MAPPING AND MONITORING SLUMS USING GEOINFORMATION TECHNOLOGIES

THESIS WEBPAGE

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Diploma Thesis

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INTRODUCTION

One of the biggest challenges faced with the huge increase in global urbanization is the irrepressible growth of slums. Within the urban population, over 1 billion people live in slums and the proportion of slum dwellers is expected to grow rapidly in the nearest decades. This research tends to map and monitor slums from imagery using different algorithms and then select the best-performed algorithm with optimal result. It was observed that within the significant number of researches that had been carried out on slum mapping and monitoring using Geographic Information, very few demonstrated comparison of different spatial algorithms hence the motivation for this study.

METHODOLOGY

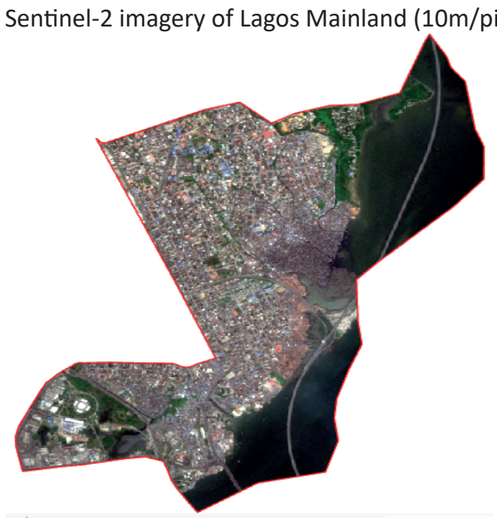
Study Area and Data

Two study areas were chosen for this study:

- Lagos Mainland Local Government Area, Nigeria
- Vila Andrade District, Brazil

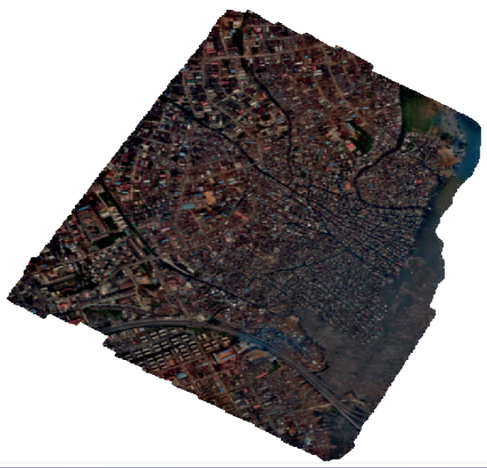
Data used

Sentinel-2 imagery of Lagos Mainland (10m/pixel)



Sentinel-2 imagery of Vila Andrade (10m/pixel)

Drone imagery of Lagos Mainland (4.9cm/pixel)

