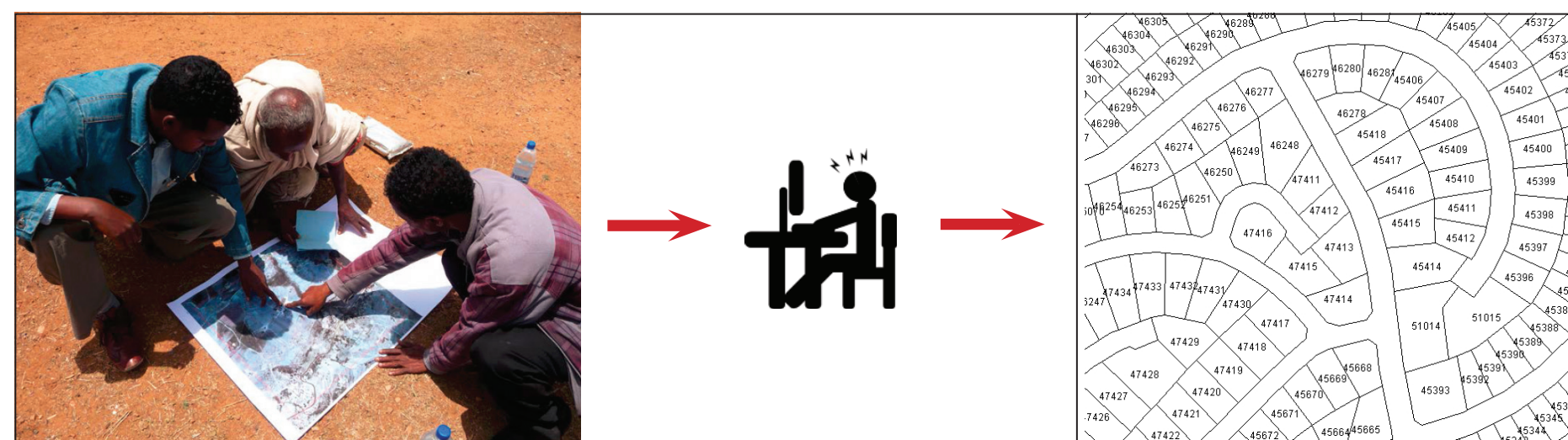


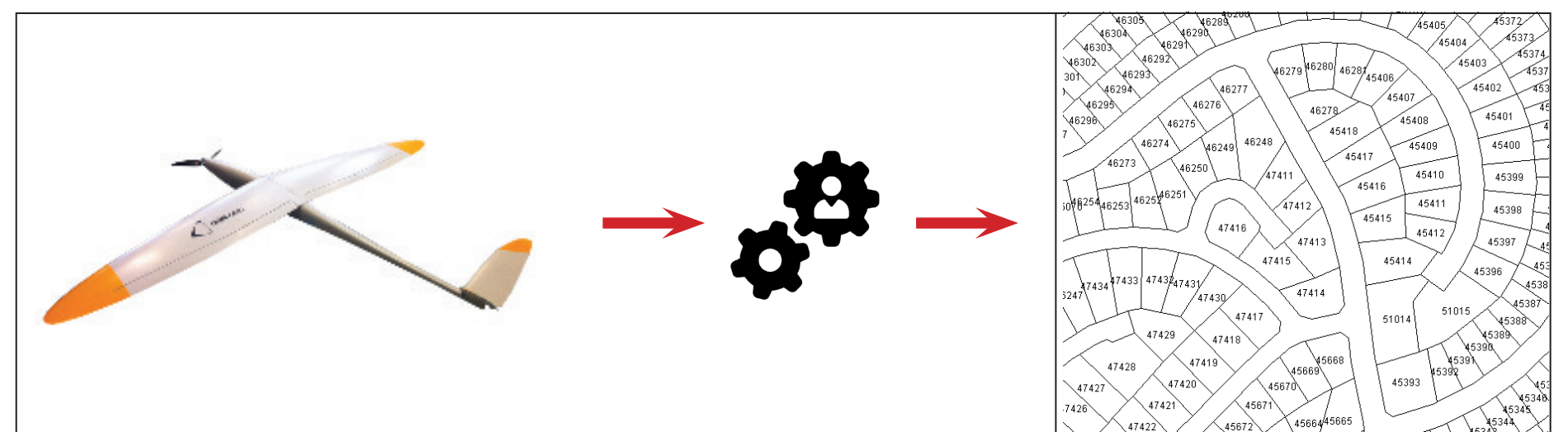
Towards Automated Boundary Delineation for UAV-based Cadastral Mapping

