenarios. If we could continue to next year, we would increase our advertising and checking in more frequently. We would also like to add a Raspberry Pi to the receivers to receive accurate information on download speed and location.

Conclusion

Our team has produced visualizations of processes related to Datacasting, but primarily the transmission process. The visualizations are made in Alice and NetLogo. Our team also aided

Dr. Gladys for the pilot Datacasting program in Taos county. On January 19th, 2022 we handed out receivers and antennas to the community in order to begin the pilot program. We also researched the data pertaining to educational success metrics from the NMPED and found that no data has been published for the 2020-2021 educational year. Unfortunately, Due to the lack of data provided by state sources (NMPED, 2021) and the necessary variables stated in our Meet the Scientist interview, we cannot expect a realistic and applicable model. However, theoretical data can be fitted to satisfy the lack of educational success metrics. This theoretical data and TensorFlow regression models (TensorFlow, 2022) can lead to a model capable of "predicting" future data with our theoretical data.

Most Significant Achievement

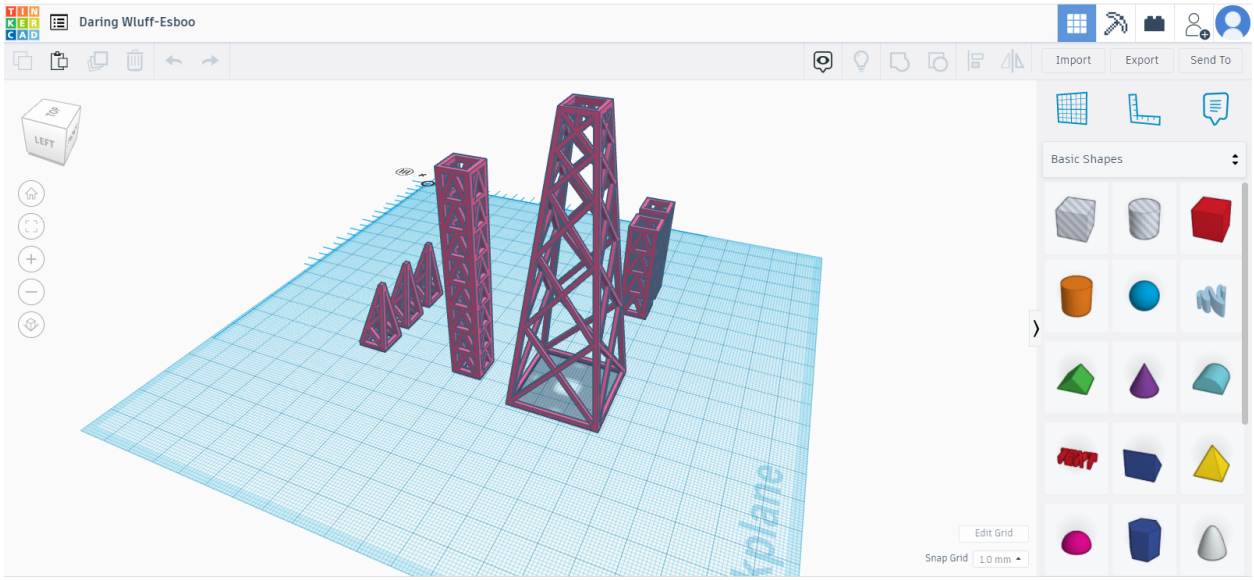
Our most significant achievement of the project was actually providing families with learning opportunities. We dispensed real packages that can be used to receive Datacasting services that will give the family a chance to improve education, particularly in family literacy. This is important because so many families don't have the opportunity to receive education due to economic differences and remote locations that limit internet access. These receivers and antennas can give kids and parents alike a chance to improve their education.

