Cadastral Boundary Delineation using Deep Learning and Remote Sensing Imagery: State of the Art and Future Developments

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SUMMARY

Global estimates indicate that 70-75% of the people in the world do not have access to a legal land administration system. The absence of such a system has a negative impact on essential developments such as tenure security, agricultural productivity, and sustainable development. Therefore, the UN included the formal registration of property rights, ownership, and value in several targets of the sustainable development goals. A concept that tries to speed up the registration of legal land rights is fit-for-purpose land administration. Leading principles in this approach are the use of visible cadastral boundaries and the delineation of these boundaries by using remotely sensed imagery. These principles have resulted in a growing demand for automated cadastral boundary extraction methods in recent years. Recent studies on cadastral boundary extraction using deep learning and remote sensing imagery look promising. However, the number of studies is limited. Recent studies are based on small study areas and data sets, did not implement state-of-the-art deep learning models, and did not investigate the transferability and generalization ability of the models to other geographical locations. This paper reviews the applications of deep learning and remote sensing data for cadastral mapping and describes several possible improvements that could be made in the field. The improvements include building benchmark datasets, calculating the proportion visible/invisible boundaries in these benchmark datasets by analyzing the overlap between cadastral and topographical boundaries, using applications from other remote sensing fields for cadastral mapping and creating human-in-the-loop deep learning pipelines.