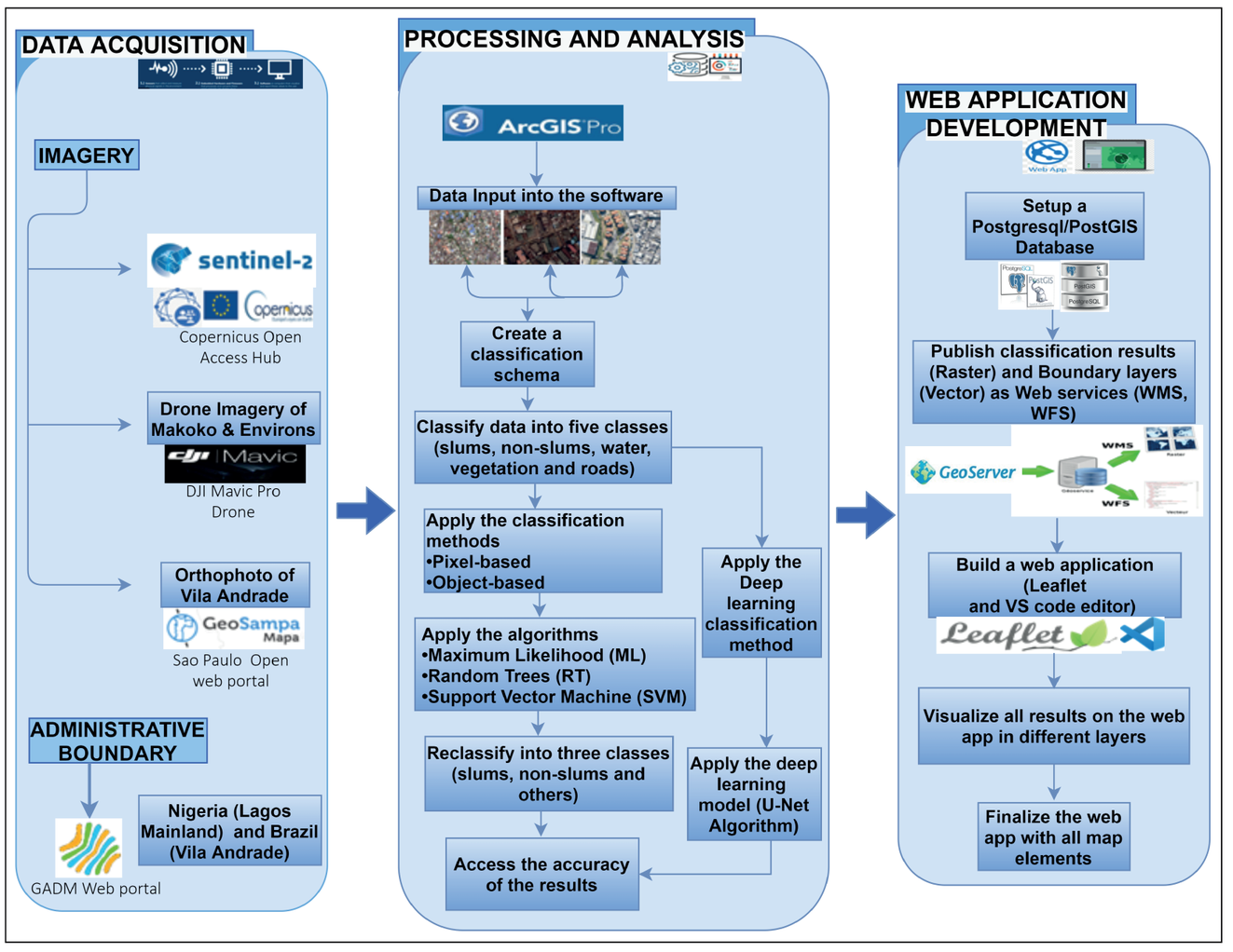


Orthophoto of Vila Andrade (12cm/pixel)

