Visualization of Flood Modelling Results Using Augmented Reality

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for Undergraduates

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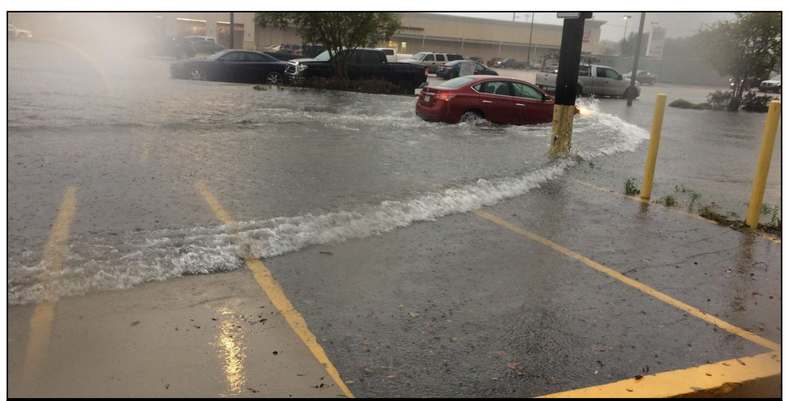
Abstract

Flood modelling is a powerful tool to predict the devastating effect of flooding. With the existence of climate change and rising sea level, the models have become indispensable as part of governmental decision making. With computers becoming more powerful and more accessible, physical models soon were phased out in favor of software. However, without the knowledge of hydraulics or calculus, it is hard for an average person to understand modelling results. For government, reliable information is important for decision making, but also is its clarity. In order to provide better representation of the modelling result, this research seeks to provide a solution that is accessible, interactive, and cost effective.

Background

Modelling allows scientists to simulate situations that never happened or to recreate scenarios of the past without the need to scavenge for information. Due to the rise of computing power, models are allowed to be larger and more complex. However, models are not tailored for be comprehended by people outside the scientific community, causing miscommunication to happen between scientists and the audience. When dealing with emergency situations such as flooding, wildfire, or pandemic, miscommunication can lead to disastrous outcomes.



Credit: FOX8Live.com

Flooded street in Los Angeles. Flooded roads are not only a hazard but also slows down emergency services

Objective and Method

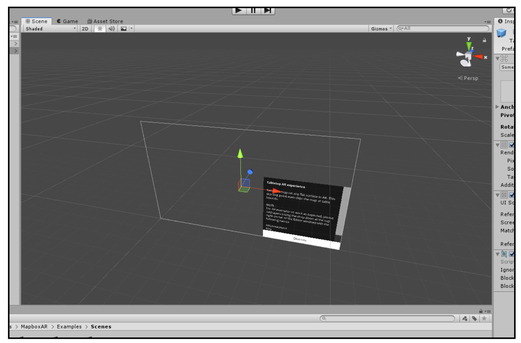
Modelling results can be represented in multiple formats. Depending on the model, the data can have a variety of meanings. While some newer models provide an user interface to display the results, older, yet reliable, models output tabulated information for the user to figure out. This method ensure software stays compatible with modern hardware, but are harder to use. Our solution is to create solutions that target models of many kinds, interpret its data and show the results in an accurate and easy to understand.

	lon	lat	depth
0	-60.040050	8.559675	6.157000
1	-60.040290	8.664245	12.853000
2	-60.040530	8.768816	25.354000
3	-60.041010	8.977957	46.155998
4	-60.041491	9.187097	26.455000
...	...	...	...
604785	-73.682933	42.762878	-2.743206
604786	-73.687645	42.764017	-10.798174
604787	-73.686926	42.762131	-7.626565
604788	-73.685015	42.762077	-2.743206
604789	-73.684787	42.763427	-2.743206

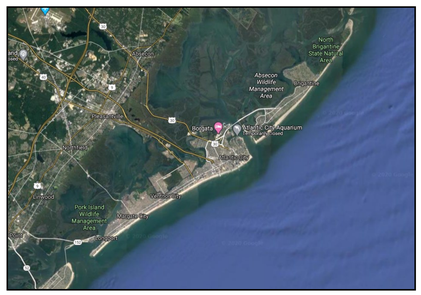
604790 rows × 3 columns

Raw Data

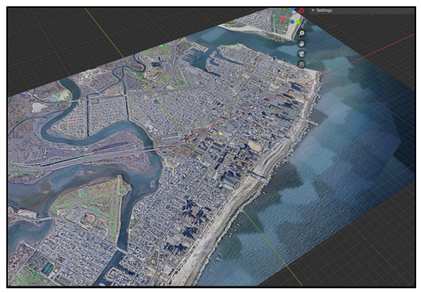
Data Processing



App Development



Map Data



Map Model Development

Deployment

Terrain + 3D data

Conclusion

Models are powerful tools that allows scientist to conduct research with limited resources. Great progress has been done in the modeling field; today many of our forecasting depends heavily in computers. However, showing and sharing the results of model runs can be challenging when addressing an audience with diverse background. To achieve this task, an application using augmented reality was build from the ground as proof of concept, which showed sign of intended effect on the target audience. With the proper development, programs like the one presented can be applied to other field of study, such as sea level rise projection, wildfire monitoring, and so on.