

An Urban Morphometrics Approach to Investigate the Quality of Urban Life in Saudi Arabia

Raghad Halawani
University of Strathclyde, Glasgow

INTRODUCTION & AIM

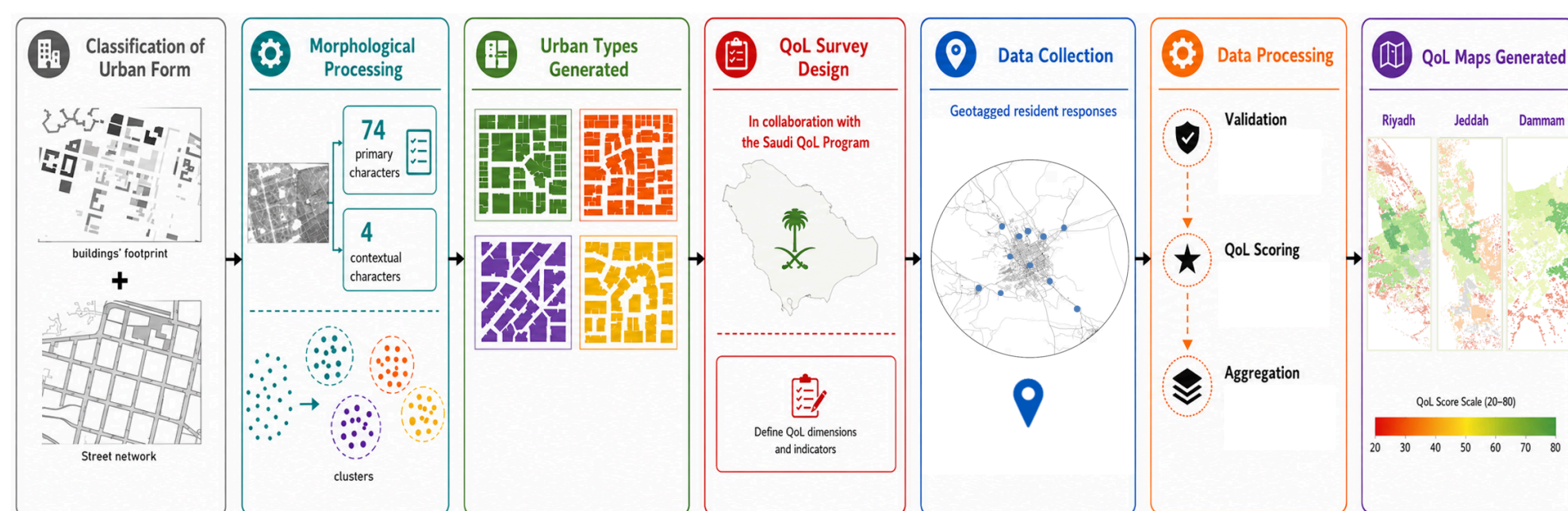
Saudi Arabia has undergone rapid urban transformation, reshaping the form and function of its cities. However, the relationship between these changing urban forms and residents' Quality of Urban Life (QoUL) remains underexplored and insufficiently measured. This study addresses this gap by classifying urban types in Saudi cities and examining how they relate to QoUL outcomes.

Aims

- Classify different UTs in Saudi Arabia through numerical representation.
- Test whether these UTs are related to QoUL outcomes.
- Develop a predictive model for QoUL outcomes.
- Propose approaches to improve the performance of cities.