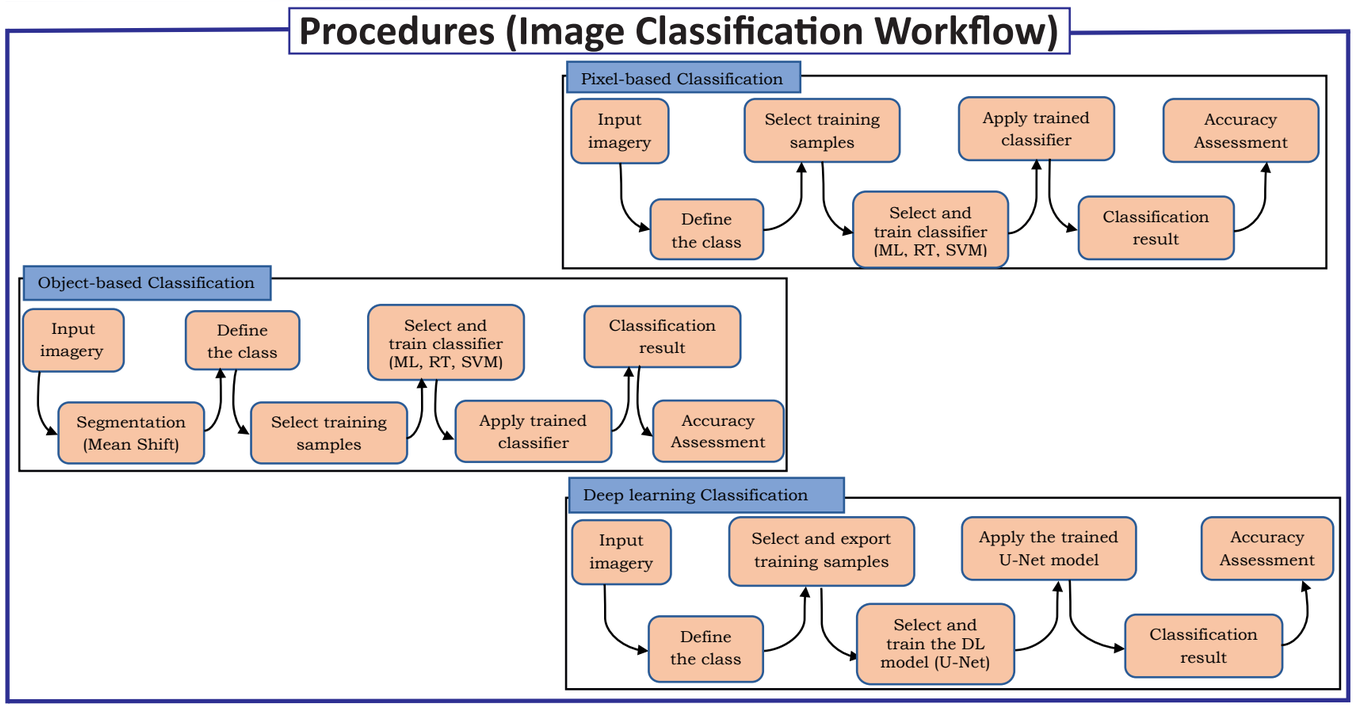
Softwares

- ArcGIS Pro — Processing and Analysis
- PostgreSQL + PostGIS — Spatial Database
- GeoServer — Publishing Web services
- Leaflet — Web App Development
- Visual Studio Code — Code Editor
- Excel — Graphical Representation
- Word — Thesis Documentation

Workflow Diagram

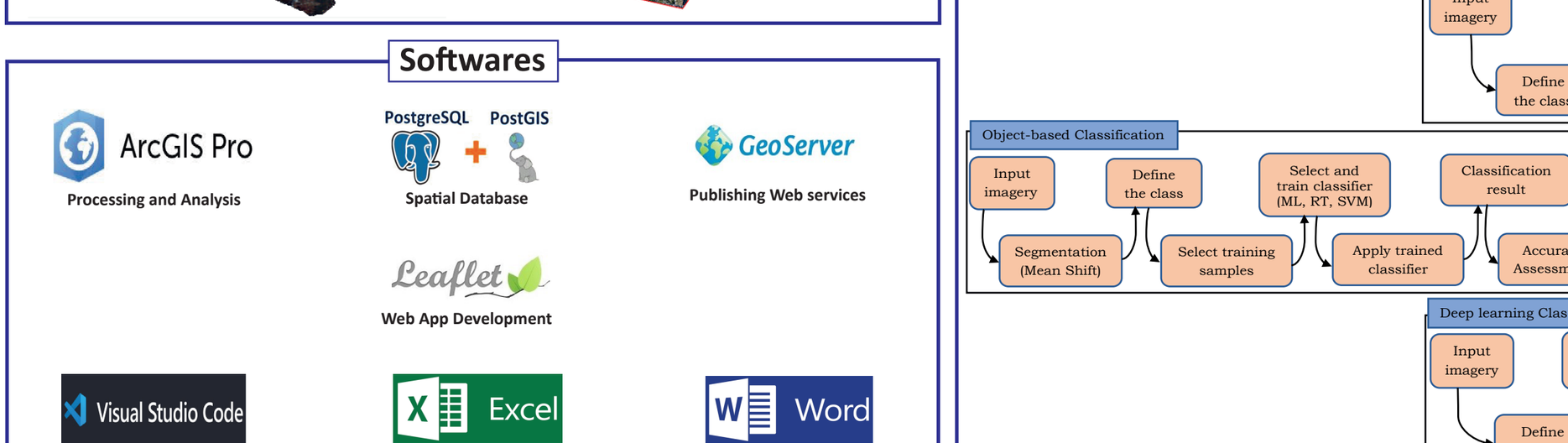


Procedures (Image Classification Workflow)



RESULT AND CONCLUSION

Classification Result



NOTE:
This section shows only the best-performed algorithm (SVM) results. Other algorithms results are accessible via the QR code in the upper part of the poster.

- The pixel-based and object-based Support Vector Machine (SVM) algorithm outperformed other algorithms for all datasets however the object-based SVM performed better with an overall accuracy of 68% over the pixel-based SVM (63.1%).
- The Random Trees (RT) algorithm for both pixel and object-based methods had accuracies of 58.4% and 52.8% respectively followed by the Maximum Likelihood (ML) algorithm with overall accuracies of 49.8% and 38.7% for both methods. The deep learning method (U-Net algorithm) had an overall accuracy of 60%.
- Since slums is a global challenge, this study suggests that slum areas should be added as a global land cover class and be separated from urban areas (buildings) when generating an updated global land cover.

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