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| **lasR: Development of an R package for lidar data processing** |
| **Introduction/Aim:** The widespread interest and adoption of ALS-based technologies in the forestry arena over the past decade have generated a need for visualisation and processing software and scripts. We present the recent development of lasR, a new R package for processing airborne lidar data and is designed as a complement of the well-established lidR package developed by the same team. The lidR package was conceived both as a toolbox and a sandbox, allowing for easy testing, exploration, manipulation, and analysis of lidar data in a research and development context within R. This vision led to several suboptimal implementation choices in terms of computing time and memory usage, such as loading lidar data into a data.frame to make them easily manipulable and compatible with other R packages. The lidR package is therefore not well suited for common tasks such as creating a digitial terrain model, a canopy height model, or biomass prediction map over large areas. In contrast, lasR has been designed to be highly efficient. Instead of a sandbox, lasR is set of well-established programs from the state of the art, carefully combined to achieve the best performances.**Results:** Unlike lidR, lasR is written 100% in C++ and does not load lidar data into a data.frame. This design allows for efficient memory management compared to the lidR package. lasR introduces a versatile pipeline engine, enabling the creation of complex processing set of consecutive stages. Users can simultaneously create a biomass prediction map and compute a digital terrain model in a single pass. The memory usage being low compared to the lidR package, it allows to parallelize the treatments on more cores. The benchmark tests show that lasR can be up to 5 times faster than lidR and use up to five time less memory.**Conclusion:** The lasR package is considerably more efficient than the established lidR package. It computes faster, can use more cores, uses less memory and allows to build more complex pipelines. The lasR package is oriented toward production, while lidR is oriented toward exploration. Both software are therefore complementary, and lasR does not supersede the lidR package. |

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