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State-of-art workflow



Envisioned workflow

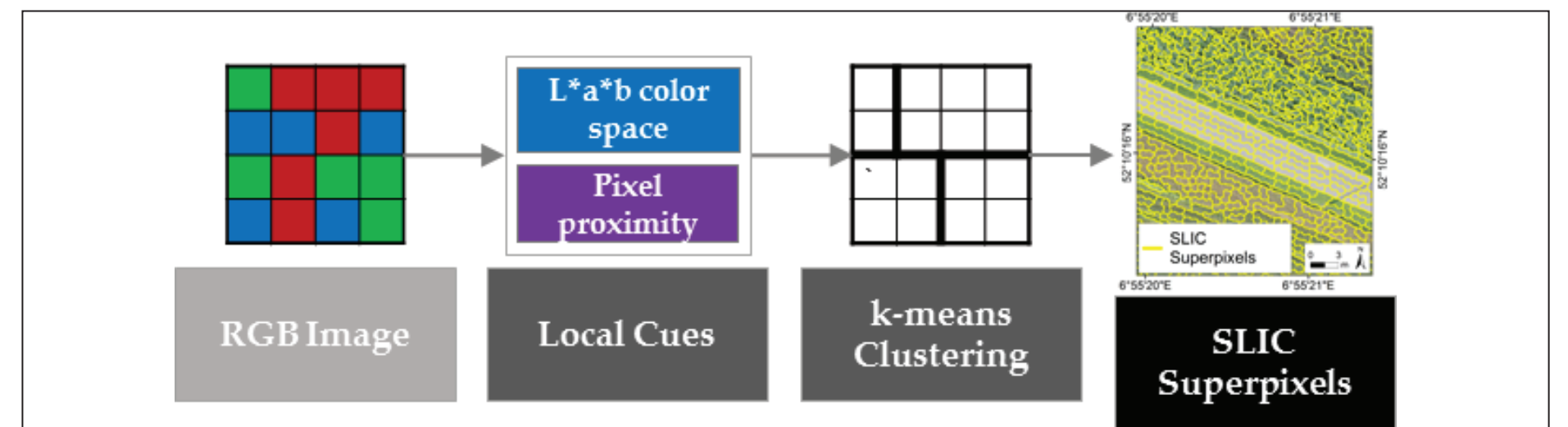
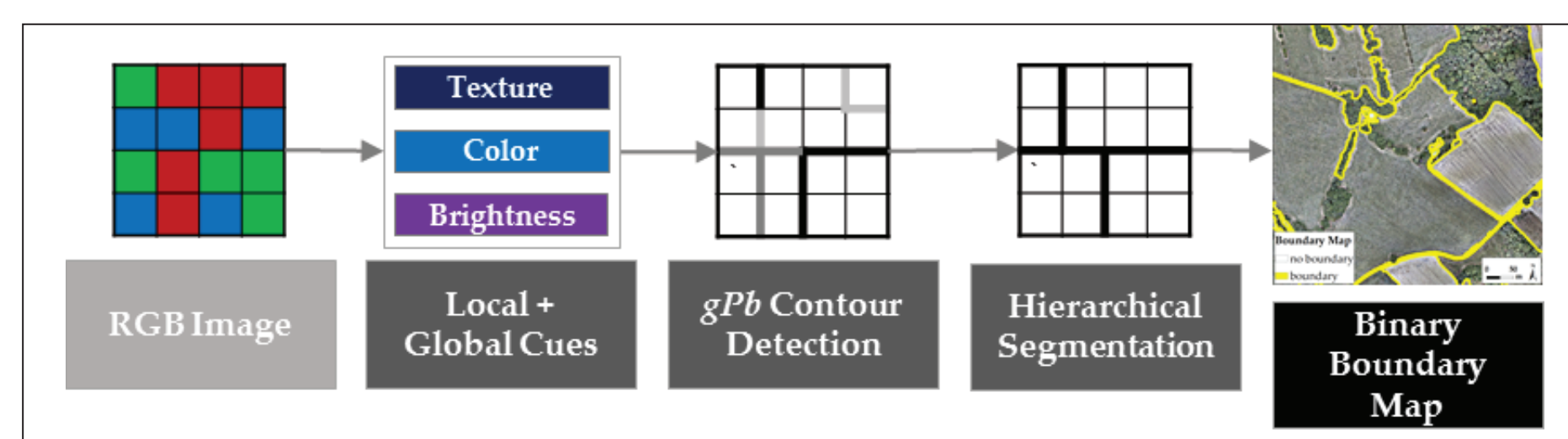