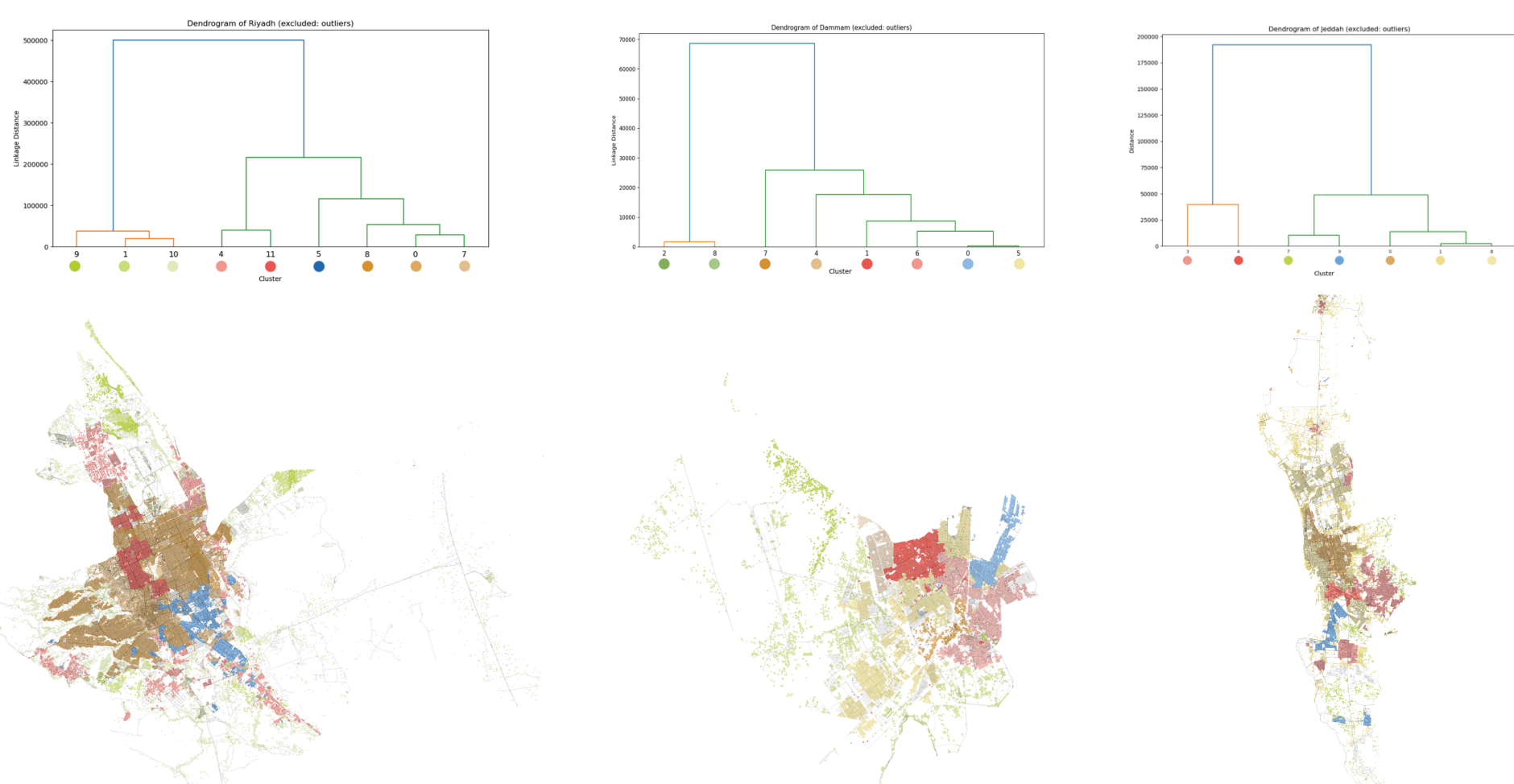
METHOD

First, Building footprints and street networks were processed in momepy to generate tessellation cells, 74 primary attributes, and 296 contextual attributes. Similar cells were then clustered to produce a taxonomy of urban types. After that, collaboration with the Saudi QoL Program, a QoL survey was developed, tested, and distributed across the urban types. Respondents' locations were collected, analysed and aggregated to the tessellation cells. Final QoL scores were mapped across urban types.



RESULTS & DISCUSSION

First, the classification produced a dendrogram for each city after removing the outlier clusters. The dendrograms showed how similar or different the UTs were based on their morphometric attributes. The final UTs were then generated, with each type described through 298 morphometric characteristics.



