USE OF VERY HIGH RESOLUTION SATELLITE IMAGERY FOR SAMPLING *CARNEGIEA GIGANTEA* (MAGNOLIOPSIDA: *CACTACEAE*)

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INTRODUCTION

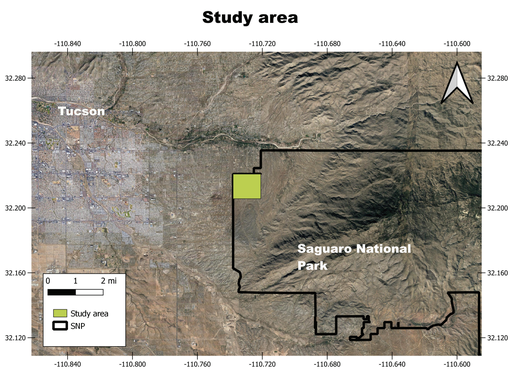
Saguaro is a species of cacti specific to southwest Arizona and Sonora, Mexico. Population studies have been limited to small plots of land, due to the harsh climate of the area, therefore large areas of saguaro have not been studied. This research will help saguaro monitoring research by being able to map saguaro on bigger scale than past efforts have shown. By mapping saguaros using their shadows in satellite images, as in Carter & van Leeuwen (2018), it becomes much less time and labor intensive. Using automated detection provides low investment for large extent censuses.

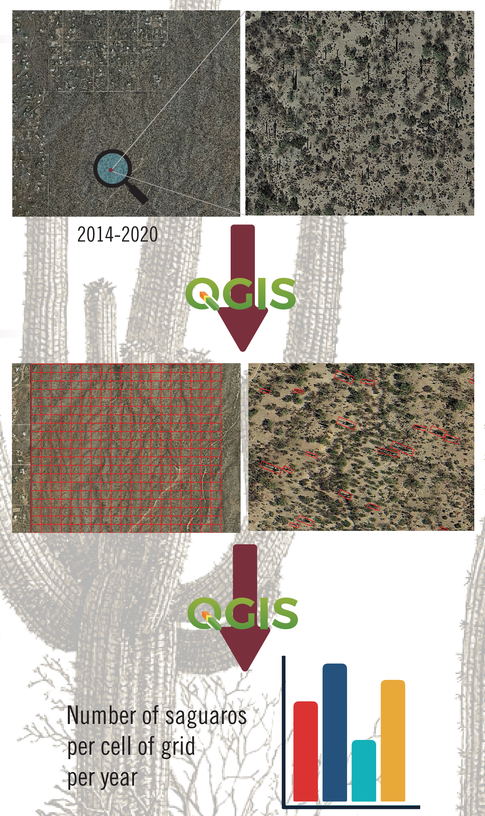
OBJECTIVES

-To process satellite data and identify individuals of *Carnegiea gigantea*.
-To create spatial layers with all identified saguaros, which serve as a training layer for machine learning models.
-To account the number of individuals per cell of the grid.

METHODS

We obtained six high resolution (≈12 inch) satellite images from Saguaro National Park (SNP). Every TIF file was processed using QGIS 3.20 (QGIS.org, 2022), and we created a grid covering the field sampling area in Conver et al. (2013). Every saguaro's shadow was located through visual identification with the help of data from the previous field sampling (Conver et al. 2013). When a shadow is identified, it is wrapped with a rectangle using the *Rectangle by 3 points* tool, and an confidende column was added to the attributes table. Finally, the number of individuals per cell in the grid was calculated, using a centroid calculation and the *Counts points in polygon* tool.





RESULTS & DISCUSSION

Fig. 1

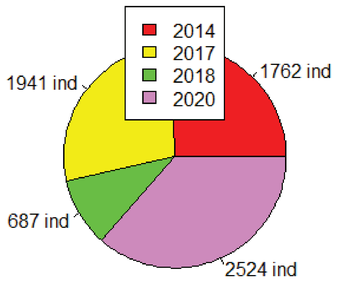
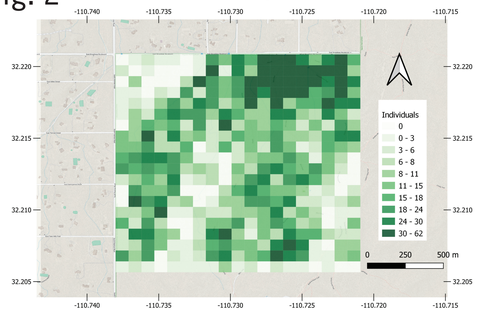


Fig. 2



We created four shapefiles with squares enclosing the shadow of the saguaro. We obtained the account of saguaro (Fig.1). We also obtained a map with the cumulative sum of individuals per cell in our grid (Fig.2).

CONCLUSIONS

The main purpose of this research was to create training layers to improve performance in automatic saguaro detection. This work continues with a long history of saguaro monitoring in SNP (see Carter & van Leeuwen, 2018). The automated shadow detection method is a very valuable tool for many other researchers. On the other hand, the visual identification of shadows by humans is very time-consuming, and it is also prone to identification errors, so an uncertainty column was added to our resulting layers to facilitate interpretation with caution.

REFERENCES

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