CMSC 451/452
NNSB Proposal
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Newport News Shipbuilding Climate Change Impact Prediction Tool

Proposed by: Gavin Alberghini, Christopher Maybush, Daniel Webster, and Hakizimana Jeanmarie

1. Executive Summary

1.1. Problem Statement

Newport News Shipbuilding is a large supplier of design, refuel, and build work at scale for the U.S. Navy. It is not an exaggeration to say that NNSB is a fundamental support to U.S. warfighting capabilities and national defence. For this reason along with many others, NNSB should be constantly evolving, adapting, and integrating next generation ideas into their workplace.

Climate change is a chronic issue that plagues coastal business and infrastructure. At current rates, climate change promises to change how businesses secure new coastal locations. Businesses that currently hold coastal property will have to reinforce existing sites to withstand enhanced storm surges as time moves forward. It is not a cost effective solution to be satisfied with rebuilding damaged infrastructure.

NNSB has already taken the first step and realized that the issue of climate change could pose significant impact on coastal operations. By reaching out to our VCU Capstone team, NNSB has asked us to utilize our Computer Science knowledge and VCU resources to begin analyzing what the future may hold.

1.2. Value

The proposed project is a climate change predictive system. As with any prediction system, the value coming from our project comes in the form of knowledge. Meaning that information learned by the end-user has significant value.

That information is how climate change or more specifically, sea level change, effects NNSB operations. Through analyzing southern chesapeake bay climate change data, a prediction can be made on what the projected sea level will be years in the future. Information like this is useful when securing coastal infrastructure such as building and also in NNSB’s case, dry docks.

2. Project Introduction/Technical Volume

2.1. Objective

The purpose of our project will be to gather, compile, and learn data regarding climate change in the Newport News area. Then utilizing computer science knowledge implement a system to predict how climate change will affect sea level and in turn NNSB operations.

2.2. Background

With existing resources on the web, there are already some systems that identify future sea level predictions. The proposed project is novel in the fact that we are focused on the Newport News area and can therefore examine in greater detail. This being the case there are several avenues to approach this problem. At the request of NNSB our project team will utilize GIS maps for front end interaction. Software and tools related to this project include QGIS, ArcGIS, Python, and Batch/Shell scripting.

2.3. Scope

The project scope is confined as a local computer application that will utilize local Python and Qgis applications in order to build and display an interactive GIS map.

2.4. Approach

The project design will be broken up into four main sections. A data gathering back process that serves as a compilation of existing knowledge on climate change. A formatting process that moves all of the gathered information into light weight, portable units that are easy to access. A computational process where regressions are derived so that predictions can be made. And finally a responsive front end process that lets an end-used into the loop.

2.5. Result

The expected result of this project is a deployable computer application. That application is expected to produce GIS mapping data that expresses future sea levels when taking climate change factors into account.

3. Resource Volume

3.1. Personnel

Resources for this project consist of four VCU students Gavin Alberghini, Christopher Maybush, Daniel Webster, and Hakizimana Jeanmarie along with our VCU faculty advisor Dr. Robert Dahlberg. We also have a POC at the Science Museum of Virginia who is Jeremy Hoffman, the Chief Scientist and our POC for NNSB, Christopher Lowe.

3.2. Facilities/Equipment

There is no current or planned facility or equipment resources needed beyond what VCU requires.

4. Cost Volume

4.1. Fiscal

NNSB has already paid VCU for the submission of a Capstone project. Beyond this investment, there is not a required fiscal contribution from NNSB.

4.2. Time

VCU Capstone students are allotted two semesters to complete their deliverables. Without extra time requirements from NNSB, the proposed project deadline is the date of VCU's capstone expo in May 2019. From that point the project will be able to deploy as is, or can be put in for another capstone cycle to be further refined.

5. Conclusion

5.1. Summary

NNSB has recognized that climate change carries significant impacts to coastal operations. For this reason, NNSB has proposed this capstone project that we are taking on in order to increase knowledge about future storm surge levels.

Upon completion of the 2019 capstone cycle a final deliverable will be submitted to NNSB. At that point no further work on the project is expected of the personnel. However, previous personnel can optionally function as POCs for questions regarding the project beyond this point.

6. Contact Information

6.1. Developers

6.1.1. Gavin Alberghini <alberghinig@vcu.edu>
6.1.2. Christopher Maybush <maybushcr@mymail.vcu.edu>
6.1.3. Daniel Webster <websterdd@mymail.vcu.edu>
6.1.4. Hakizimana Jeanmarie <hakizimanaj@mymail.vcu.edu>

6.2. Faculty

6.2.1. Robert A Dahlberg <dahlbergra@vcu.edu>

6.3. NNSB

6.3.1. Christopher Lowe <Christopher.Lowe@hii-nns.com>

6.4. Science Museum of Virginia

6.4.1. Jeremy S. Hoffman <jhoffman@smv.org>