Dendrograms and spatial distribution of urban types in Riyadh, Dammam, and Jeddah, from left to right. Outlier clusters are excluded from the dendrograms; colours indicate urban type, with blue representing industrial areas.

Second, after linking the survey results to the generated UTs, the findings showed that different UTs were associated with different QoUL outcomes. Each UT therefore had both a morphometric profile and a QoUL profile, as shown below.

Higher-performing urban types

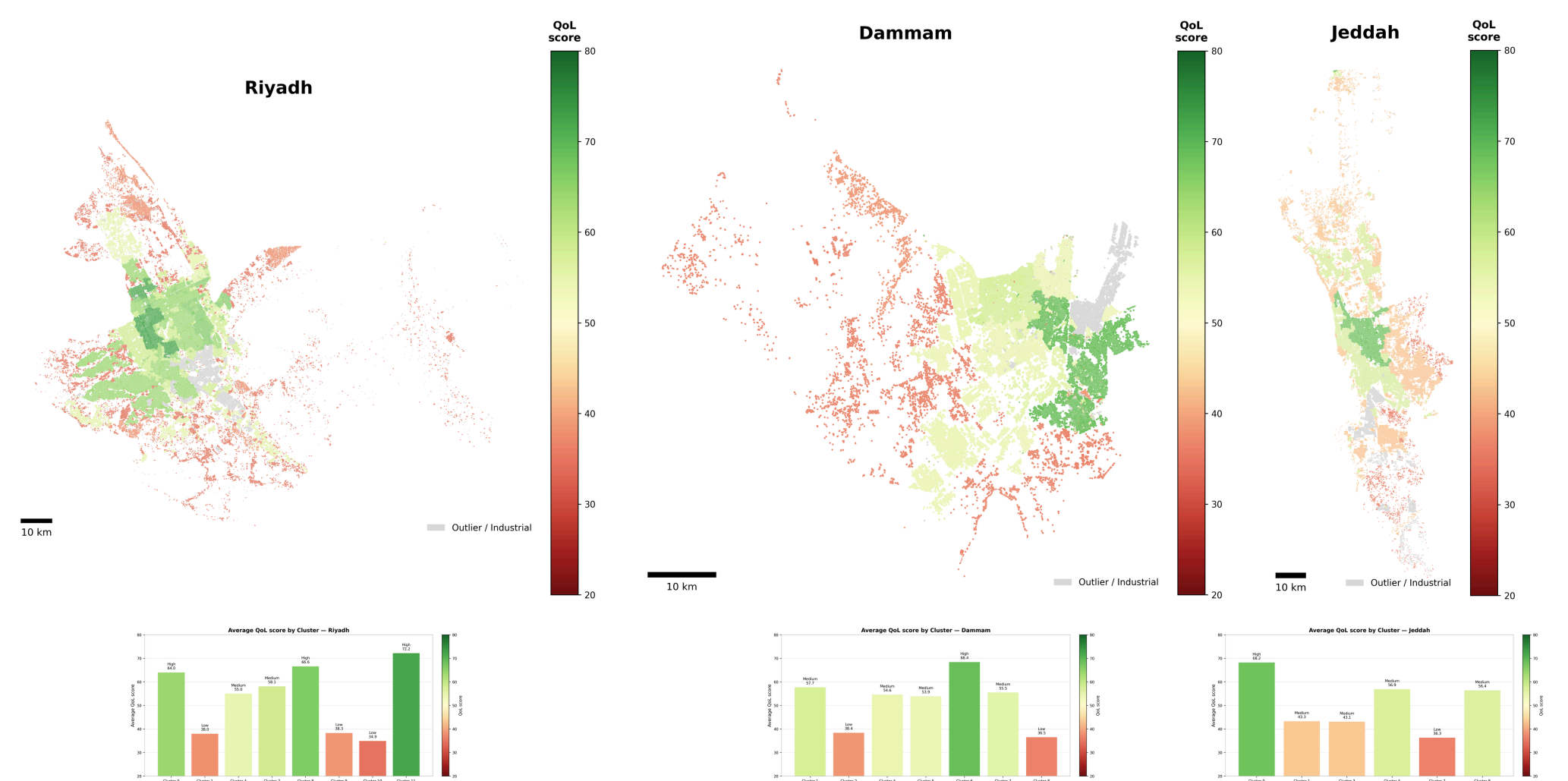
- Finer street grain
- Better local connectivity
- More direct everyday routes

