# Automatization of Manual Post-Processing Graphical Requirements of Metro Maps

## Master Thesis Extract - Abstract

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The purpose of this thesis is to investigate the automatization of manual post-processing graphical requirements of metro maps. Metro maps should ease the passenger's orientation within the network of a public transport system. For that reason, instead of using topographical maps, a simplified map is usually presented omitting irrelevant information. Probably the most famous metro map is Henry Beck's Tube Map of London City. Most of the today's used layout rules for schematic metro maps trace back to him, e.g. presenting the lines within an angle of 45 degree or a multiple of it (octilinearity). Beside network information, such maps might include graphical elements (signatures) such as landmarks and points of interest.

In the course of his study of literature the author came across variety of papers discussing approaches to generate a metro map. Some of these approaches are beneficial to generate metro maps of a simple network such as a underground train system. However, all of them do not address the issue of route segments with several routes such as often found in continental Europe where sometimes 10 or more routes are running on route segments. In addition, other graphical elements such as landmarks are not taken into account. Starting with an octilinear graph layout of a railway network, the author focusses on problems arising from adding route information. In most of the cases there is not enough space between the given map elements to include more information. The map must be changed to add such elements. This is an iterative process increasing the complexity with each iteration. The author develops an algorithm to solve the problems arising with this use case. He presents a method to determine the necessary space in order to add route information and station signatures. To increase space, neighbouring nodes are iteratively displaced. This process produces non-octilinear edges (lines) which are corrected by the author's algorithm. Based on examples, two approaches are presented. One approach uses scaling and the other moves nodes iteratively until enough space is available. The second approach may require the restoration of the edge's octilinearity with further shift processes.

Problems of metro maps are often varying from map to map. Hence, these individual problems cannot be solved completely with a routine method. This applies also to the author's examples. Whilst implementing, problems are produced which cannot be solved with his approach. The author concludes that in real situations one has always to reckon with problems that require a manual post-processing.

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