Optimization of Climate Change Adaptation Projects

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INTRODUCTION

Over a third of all natural catastrophes are caused by floods, and with increased climate change the amount of natural disasters is expected to increase. The floods are not just causing material damage, but are also destroying natural reserves, and in some developing countries a good protection could be the difference between life and death.

If we want to take proactive measures towards climate changes, adaptation projects are a necessary precaution, and for these projects to be as efficient and successful as possible, a precise and realistic data basis is essential. The key ingredient in such climate change adaptation projects is the height model, where even small inaccuracies can lead to wrong predictions of the flooding extent.

THE PROBLEM

With modern day technology, e.g. drones, the amount of accurate height data is no longer a problem - quite the opposite actually. The extreme amount of data means that simulating a flood, in order to reveal where protection is needed, takes a very long time. For bigger areas, a simulation of the effects of extreme weather could take days and even months to complete, if the simulation program can even process the large amount of data. Thus a thinning of the data is a necessity in order to save lives and homes. The current thinning methods are unfortunately not well suited for processing the data in flood simulations, but a lot can be gained by focusing the initial work towards climate change adaptation projects.

METHODS

I used a thinning algorithm that is focused on preserving topography necessary for realistic flood simulations, e.g. preserving the shape of a river or a dike. By combining this with specific optimization algorithms, I have been able to obtain a more accurate height model than the thinning algorithm traditionally used. Likewise I have tested my model against a traditional thinned model in flow simulations, which also gave more accurate and realistic results of a flood.

CONCLUSION

By combining the thinning and optimization algorithms used in my project, a more accurate and thinned height model is obtained, which is directly optimized towards climate change adaptation projects. Using these results in future projects could lead to better protection of human lives and natural reserves, and may very well save money and resources normally spend on projects based on inaccurate data that do not have the desired effect.

This project is done in cooperation with the company NIRAS, which is already deeply involved with these climate change adaptation projects. The results of this project is therefore very likely to make a real difference for future protection against extreme weather.