Introduction

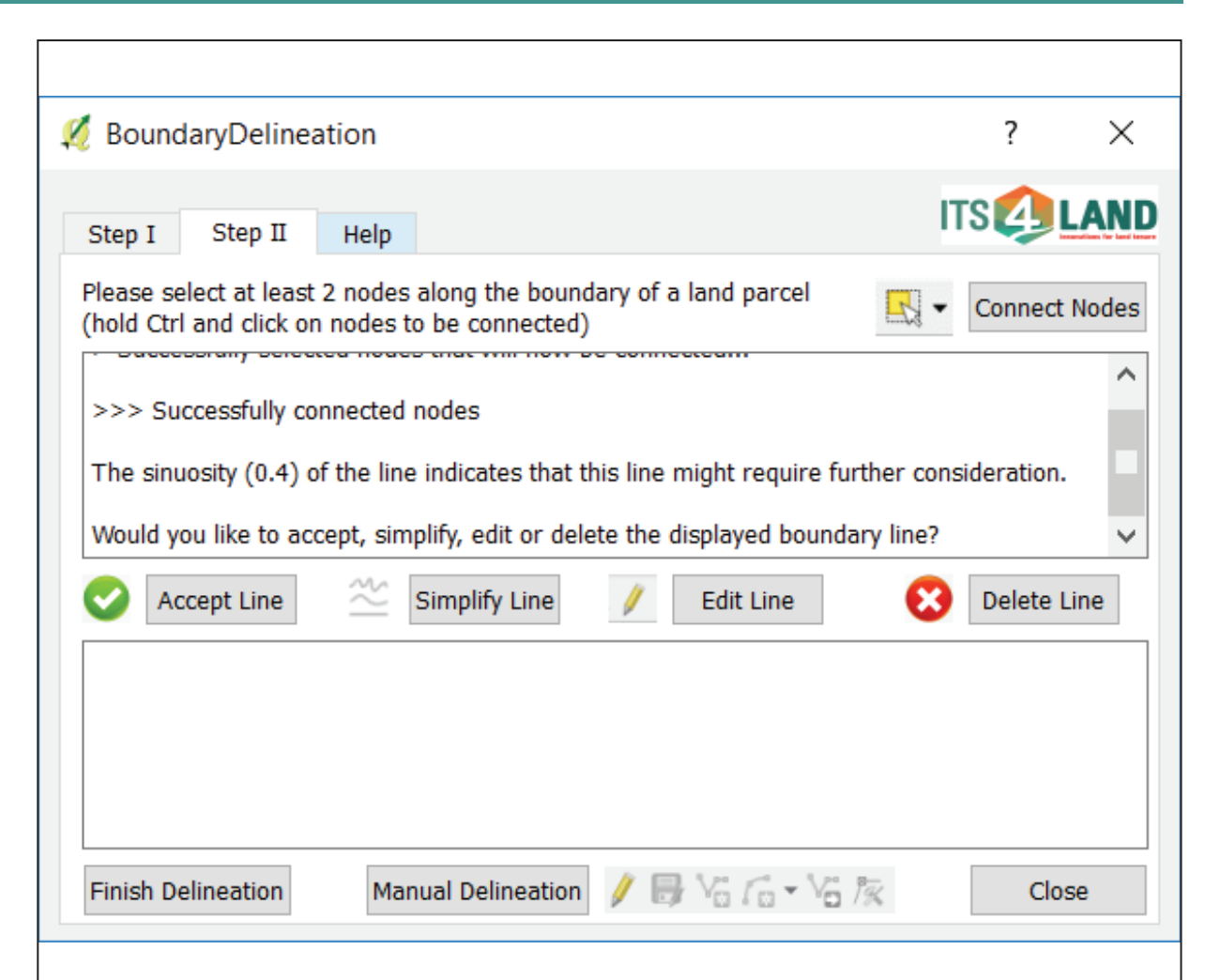
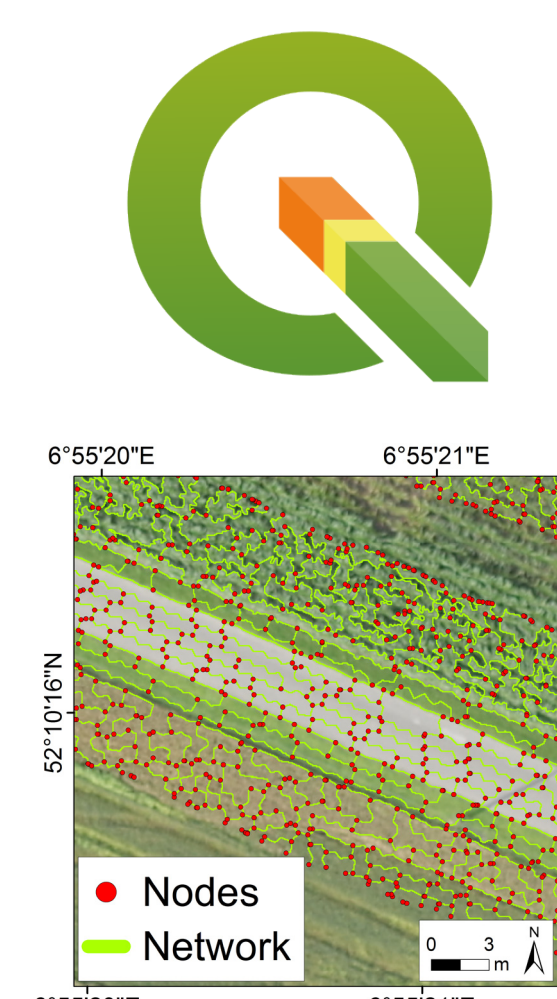
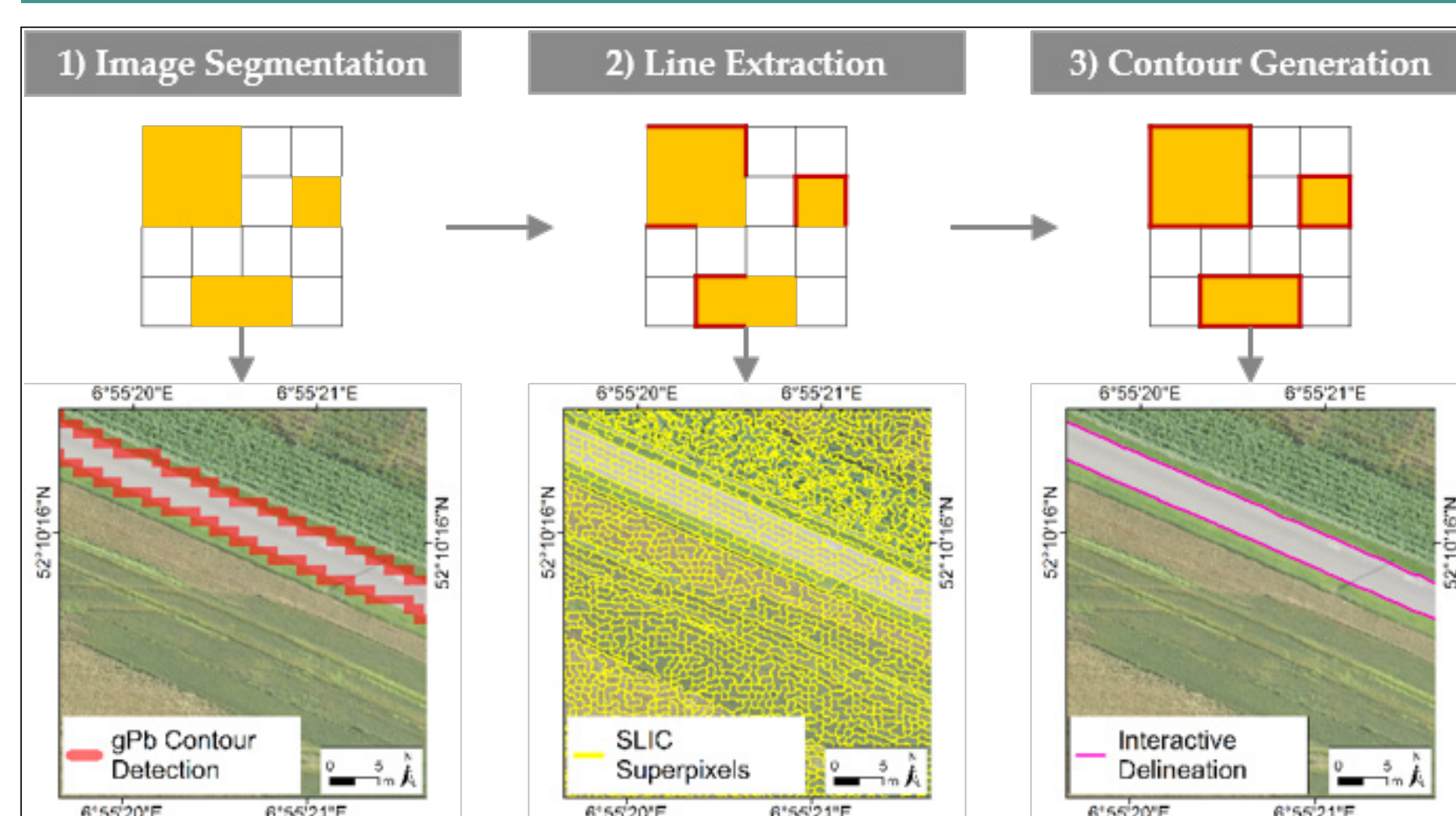
- **Trends:** Unmanned aerial vehicles (UAVs) have gained increasing popularity in remote sensing. Cadastral mapping (capturing the extent, value and owner ship of land) has emerged as field of application for UAVs.
- **Assumption:** Cadastral boundaries are often demarcated by objects that can be extracted automatically with image analysis methods.
- **Research Gap:** UAV-based cadastral mapping is to no extent automated.
- **Goal:** Contribute to recent endeavor of making cadastral mapping more reproducible, transparent, automated, scalable and cost-effective by developing a tool for UAV-based cadastral mapping.

