

## AUGMENTING QUANTUM-GIS FOR COLLABORATIVE AND INTERACTIVE TABLETOPS

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### INTRODUCTION

GIS continuously increase in complexity, more and more data are created as much features developed to treat them. On the user side, GIS software is now integrated in several processes such as emergency management.

In this article, we study how novel Human-Computer Interaction (HCI) techniques can improve GIS usability, especially for making command selection easier and for enabling collaborative work. We propose an interactive setup (Figure 1) that enables co-located collaboration around an interactive tabletop. Tabletops favor social awareness, facilitate communication among users and make it possible for several users to interact with the same data. Moreover, multi-touch tabletops provide a way of interacting that is more natural and intuitive than traditional mouse and keyboard interfaces.

We propose QGIS-MT, an extension of Quantum GIS (QGIS) for multi-touch tabletops. QGIS-MT makes it possible to use QGIS on multi-touch surfaces and favors collaboration. It also introduces a novel interaction technique, called Finger-Count Shortcuts, which allows users to navigate and activate numerous commands quickly and easily by performing simple finger gestures.



Figure 1. A group discusses the implantation of street furniture

### OUR INTERACTIVE AND COLLABORATIVE SETUP

Our setup is based on an Immersion Ilight multi-touch tabletop. This technology provides a large display, which is suitable for the visualization of geographical data. All participants can interact directly with the system by touching the tabletop, a situation that is likely to be more efficient for supporting users' ideas and exploiting their respective skills. Besides, direct touch rather than mouse and keyboard interaction allows users to more easily notice their partner's actions (Hofstra, et al. 2008).

We thus propose novel techniques for simplifying the interaction with QGIS in order to allow technical and non-technical users to perform a large set of tasks (including navigation tasks, as well as editing, annotating) by performing simple gestures (Figure 2).

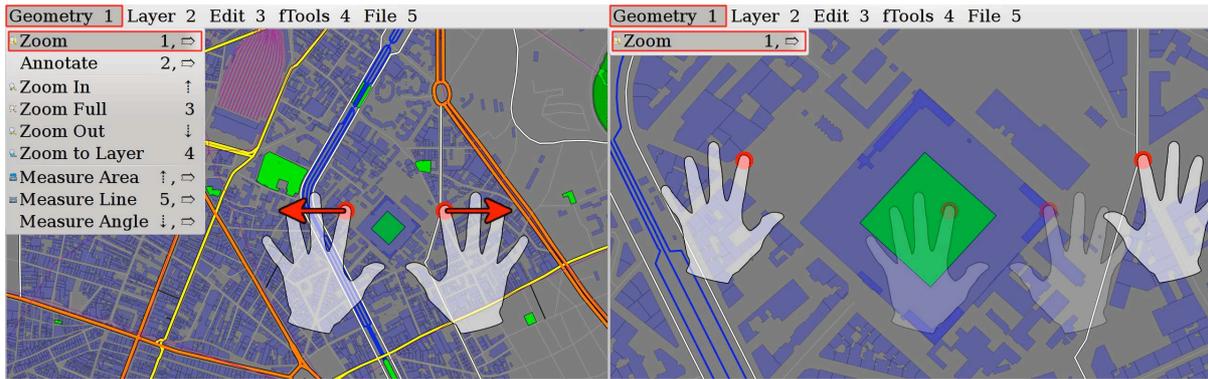


Figure 2. Zooming in QGIS-MT

## USER NEEDS

QGIS provides a large number of features and all of them are obviously not useful when interacting on a tabletop. For instance, a PC is better suited for writing tasks. But some tasks such as layer editing are likely to be really useful in collaborative scenarios. We thus conducted an interview to learn which features would be especially valuable when working collaboratively on a tabletop.

The results confirm those obtained in (Hofstra et al. 2008), which reveal the need of co-located GIS for providing the best of paper maps and desktop GIS software, that is to say interactivity and collaboration. This study also highlights the need for numerous features, contrary to what is generally available in existing co-located prototypes and products. According to these results, we will now present a novel interaction technique that addresses the above-mentioned recommendations.

## FINGER-COUNT SHORTCUTS: A NOVEL INTERACTION TECHNIQUE FOR QGIS

Finger-Count Shortcuts (Bailly et al. 2010) is an alternate interaction technique. It makes it possible to use common pan, zoom, and rotate gestures together with arbitrary gestures for selecting numerous commands. It is based on a very simple principle: the selected command just depends on the number of fingers that the user places on the interactive surface using his hands. This paper proposes an improvement of FC Shortcuts that is specifically adapted for QGIS.

First enhancement consists in allowing command to set one or several values interactively (Figure 3). Second enhancement consists in augmenting the numbers of commands by selecting menu items that do not have a dedicated FC shortcut by first selecting a neighboring item that has a shortcut, then moving the right hand up or down before releasing it from the table surface.

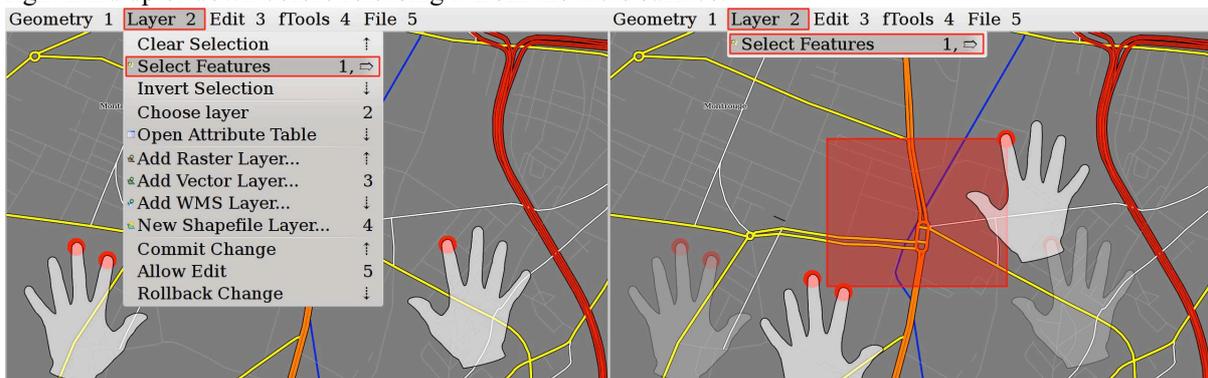


Figure 3. Selecting features in QGIS-MT

## CONCLUSION

The resulting implementation provides a collaborative GIS environment with access to advanced features. We plan to add on new capabilities, such as the ability to use a smartphone or a tablet that would serve as a private space for interacting with the surface.

## REFERENCES

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- Hofstra H, Scholten H, Zlatanova S and Scotta A (2008) Multi-user tangible interfaces for effective decision-making in disaster management. In : Remote Sensing and GIS Technologies for Monitoring and Prediction of Disasters, Environmental Science and Engineering, 2008, Part 3, 243-266