Software Description

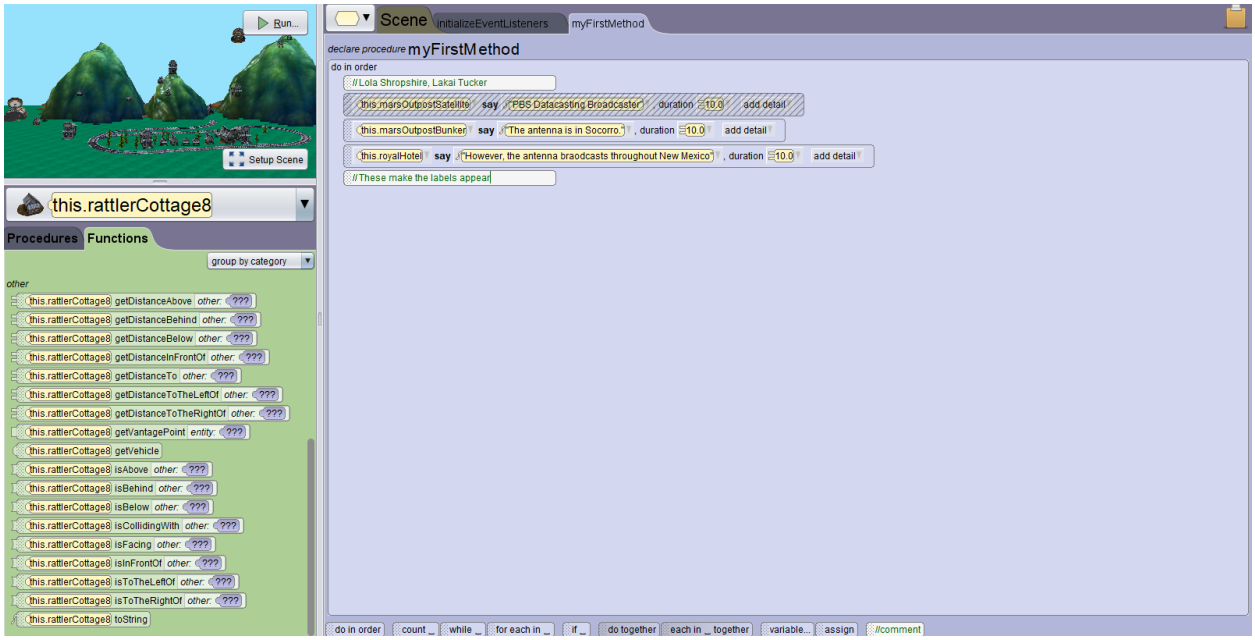
The softwares we used for this project are Python, Alice, and Netlogo. We created a diagram that illustrates a basic model of how datacasting would work. It's a pretty simple diagram that shows a starting point of how the system would work. As a slightly more complex and 3d diagram we used Alice. Alice provided us with minimal tools and an extremely basic platform, but we created a more intricate model that shows how datacasting can be used to reach

diverse locations. For a model more centered on data we used Python. As described in the executive summary, with TensorFlow we created a linear regression model. These softwares, especially Alice and NetLogo, are very basic and only provide a visual model. The Python model could be improved through actual access to data collected in the field, and long term data. To improve the visual models we could use software with a better platform. We could use a more detailed model and add moving or interactive details.

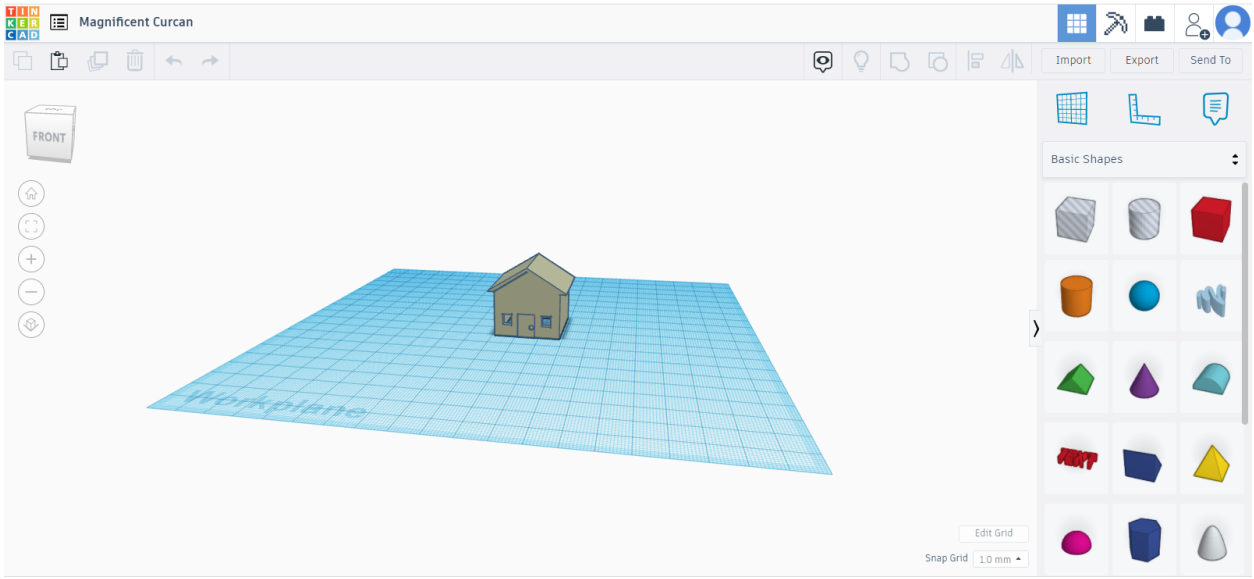
Models and Codes



The 3D printed pieces of our Datacasting antenna visualization.

