Short description of thesis on "**Automated Detection of Clutter in Tactile Maps**" (preliminary title)

As there is a lack of availability of navigation products and ultimately tactile map products, some projects target inclusive mapping with a focus on tactile maps (Hofmann et al., 2022; Van Altena et al., 2023; Wabiński & Mościcka, 2019; Wabiński, Mościcka, & Touya, 2022). Tactile maps are used mostly as a supplement to other sources, but can be a useful addition to serving different user tasks. Within the projects, the main challenge is the automated generalization process for quick production and access of tactile (topographic) maps. The level of generalization for tactile maps is 10 times higher than in standard maps for sighted users (Wabiński, Śmiechowska-Petrovskij, et al., 2022).

One of the issues in the readability of tactile maps is clutter, information overload, or a certain density of map elements (Hofmann et al., 2022; Touya et al., 2019; Wabiński, Mościcka, & Touya, 2022). In standard maps, several measures (Touya et al., 2015) were used to quantify clutter or information density and some were applied to tactile maps, too (Touya et al., 2019; Wabiński et al., 2020), but the relation of these measures to map readability was not studied yet.

To address this question of how map clutter can affect the readability, the aspects clutter, complexity, information density and readability should be defined for tactile maps, and the differences to standard maps should be outlined. Feasible measures to quantify the aspects of clutter, complexity and information density, in a local neighborhood within a tactile map should be introduced and applied to tactile maps. The statistical variability should be evaluated by using different tactile maps with varying degrees of clutter.

In order to address the map readability, a user study is desirable. The user group of tactile maps is very diverse: People with blindness or visual impairment have different abilities, levels of experience with tactile maps, and have different requirements for diverse tasks. For this reason, results of a study need to be supported with additional sources of information, for example by incorporating expert knowledge from perception research in the domain of tactile maps, or related fields.

A further step of the research could focus on the generalization techniques to handle the clutter, thus improving the readability while maintaining the meaningfulness of the tactile map. In certain situations, information could be lost in this process. One solution could be to incorporate users, by asking to choose generalization techniques according to their preferences. For such a dialog in the process of automatic generalization and 'clutter resolving', a verbalization of the problem and its possible solutions is required and could be addressed in the research, too.

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