Lower-performing urban types

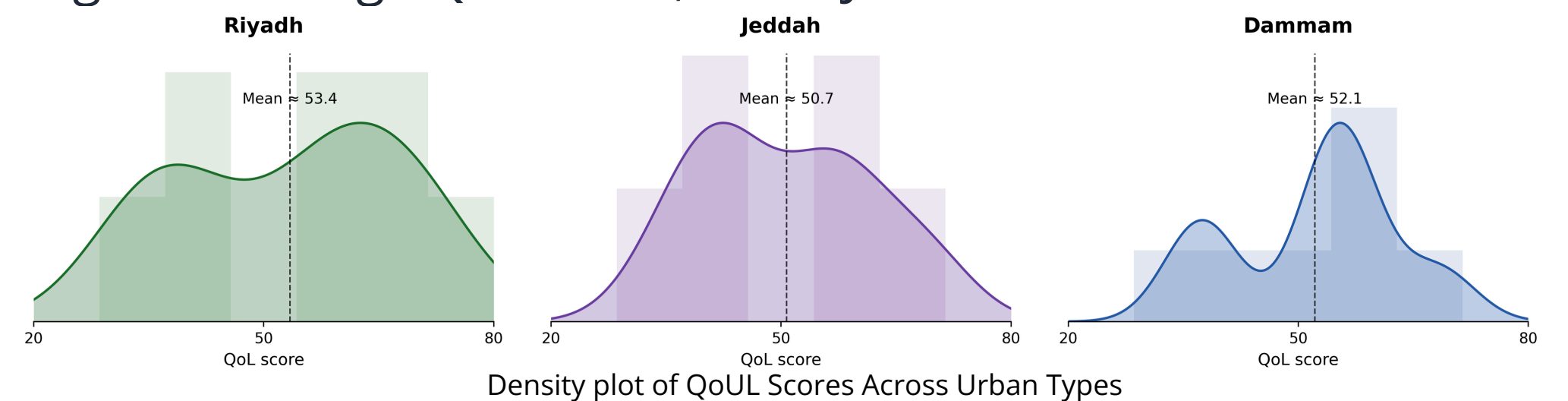
- Large blocks
- Fragmented pedestrian routes
- Indirect access and weak service proximity

A key point is that no single morphometric variable explained QoUL on its own. The research did not show that density alone, height alone, or one feature alone determines better urban life. Instead, the strongest urban environments were those where multiple spatial qualities worked together, including reachability, connectivity, block structure, building form, access to services, and public-realm performance.

Third, QoUL maps and bar charts were generated to show the spatial distribution and average scores of high-, medium-, and low-QoUL Urban Types across each city, as shown below.



Finally, the density plot compares the QoL score distribution for the UTs in the three cities. Each type has a QoL score. The curves show how those scores are spread. Riyadh has the highest average QoL score, while Jeddah has the lowest.



CONCLUSION

The study closes a gap between objective studies of urban morphology and subjective studies of the QoUL in the Saudi context. In addition, it provides an evidence-based tool for identifying morphological conditions that support better everyday urban experience.

FUTURE WORK/REFERENCES

Future researchers could translate the conclusions drawn from this study into something practical, such as urban design guides, and neighbourhood assessment models.

(1) Fleischmann, M. (2019) 'momepy: Urban Morphology Measuring Toolkit'. *Open Source Software*, 4 (43), pp. 1807.