Approach

- Review case studies on (cadastral) mapping based on remotely sensed data and the methods applied to extract features.
- Design hypothetical workflow for automated feature extraction from high-resolution optical data.
- Determine optimal methods for workflow by testing them on UAV datasets in terms of detection quality and localization quality of visible boundaries.
- Design and implement QGIS plugin that combines optimal methods.



Results



Conclusion

- The proposed workflow bears potential to generate a tool for cadastral boundary delineation that is highly automatic, generic and adaptive to different scenarios.
- Methods from computer vision bear potential for solving the described task and are transferable to remote sensing data of high-resolution.
- The approach is most suitable for areas (i) where object contours are clearly visible and coincide with cadastral boundaries and (ii) where concepts such as fit-for-purpose and responsible land administration are accepted or in place.
- Future work will focus of the tool's usability and the integration of user interaction.



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References

- Colomina, I.; Molina, P. Unmanned aerial systems for photogrammetry and remote sensing: A review. ISPRS Journal of Photogrammetry and Remote Sensing 2014, 92, 79-97.
- Crommelinck, S.; Bennett, R.; Gerke, M.; Koeva, M.; Yang, M.Y.; Vosselman, G. SLIC Superpixels for Object Delineation from UAV Data. In: UAV-g, Bonn, Germany, 04-07 September 2017, pp. 1-8.
- Crommelinck, S.; Bennett, R.; Gerke, M.; Nex, F.; Yang, M.; Vosselman, G. Review of automatic feature extraction from high-resolution optical sensor data for UAV-based cadastral mapping. Remote Sensing 2016, 8, 1-28.
- Crommelinck, S.; Bennett, R.; Gerke, M.; Yang, M.; Vosselman, G. Contour detection for UAV-based cadastral mapping. Remote Sensing 2017, 9, 171.

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