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Detection of perceived linear structures by deer based on abrupt vegetation height changes using airborne laser scanning data.

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Sudden changes in vegetation height are important natural structures perceived by deer which provide orientation and cover. Hence, these linear structures form potential paths through forested areas used by these animals. Nevertheless, perception of these structures not only depends on the magnitude of the height differences but also on the height of the vegetation itself, their spatial extent and geometrical complexity. Therefore an approach is necessary which not only detects these changes, which would be trivial, but also takes those additional parameters into account.

Hence, we used a normalized digital surface model (nDSM) with a resolution of 1m derived from airborne laserscanning (ALS) data. As these height changes are local phenomena, local filters and morphological operations were used to extract potential pixels. Further aggregating connected pixels into connected components enabled us to prune spurious dangles, close small gaps and describe their geometrical complexity. Splitting the extracted and cleaned connected components at branch points made it possible to represent them as graphs. This opens up new possibilites to analyse these linear structures using graph algorithms which would not have been possible using solely a raster based representation.

Visual analysis of initial results calculated for two provinces in Austria (Styria and Lower Austria) indicate that the extracted linear structures aggree well with prior suggestions and are valid indicators for potential corridors through forested areas. While many extracted structures run along forest borders, additional structures within forest are detected. As the developed approach is only dependent on few easily interpretable parameters it can be quickly adapted to other species or animals.