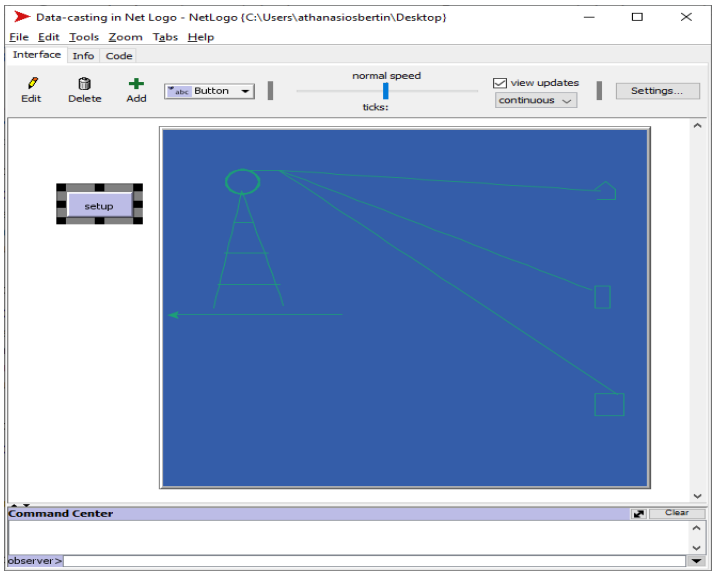


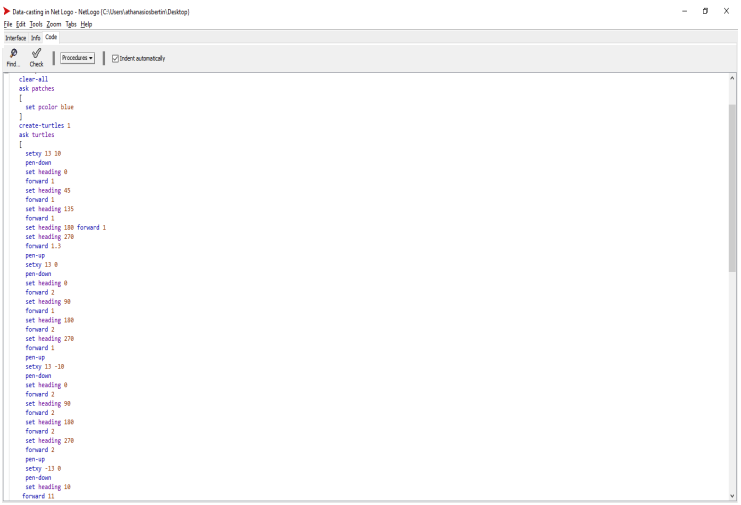
The code that makes our small scale town representation.↑

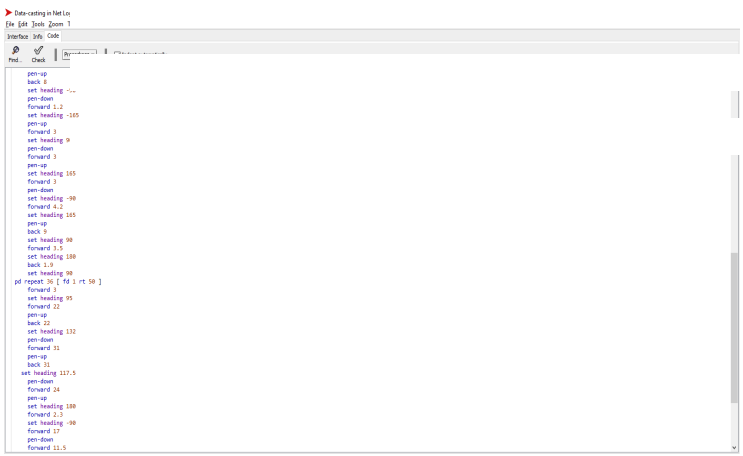


An example home, 3D printed for our physical model.

Small-scale representation of a town in Alice, specifically demonstrating the widespread.







←← The NetLogo program with a brief↑ Representation of how datacasting Works (Code included)

Acknowledgments

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Sources

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