

Moon Zoo:

Transforming Citizen Science into Publishable Science

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Moon Zoo is one of several citizen science projects in the Zooniverse. Users review high spatial resolution images from the Lunar Reconnaissance Orbiter Camera's (LROC) Narrow Angle Camera (NAC) in order to identify the locations, diameters, and level of degradation of craters on the Moon. This information is used to address current questions in lunar science and to better inform future Moon missions. Using public data collected from 2010-2015, Bugiolacchi et al. (2016) developed a method to transform raw Moon Zoo data into publication-quality data (i.e. assigning one diameter to one crater with up to fifteen independent citizen measurements).

In this project, I explore the idea of taking citizen science data and transforming it into data that is suitable for scientific endeavors. Citizen science data was collected in the Fall 2016 ASTR101 course using a worksheet added on to the Planetary Surface Features lab; the worksheet asked students to circle prominent craters with the goal to determine the diameter of numerous craters. In the spirit of Bugiolacchi et al. (2016), I use kernel density estimation to produce a single diameter measurement of each crater and explore various ways to filter and/or weight the citizen science data in order to remove low-quality "contaminating" measurements. This study was designed to avoid some of the pitfalls identified in Bugiolacchi et al. (2016) yet inevitably introduced new ones which may be specific to a classroom setting (as opposed to a project with the size and scale of Moon Zoo). Overall, using clustering methods combined with filtering and weighting the raw citizen science data can produce final results which converge with expert analysis.

References

Bugiolacchi, R., Bamford, S., Tar, P., et al. 2016, *Icarus*, 271, 30